IP Addresses and Services Command Reference for Cisco NCS 5500 Series, Cisco NCS 540 Series, and Cisco NCS 560 Series Routers

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Preface

This preface contains these sections:

Changes to This Document

This table lists the technical changes made to this document since it was first published.

Table 1: Changes to this Document

Date	Change Summary
August 2023	Republished for Release 7.10.1.
July 2021	Republished with documentation updates for Cisco IOS XR Release 7.4.1 features.
August 2020	Republished with documentation updates for Cisco IOS XR Release 7.2.1 features.
March 2020	Republished with documentation updates for Cisco IOS XR Release 7.0.2 features.
January 2020	Republished with documentation updates for Cisco IOS XR Release 7.1.1 features.
December 2019	Republished with documentation updates for Cisco IOS XR Release 6.6.3 features.
March 2018	Republished with documentation updates for Cisco IOS XR Release 6.3.2 and 6.4.1 features.
September 2017	Republished with documentation updates for Cisco IOS XR Release 6.3.1 features.
July 2017	Republished with documentation updates for Cisco IOS XR Release 6.2.2 features.

Date	Change Summary
November 2016	Initial release of this document.

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
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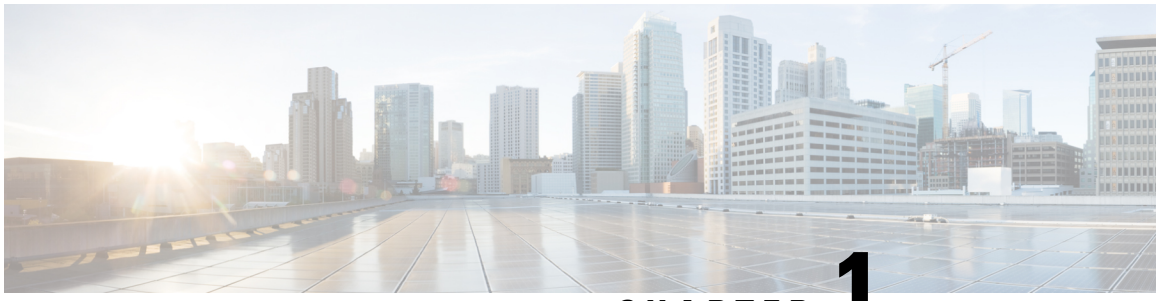
Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.



CHAPTER 1

Access List Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This module describes the Cisco IOS XR software commands used to configure IP Version 4 (IPv4) and IP Version 6 (IPv6) access lists.

For detailed information about ACL concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

acl compress

To load the compression ACL database profile instead of the ACL database profile, use the **acl {ingress | egress} compress enable** option with the **hw-module** command in the global configuration mode.

hw-module profile acl { { **ingress** | **egress** } **compress enable** [**location** *location*] | **egress layer 3** }

Syntax Description

hw-module	Configures the hardware module.
profile	Configures the profile of the hardware module.
acl ingress	Configures the Ingress ACL profile.
acl egress	Configures the egress compress ACL profile. **Note** To enable this option, you must first enable the `acl ingress compress` command on the Cisco NCS-57B1-5DSE and Cisco NCS-57C3-MODS-SYS routers and, NC57-18DD-SE, and NC57-36H-SE line cards.
compress enable	Enables the compression ACL database profile on the line card.
location *location*	Configures the location of the ACL.
egress layer3	Configure the egress compress ACL profile for layer3 (L3) traffic.

Command Default

If you do not configure the **acl ingress compress enable** command, the ACL database profile is loaded by default on the Cisco NCS-57B1-5DSE and Cisco NCS-57C3-MODS-SYS routers and, NC57-18DD-SE, and NC57-36H-SE line cards..

Command History

Release	Modification
Release 7.0.2	This command was introduced for the **acl ingress** compress option.
Release 7.7.1	The **acl egress compress** command was introduced.

Usage Guidelines for acl ingress compress enable Command

The compression ACL database profile is loaded for the Cisco NCS-57B1-5DSE and Cisco NCS-57C3-MODS-SYS routers and, NC57-18DD-SE, and NC57-36H-SE line cards only after you execute the **acl ingress compress enable** command and reboot the line cards.

Usage Guidelines for acl egress compress enable Command

- To enable the **acl egress compress enable** command, you must first enable the `hw-module profile acl ingress compression enable location <location>` command and save your changes. After you've saved your changes for ingress compress and egress compress options, reboot the line card to enable this command.
- This command is not supported on devices that have both Cisco NC57 and Cisco NCS5500 Series line cards installed.
- To enable this command, you must first enable the `hw-module profile acl ingress compression enable location <location>` command, save your changes, and then enable the **acl egress compress** option.
- This feature is not supported on the Cisco NCS 5500 Series Routers.
- This feature is not supported on the Cisco NCS 5700 Series Routers that operate in compatible mode.
- This command is supported on physical interface, physical-subinterface, bundle interface, bundle-subinterface, and on BVIs.
- In case of bundle-ethernet interfaces, all the bundle members must be from the Cisco NC57 line cards.

Table 2: Task ID

Task ID	Operations
configuration	read, write
root-lr	read, write

Examples

The following example shows you how to configure the **acl ingress compress** command:

```
Router# configure
Router(config)# hw-module profile acl ingress compress enable location 0/6/CPU0
Mon Feb  3 09:35:31.640 PST
In order to activate/deactivate Ingress ACL profile, you must manually reload the chassis/line
 card(s).
Router(config)#commit
Mon Feb  3 09:35:35.355 PST
Router#(config)#exit
Router#reload location 0/6/CPU0
Mon Feb  3 09:36:49.892 PST

Proceed with reload?  [confirm] yes
Router#
```

The following example shows you how to configure the **acl egress compress** command:

```
Router# configure
Router(config)# hw-module profile npu native-mode-enable
Router(config)# hw-module profile acl egress compress enable location 0/7/CPU0
Router(config)# hw-module profile acl ingress compress enable location 0/7/CPU0
Router(config)#commit
```

```
Router#(config)#exit
Router#
```

acl egress layer3 interface-based

To enable a Layer3 ACL over BVI interfaces in the egress direction, use the **acl egress layer3 interface-based** command in the global configuration mode.

hw-module profile acl egress layer3 interface-based

Syntax Description This command has no keywords or arguments.

Command Default None

Command Modes XR Configuration

Command History

Release	Modification
Release 7.3.1	This command was introduced.

Usage Guidelines Once this profile is enabled, egress ACL will not work on any non-BVI interface.

For this configuration to take effect, you must reload all line cards on the system.

Table 3: Task ID

Task ID	Operations
configuration	read, write
root-lr	read, write

Examples

The following example shows you how to enable a Layer3 ACL over BVI interfaces in the egress direction.

```
Router# configure
Router(config)# hw-module profile acl egress layer3 interface-based
Router(config)# commit
```

acl-permit

To get the permitted statistics of the routing traffic that are allowed by an ACL, use the **acl-permit** command. Statistics of the routing sessions that are not allowed by an ACL are enabled by default.

hw-module profile stats acl-permit
no hw-module profile stats acl-permit

Syntax Description

hw-module	Configures the hardware module.
profile	Configures the profile of the hardware module.
stats	Configures the statistics profile.
acl-permit	Enables the statistics of the routing traffic that are permitted by an ACL.

Command Default

If you do not configure the **acl-permit** command, the statistics for the routing traffic permitted by an ACL are not enabled.

Command History

Release	Modification
Release 6.2.1	This command was introduced.

Usage Guidelines

- The permit statistics of the routing traffic allowed by an ACL are available only for NCS 5500 routers after you execute the **acl-permit** command and reboot the line cards.
- QoS stats are not supported (disabled) when acl-permit stats are enabled.
- You need not configure this command for NC57-24DD and NC57-18DD-SE line cards because both the permitted and denied statistics of the routing traffic that are allowed by an ACL are available by default for these line cards.

Table 4: Task ID

Task ID	Operations
configuration	read, write
root-lr	read, write

Examples

The following example shows you how to configure the acl-permit command:

```
Router# configure
Router(config)# hw-module profile stats acl-permit
Tuw Aug  14 15:31:47.505 UTC
In order to activate/deactivate this stats profile, you must manually reload the chassis/all
 line cards
Router(config)# commit
Tue Aug 14 15:31:50.103 UTC
LC/0/4/CPU0:Aug 14 15:31:50.218 UTC: fia_driver[245]:
%FABRIC-FIA_DRVR-4-STATS_HW_PROFILE_MISMATCH : Mismatch found, reload LC to activate the
new stats profile
Router(config)#
```

acl ipv6 ext-header

To permit the IPV6 extension header packets, use the **acl IPv6 ext-header** command.

hw-module profile acl ipv6 ext-header permit

no hw-module profile acl ipv6 ext-header permit

Syntax Description

hw-module	Configures the hardware module.
profile	Configures the profile of the hardware module.
acl	Configures the ACL profile.
ipv6	Configures the IPv6 protocol.
ext-header	Configures the IPv6 extension header.
permit	Permits the IPv6 extension header packets.

Command Default

By default, the control plane CPU filters the packets and applies security ACLs, when the following IPv6 extensions headers are included:

- Hop-by-Hop
- Destination-Options
- Routing
- Fragment
- Mobility
- Host-Identity

Filtering of the packets in control plane CPU reduces the packet rate to 100 packets/sec and later leads to packet drop.

Command History

Release	Modification
Release 6.6.3	This command was introduced.

Usage Guidelines

Use this command, if you don’t want to filter packets with extension headers and process the packets at line rate. This command allows you to permit all the packets with extension headers and bypass security ACLs.

Table 5: Task ID

Task ID	Operations
configuration	read, write
root-lr	read, write

Examples

The following example shows you how to configure the **ext-header permit** command:

```
Router# configure
Router(config)# hw-module profile acl IPv6 ext-header permit
Router(config)# commit
```

acl-prefix percent

To allocate a certain percentage of external TCAM of the NC55-24x100G-SE and NC55-24H12F-SE line cards for use by a compressed ACL, use the **acl-prefix percent** command.

Note You need not configure this command to support ACL with compression on NC57-24DD and NC57-18DD-SE line cards.

hw-module profile tcam acl-prefix percent percent *value*
no hw-module profile tcam acl-prefix percent percent *value*

Syntax Description

hw-module	Configures the hardware module.
profile	Configures the profile of the hardware module.
tcam	Configures the profile for TCAM LC cards.
acl-prefix	Configures the ACL table.
percent	Configures the percentage of TCAM on the LCs that will be used by a compressed ACL.
value	Configures the value of the percentage.

Command Default

None

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

After you execute this command, you must reboot the LCs.

Table 6: Task ID

Task ID	Operations
configuration	read, write
root-lr	read, write

Examples

The following example shows you how to configure the **acl-prefix percent** command:

```
Router# configure
Router(config)# hw-module profile tcam acl-prefix percent 30
Router(config)# commit
Thu Aug  9 13:07:41.401 UTC
LC/0/4/CPU0:Aug  9 13:07:41.539 UTC: fia_driver[209]:
%FABRIC-FIA_DRVR-3-ERR_HW_PROFILE_SOC_PROPERTY_MISMATCH : Mismatch found, reload LC to get
 the most recent config updated
Router(config)#
```

clear access-list ipv4

To clear IPv4 access list counters, use the **clear access-list ipv4** command in XR EXEC mode.

clear access-list ipv4 *access-list name* [{*sequence-number* | **ingress**}] [{**location** *node-id* | **sequence** *number*}]

Syntax Description

access-list-name	Name of a particular IPv4 access list. The name cannot contain a spaces or quotation marks, but can include numbers.
sequence-number	(Optional) Specific sequence number with which counters are cleared for an access list. Range is 1 to 2147483644.
ingress	Specifies an inbound direction.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location *node-id*	(Optional) Clears hardware resource counters from the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

sequence *number*	(Optional) Clears counters for an access list with a specific sequence number. Range is 1 to 2147483644.

Command Default

The default clears the specified IPv4 access list.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **clear access-list ipv4** command to clear counters for a specified configured access list. Use a sequence number to clear counters for an access list with a specific sequence number.

Use an asterisk (***)** in place of the *access-list-name* argument to clear all access lists.

Task ID

Task ID	Operations
basic-services	read, write
acl	read, write
bgp	read, write, execute

Examples

In the following example, counters for an access list named *marketing* are cleared:

```
RP/0/RP0/CPU0:router# show access-lists ipv4 marketing

ipv4 access-list marketing
  10 permit ip 192.168.34.0 0.0.0.255
  20 permit ip 172.16.0.0 0.0.255.255
  30 deny tcp host 172.16.0.0 eq bgp host 192.168.202.203 30

RP/0/RP0/CPU0:router# clear access-list ipv4 marketing

RP/0/RP0/CPU0:router# show access-lists ipv4 marketing

ipv4 access-list marketing
  10 permit ip 192.168.34.0 0.0.0.255 any
  20 permit ip 172.16.0.0 0.0.255.255 any
  30 deny tcp host 172.16.0.0 eq bgp host 192.168.202.203 30
```

clear access-list ipv6

To clear IPv6 access list counters, use the **clear access-list ipv6** command in .

clear access-list ipv6 *access-list-name* [{*sequence-number* | **ingress**}] [{**location** *node-id* | **sequence** *number*}]

Syntax Description

access-list-name	Name of a particular IPv6 access list. The name cannot contain a spaces or quotation marks, but can include numbers.
sequence-number	(Optional) Specific sequence number for a particular access control entry (ACE) with which counters are cleared for an access list. Range is 1 to 2147483644.
ingress	(Optional) Specifies an inbound direction.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
instance *interface-path-id*	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location *node-id*	(Optional) Clears counters for an access list enabled on a card interface. The *node-id* argument is entered in the rack/slot/module notation.
sequence *number*	(Optional) Specifies a specific sequence number that clears access list counters. Range is 1 to 2147483644.

Command Default

The default clears the specified IPv6 access list.

Command Modes

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **clear access-list ipv6** command is similar to the **clear access-list ipv4** command, except that it is IPv6-specific.

Use the **clear access-list ipv6** command to clear counters for a specified configured access list. Use a sequence number to clear counters for an access list with a specific sequence number

Use an asterisk (*****) in place of the *access-list-name* argument to clear all access lists.

Task ID

Task ID	Operations
basic-services	read, write
acl	read, write
network	read, write

Examples

In the following example, counters for an access list named *marketing* are cleared:

```
RP/0/# show access-lists ipv6 marketing
ipv6 access-list marketing
  10 permit ipv6 3333:1:2:3::/64 any
  20 permit ipv6 4444:1:2:3::/64 any
  30 permit ipv6 5555:1:2:3::/64 any
RP/0/# clear access-list ipv6 marketing
RP/0/# show access-lists ipv6 marketing
ipv6 access-list marketing
  10 permit ipv6 3333:1:2:3::/64 any
  20 permit ipv6 4444:1:2:3::/64 any
  30 permit ipv6 5555:1:2:3::/64 any
```

common-acl

To enable IPv4 or IPv6 common ACLs in an ingress direction on the TCAM of a router, use the **common-acl** option with the **hw-module** command in the XR Config modeglobal configuration mode.

hw-module profile tcam format access-list { **ipv4** | **ipv6** } **common-acl**

Syntax Description

common-acl	Enables you to configure common ACLs.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.0.1	The command was introduced.

Usage Guidelines

A reboot of the line card is required after entering the **hw-module profile** command to activate the command.

Configuring Common ACLs for IPv4 and IPv6 ACLs Using User-Defined TCAM Keys

Enable the use of common ACL when IPv4 and IPv6 User-Defined TCAM Keys are used instead of the default TCAM Keys. The following configuration describes how you can enable a common ACL in the IPv4 UDK.

```
/* Configure a common IPv4 acl, common-1, in the global configuration mode by using the
hw-module command */
Router(config)# hw-module profile tcam format access-list ipv4 src-addr dst-addr src-port
dst-port proto tcp-flags frag-bit common-acl location 0/7/CPU0
```

The following configuration describes how you can enable a common ACL in the IPv6 UDK.

```
/* Configure a common IPv6 acl, common-1, in the global configuration mode by using the
hw-module command */
```

```
Router(config)# hw-module profile tcam format access-list ipv6 src-addr src-port dst-addr
next-hdr tcp-flags payload-length common-acl location 0/7/CPU0
```

copy access-list ipv4

To create a copy of an existing IPv4 access list, use the **copy access-list ipv4** command in XR EXEC mode.

copy access-list ipv4 *source-acl destination-acl*

Syntax Description

source-acl	Name of the access list to be copied.
destination-acl	Name of the destination access list where the contents of the *source-acl* argument is copied.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **copy access-list ipv4** command to copy a configured access list. Use the *source-acl* argument to specify the access list to be copied and the *destination-acl* argument to specify where to copy the contents of the source access list. The *destination-acl* argument must be a unique name; if the *destination-acl* argument name exists for an access list or prefix list, the access list is not copied. The **copy access-list ipv4** command checks that the source access list exists then checks the existing list names to prevent overwriting existing access lists or prefix lists.

Task ID

Task ID	Operations
acl	read, write
filesystem	execute

Examples

In the following example, a copy of access list list-1 is created:

```
RP/0/RP0/CPU0:router# show access-lists ipv4 list-1

ipv4 access-list list-1
  10 permit tcp any any log
  20 permit ip any any
RP/0/RP0/CPU0:router# copy access-list ipv4 list-1 list-2
RP/0/RP0/CPU0:router# show access-lists ipv4 list-2
ipv4 access-list list-2
  10 permit tcp any any log
  20 permit ip any any
```

In the following example, copying the access list list-1 to list-3 is denied because a list-3 access list already exists:

```
RP/0/RP0/CPU0:router# copy access-list ipv4 list-1 list-3

list-3 exists in access-list

RP/0/RP0/CPU0:router# show access-lists ipv4 list-3

ipv4 access-list list-3
  10 permit ip any any
  20 deny tcp any any log
```

copy access-list ipv6

To create a copy of an existing IPv6 access list, use the **copy access-list ipv6** command in .

copy access-list ipv6 *source-acl destination-acl*

Syntax Description

source-acl	Name of the access list to be copied.
destination-acl	Destination access list where the contents of the *source-acl* argument is copied.

Command Default

No default behavior or value

Command Modes

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **copy access-list ipv6** command to copy a configured access list. Use the *source-acl* argument to specify the access list to be copied and the *destination-acl* argument to specify where to copy the contents of the source access list. The *destination-acl* argument must be a unique name; if the *destination-acl* argument name exists for an access list or prefix list, the access list is not copied. The **copy access-list ipv6** command checks that the source access list exists then checks the existing list names to prevent overwriting existing access lists or prefix lists.

Task ID

Task ID	Operations
acl	read, write
filesystem	execute

Examples

In this example, a copy of access list list-1 is created:

```
RP/0/# show access-lists ipv6 list-1

ipv6 access-list list-1
  10 permit tcp any any log
  20 permit ipv6 any any

RP/0/# copy access-list ipv6 list-1 list-2

RP/0/# show access-lists ipv6 list-2

ipv6 access-list list-2
  10 permit tcp any any log
  20 permit ipv6 any any
```

In this example, copying access list list-1 to list-3 is denied because a list-3 access list already exists:

```
RP/0/# copy access-list ipv6 list-1 list-3

list-3 exists in access-list

RP/0/# show access-lists ipv6 list-3
ipv6 access-list list-3
  10 permit ipv6 any any
  20 deny tcp any any log
```

deny (IPv4)

To set conditions for an IPv4 access list, use the **deny** command in access list configuration mode. There are two versions of the **deny** command: **deny** (source), and **deny** (protocol). To remove a condition from an access list, use the **no** form of this command.

[*sequence-number*] **deny** *source* [*source-wildcard*] **counter** *counter-name* [{ **log** | **log-input** }]
[*sequence-number*] **deny** *protocol source source-wildcard destination destination-wildcard* [**precedence** *precedence*] [**dscp** *dscp*] [**fragments**] [*packet-length operator packet-length value*] [**log** | **log-input**] [**ttl** *ttl value* [*value1....value2*]] [**counter** *counter-name*]
no *sequence-number*

Internet Control Message Protocol (ICMP)
[*sequence-number*] **deny icmp** *source source-wildcard destination destination-wildcard* [*icmp-type*] [*icmp-code*] [**precedence** *precedence*] [**dscp** *dscp*] [**fragments**] [{ **log** | **log-input** }] [**counter** *counter-name*] [**icmp-off**]

Internet Group Management Protocol (IGMP)
[*sequence-number*] **deny igmp** *source source-wildcard destination destination-wildcard* [*igmp-type*] [**precedence** *precedence*] [**dscp** *value*] [**fragments**] [{ **log** | **log-input** }] [**counter** *counter-name*]

User Datagram Protocol (UDP)

[*sequence-number*] **deny udp** *source source-wildcard* [*operator* { *port protocol-port* }] *destination destination-wildcard* [*operator* { *port protocol-port* }] [**precedence** *precedence*] [**dscp** *dscp*] [**fragments**] [{ **log** | **log-input** }] [**counter** *counter-name*]

Syntax Description

sequence-number	(Optional) Number of the **deny** statement in the access list. This number determines the order of the statements in the access list. The number can be from 1 to 2147483644. (By default, the first statement is number 10, and the subsequent statements are incremented by 10.)
source	Number of the network or host from which the packet is being sent. There are three alternative ways to specify the source: • Use a 32-bit quantity in four-part dotted-decimal format. • Use the **any** keyword as an abbreviation for a *source* and *source-wildcard* of 0.0.0.0 255.255.255.255. • Use the **host** *source* combination as an abbreviation for a *source* and *source-wildcard* of *source* 0.0.0.0.
source-wildcard	Wildcard bits to be applied to the source. There are three alternative ways to specify the source wildcard: • Use a 32-bit quantity in four-part dotted-decimal format. Place ones in the bit positions you want to ignore. • Use the **any** keyword as an abbreviation for a *source* and *source-wildcard* of 0.0.0.0 255.255.255.255. • Use the **host** *source* combination as an abbreviation for a *source* and *source-wildcard* of *source* 0.0.0.0.
protocol	Name or number of an IP protocol. It can be one of the keywords **ahp** , **esp** , **gre** , **icmp** , **igmp** , **igrp** , **ip** , **ipinip** , **nos** , **ospf** , **pim** , **pcp** , **tcp** , or **udp** , or an integer from 0 to 255 representing an IP protocol number. To match any Internet protocol (including ICMP, TCP, and UDP), use the **ip** keyword. ICMP, and TCP allow further qualifiers, which are described later in this table. **Note** Filtering on AHP protocol is not supported.
destination	Number of the network or host to which the packet is being sent. There are three alternative ways to specify the destination: • Use a 32-bit quantity in four-part dotted-decimal format. • Use the **any** keyword as an abbreviation for the *destination* and *destination-wildcard* of 0.0.0.0 255.255.255.255. • Use the **host** *destination* combination as an abbreviation for a *destination* and *destination-wildcard* of *destination* 0.0.0.0.

destination-wildcard	Wildcard bits to be applied to the destination. There are three alternative ways to specify the destination wildcard: • Use a 32-bit quantity in four-part dotted-decimal format. Place ones in the bit positions you want to ignore. • Use the **any** keyword as an abbreviation for a *destination* and *destination-wildcard* of 0.0.0.0 255.255.255.255. • Use the **host** *destination* combination as an abbreviation for a *destination* and *destination-wildcard* of *destination* 0.0.0.0.
precedence *precedence*	(Optional) Packets can be filtered by precedence level (as specified by a number from 0 to 7) or by the following names: • **routine** —Match packets with routine precedence (0) • **priority** —Match packets with priority precedence (1) • **immediate** —Match packets with immediate precedence (2) • **flash** —Match packets with flash precedence (3) • **flash-override** —Match packets with flash override precedence (4) • **critical** —Match packets with critical precedence (5) • **internet** —Match packets with internetwork control precedence (6) • **network** —Match packets with network control precedence (7)

dscp *dscp*	(Optional) Differentiated services code point (DSCP) provides quality of service control. The values for *dscp* are as follows: • **0**–**63**–Differentiated services codepoint value • **af11**—Match packets with AF11 dscp (001010) • **af12**—Match packets with AF12 dscp (001100) • **af13**—Match packets with AF13 dscp (001110) • **af21**—Match packets with AF21 dscp (010010) • **af22**—Match packets with AF22 dscp (010100) • **af23**—Match packets with AF23 dscp (010110) • **af31**—Match packets with AF31 dscp (011010) • **af32**—Match packets with AF32 dscp (011100) • **af33**—Match packets with AF33 dscp (011110) • **af41**—Match packets with AF41 dscp (100010) • **af42**—Match packets with AF42 dscp (100100) • **af43**—Match packets with AF43 dscp (100110) • **cs1**—Match packets with CS1 (precedence 1) dscp (001000) • **cs2**—Match packets with CS2 (precedence 2) dscp (010000) • **cs3**—Match packets with CS3 (precedence 3) dscp (011000) • **cs4**—Match packets with CS4 (precedence 4) dscp (100000) • **cs5**—Match packets with CS5 (precedence 5) dscp (101000) • **cs6**—Match packets with CS6 (precedence 6) dscp (110000) • **cs7**—Match packets with CS7 (precedence 7) dscp (111000) • **default**—Default DSCP (000000) • **ef**—Match packets with EF dscp (101110)
fragments	(Optional) Causes the software to examine fragments of IPv4 packets when applying this access list entry. When this keyword is specified, fragments are subject to the access list entry.

log	(Optional) Causes an informational logging message about the packet that matches the entry to be sent to the console. (The level of messages logged to the console is controlled by the **logging console** command.) The message includes the access list number, whether the packet was permitted or denied; the protocol, whether it was TCP, UDP, ICMP, or a number; and, if appropriate, the source and destination addresses and source and destination port numbers. The message is generated for the first packet that matches a flow, and then at 5-minute intervals, including the number of packets permitted or denied in the prior 5-minute interval.
log-input	(Optional) Provides the same function as the **log** keyword, except that the log-message also includes the input interface.
ttl value [*value1*. . *value2*[	(Optional) TTL value used for filtering. Range is 1 to 255. If only *value* is specified, the match is against this value. If both *value1* and *value2* are specified, the packet TTL is matched against the range of TTLs between *value1* and *value2* .
icmp-off	(Optional) Turns off ICMP generation for denied packets.
icmp-type	(Optional) ICMP message type for filtering ICMP packets. Range is from 0 to 255.
icmp-code	(Optional) ICMP message code for filtering ICMP packets. Range is from 0 to 255.
igmp-type	(Optional) IGMP message type (0 to 15) or message name for filtering IGMP packets, as follows: • dvmrp • host-query • host-report • mtrace • mtrace-response • pim • precedence • trace • v2-leave • v2-report • v3-report

operator	(Optional) Operator is used to compare source or destination ports. Possible operands are **lt** (less than), **gt** (greater than), **eq** (equal), **neq** (not equal), and **range** (inclusive range). If the operator is positioned after the *source* and *source-wildcard* values, it must match the source port. If the operator is positioned after the *destination* and *destination-wildcard* values, it must match the destination port. If the operator is positioned after the **ttl** keyword, it matches the TTL value. The **range** operator requires two port numbers. All other operators require one port number.
port	Decimal number of a TCP or UDP port. A port number is a number from 0 to 65535. TCP ports can be used only when filtering TCP. UDP ports can be used only when filtering UDP.
protocol-port	Name of a TCP or UDP port. TCP and UDP port names are listed in the "Usage Guidelines" section. TCP port names can be used only when filtering TCP. UDP port names can be used only when filtering UDP.
established	(Optional) For the TCP protocol only: Indicates an established connection.
match-any	(Optional) For the TCP protocol only: Filters on any combination of TCP flags.
match-all	(Optional) For the TCP protocol only: Filters on all TCP flags.
+ | -	(Required) For the TCP protocol **match-any** , **match-all** : Prefix *flag-name* with **+** or **-** . Use the **+** *flag-name* argument to match packets with the TCP flag set. Use the **-** *flag-name* argument to match packets when the TCP flag is not set.
flag-name	(Optional) For the TCP protocol **match-any** , **match-all** . Flag names are: **ack** , **fin** , **psh** , **rst** , **syn** , **urg**.
counter	(Optional) Enables accessing ACL counters using SNMP query.
counter-name	Defines an ACL counter name.

Command Default

There is no specific condition under which a packet is denied passing the IPv4 access list.

ICMP message generation is enabled by default.

Command Modes

IPv4 access list configuration

Command History

Release	Modification
Release 7.6.1	The **log-input** option was introduced.
Release 6.0	This command was introduced.

Usage Guidelines

Use the **deny** command following the **ipv4 access-list** command to specify conditions under which a packet cannot pass the access list.

By default, the first statement in an access list is number 10, and the subsequent statements are incremented by 10.

You can add **permit**, **deny**, or **remark** statements to an existing access list without retyping the entire list. To add a new statement anywhere other than at the end of the list, create a new statement with an appropriate entry number that falls between two existing entry numbers to indicate where it belongs.

The following is a list of precedence names:

- critical
- flash
- flash-override
- immediate
- internet
- network
- priority
- routine

The following is a list of ICMP message type names:

- administratively-prohibited
- alternate-address
- conversion-error
- dod-host-prohibited
- dod-net-prohibited
- echo
- echo-reply
- general-parameter-problem
- host-isolated
- host-precedence-unreachable
- host-redirect
- host-tos-redirect
- host-tos-unreachable
- host-unknown
- host-unreachable
- information-reply

- information-request
- mask-reply
- mask-request
- mobile-redirect
- net-redirect
- net-tos-redirect
- net-tos-unreachable
- net-unreachable
- network-unknown
- no-room-for-option
- option-missing
- packet-too-big
- parameter-problem
- port-unreachable
- precedence-unreachable
- protocol-unreachable
- reassembly-timeout
- redirect
- router-advertisement
- router-solicitation
- source-quench
- source-route-failed
- time-exceeded
- timestamp-reply
- timestamp-request
- traceroute
- ttl-exceeded
- unreachable

The following is a list of TCP port names that can be used instead of port numbers. Refer to the current *Assigned Numbers* RFC to find a reference to these protocols. You can find port numbers corresponding to these protocols by typing a ? in the place of a port number.

- bgp

- chargen
- cmd
- daytime
- discard
- domain
- echo
- exec
- finger
- ftp
- ftp-data
- gopher
- hostname
- ident
- irc
- klogin
- kshell
- login
- lpd
- nntp
- pim-auto-rp
- pop2
- pop3
- smtp
- sunrpc
- tacacs
- talk
- telnet
- time
- uucp
- whois
- www

The following UDP port names can be used instead of port numbers. Refer to the current *Assigned Numbers* RFC to find a reference to these protocols. You can find port numbers corresponding to these protocols by typing a ? in the place of a port number.

- biff
- bootpc
- bootps
- discard
- dnsix
- domain
- echo
- isakmp
- mobile-ip
- nameserver
- netbios-dgm
- netbios-ns
- netbios-ss
- ntp
- pim-auto-rp
- rip
- snmp
- snmptrap
- sunrpc
- syslog
- tacacs
- talk
- tftp
- time
- who
- xdmcp

Use the following flags in conjunction with the **match-any** and **match-all** keywords and the + and - signs to select the flags to display:

- ack
- fin

- psh
- rst
- syn

For example, **match-all** + *ack* + *syn* displays TCP packets with both the ack *and* syn flags set, or **match-any** + *ack* - *syn* displays the TCP packets with the ack set *or* the syn not set.

Note If any ACE in an ACL contains ABF clause, this ACL cannot be applied at any non-zero compression level.

Task ID

Task ID	Operations
ipv4	read, write
acl	read, write

Examples

This example shows how to set a deny condition for an access list named Internet filter:

```
Router(config)# ipv4 access-list Internetfilter
Router(config-ipv4-acl)# 10 deny 192.168.34.0 0.0.0.255
Router(config-ipv4-acl)# 20 deny 172.16.0.0 0.0.255.255
Router(config-ipv4-acl)# 25 deny tcp host 172.16.0.0 eq bgp host 192.168.202.203 range 1300
 1400
Router(config-ipv4-acl)# permit 10.0.0.0 0.255.255.255
```

deny (IPv6)

To set deny conditions for an IPv6 access list, use the **deny** command in IPv6 access list configuration mode. To remove the deny conditions, use the **no** form of this command.

[sequence-number] **deny** *protocol* { *source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address ipv6-wildcard-mask/ prefix-length* } [*operator* { *port* | *protocol-port* }] [**dscp** *value*] [**routing**] [**hop-by-hop**] [**authen**] [**destopts**] [**fragments**] [*packet-length operator packet-length value*] [**log** | **log-input**] [**ttl** *operator ttl value*] [**icmp-off**]
no *sequence-number*

Internet Control Message Protocol (ICMP)
*[sequence-number]***deny icmp** {*source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address ipv6-wildcard-mask/ prefix-length*} {*destination-ipv6-prefix/ prefix-length* | *any* | *host destination-ipv6-address ipv6-wildcard-mask/ prefix-length*} [*icmp-type*] [*icmp-code*] [**dscp** *value*] [routing] [**hop-by-hop**] [**authen**] [**destopts**] [**fragments**] [**log**] **log-input**] [[**icmp-off**]

Transmission Control Protocol (TCP)

*[sequence-number]***deny tcp** {*source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address ipv6-wildcard-mask/ prefix-length*} [*operator*{*port* | *protocol-port*}] {*destination-ipv6-prefix/ prefix-length* | *any* | *host destination-ipv6-address ipv6-wildcard-mask/ prefix-length*} [*operator*{*port* | *protocol* | *port*}] [**dscp***value*] [**routing**] [**hop-by-hop**] [**authen**] [**destopts**] [**fragments**] [**established**] {**match-any | match-all | + | -**} [*flag-name*] [**log**] [**log-input**] [**icmp-off**]

User Datagram Protocol (UDP)

*[sequence-number]***deny tcp** {*source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address ipv6-wildcard-mask/ prefix-length*} [*operator*{*port* | *protocol-port*}] {*destination-ipv6-prefix/ prefix-length* | *any* | *host destination-ipv6-address ipv6-wildcard-mask/ prefix-length*} [*operator*{*port* | *protocol* | *port*}] [**dscp***value*] [**routing**] [**hop-by-hop**] [**authen**] [**destopts**] [**fragments**] [**established**] [*flag-name*] [**log**] [**log-input**] [**icmp-off**]

Syntax Description

sequence-number	(Optional) Number of the **deny** statement in the access list. This number determines the order of the statements in the access list. Range is 1 to 2147483644. (By default, the first statement is number 10, and the subsequent statements are incremented by 10.)
protocol	Name or number of an Internet protocol. It can be one of the keywords **ahp** , **esp** , **gre**, **icmp** , **igmp**, **igrp**, **ipinip**, **ipv6** , **nos**, **ospf**, **pcp** , **tcp** , or **udp** , or an integer in the range from 0 to 255 representing an IPv6 protocol number.
source-ipv6-prefix / prefix-length	The source IPv6 network or class of networks about which to set deny conditions. This argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
any	An abbreviation for the IPv6 prefix ::/0.
host *source-ipv6-address*	Source IPv6 host address about which to set deny conditions. This *source-ipv6-address* argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
ipv6-wildcard-mask	IPv6 wildcard mask. The IPv6 wildcard mask can take any IPv6 address value which is used instead of prefix length.
operator {*port* | *protocol-port*}	(Optional) Operand that compares the source or destination ports of the specified protocol. Operands are **lt** (less than), **gt** (greater than), **eq** (equal), **neq** (not equal), and **range** (inclusive range). If the operator is positioned after the *source-ipv6-prefix / prefix-length* argument, it must match the source port. If the operator is positioned after the *destination-ipv6-prefix / prefix-length* argument, it must match the destination port. The **range** operator requires two port numbers. All other operators require one port number. The *port* argument is the decimal number of a TCP or UDP port. Range is 0 to 65535. The *protocol-port* argument is the name of a TCP or UDP port. TCP port names can be used only when filtering TCP. UDP port names can be used only when filtering UDP.

destination-ipv6-prefix / prefix-length	Destination IPv6 network or class of networks about which to set deny conditions. This argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
host *destination-ipv6-address*	Destination IPv6 host address about which to set deny conditions. This *destination-ipv6-address* argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
dscp *value*	(Optional) Matches a differentiated services code point DSCP value against the traffic class value in the Traffic Class field of each IPv6 packet header. Range is 0 to 63.
routing	(Optional) Matches source-routed packets against the routing extension header within each IPv6 packet header.
hop-by-hop	(Optional) Supports Jumbo-grams. With the Router Alert option, it is an integral part in the operation of Multicast Listener Discovery (MLD). Router Alert [3] is an integral part in the operations of IPv6 Multicast through MLD and RSVP for IPv6.
authen	(Optional) Matches if the IPv6 authentication header is present.
destopts	(Optional) Matches if the IPv6 destination options header is present.
fragments	(Optional) Matches noninitial fragmented packets where the fragment extension header contains a nonzero fragment offset. The **fragments** keyword is an option only if the *operator* [*port-number*] arguments are not specified.
log	(Optional) Causes an informational logging message about the packet that matches the entry to be sent to the console. (The level of messages logged to the console is controlled by the **logging console** command.) The message includes the access list name and sequence number, whether the packet was denied; the protocol, whether it was TCP, UDP, ICMP, or a number; and, if appropriate, the source and destination addresses and source and destination port numbers. The message is generated for the first packet that matches, and then at 5-minute intervals, including the number of packets denied in the prior 5-minute interval.
log-input	(Optional) Provides the same function as the **log** keyword, except that the log-message also includes the input interface.
ttl	(Optional) Turns on matching against time-to-life (TTL) value.
operator	(Optional) Operand that compares the source or destination ports of the specified protocol. Operands are **lt** (less than), **gt** (greater than), **eq** (equal), **neq** (not equal), and **range** (inclusive range).

ttl value [*value1 ... value2*]	(Optional) TTL value used for filtering. Range is 1 to 255. If only *value* is specified, the match is against this value. If both *value1* and *value2* are specified, the packet TTL is matched against the range of TTLs between *value1* and *value2* .
icmp-off	(Optional) Turns off ICMP generation for denied packets.
icmp-type	(Optional) ICMP message type for filtering ICMP packets. ICMP packets can be filtered by ICMP message type. Range is 0 to 255.
icmp-code	(Optional) ICMP message code for filtering ICMP packets. ICMP packets that are filtered by ICMP message type can also be filtered by the ICMP message code. Range is 0 to 255.
established	(Optional) For the TCP protocol only: Indicates an established connection.
match-any	(Optional) For the TCP protocol only: Filters on any combination of TCP flags.
match-all	(Optional) For the TCP protocol only: Filters on all TCP flags.
+ | -	(Required) For the TCP protocol **match-any** , **match-all** : Prefix *flag-name* with + or - . Use the + *flag-name* argument to match packets with the TCP flag set. Use the - *flag-name* argument to match packets when the TCP flag is not set.
flag-name	(Optional) For the TCP protocol **match-any** , **match-all** . Flag names are: **ack**, **fin**, **psh**, **rst**, **syn**, **urg**.

Command Default

No IPv6 access list is defined.

ICMP message generation is enabled by default.

Command Modes

IPv6 access list configuration

Command History

Release	Modification
Release 7.6.1	The **log-input** option was introduced.
Release 6.5.1	Added the hop-by-hop option.
Release 6.0	This command was introduced.

Usage Guidelines

The **deny** (IPv6) command is similar to the **deny** (IPv4) command, except that it is IPv6-specific.

Use the **deny** (IPv6) command following the **ipv6 access-list** command to define the conditions under which a packet passes the access list.

Note If any ACE in an ACL contains ABF clause, this ACL cannot be applied at any non-zero compression level.

Specifying **ipv6** for the *protocol* argument matches against the IPv6 header of the packet.

By default, the first statement in an access list is number 10, and the subsequent statements are numbered in increments of 10.

You can add permit, deny, or remark statements to an existing access list without retyping the entire list. To add a new statement anywhere other than at the end of the list, create a new statement with an appropriate entry number that falls between two existing entry numbers to indicate where it belongs.

Both the *source-ipv6-prefix/prefix-length* and *destination-ipv6-prefix/prefix-length* arguments are used for traffic filtering (the source prefix filters traffic based upon the traffic source; the destination prefix filters traffic based upon the traffic destination).

Note IPv6 prefix lists, not access lists, should be used for filtering routing protocol prefixes.

The **fragments** keyword is an option only if the *operator* [*port* | *protocol-port*] arguments are not specified.

Task ID

Task ID	Operations
acl	read, write

Examples

The following example shows how to configure the IPv6 access list named toCISCO and apply the access list to the traffic entering the HundredGigE interface 0/2/0/2. Specifically, the deny entry in the list keeps all packets that have a destination TCP port number greater than 5000 from entering the HundredGigE interface 0/2/0/2. The permit entry in the list permits all ICMP packets to enter the HundredGigE interface 0/2/0/2.

```
Router(config)# ipv6 access-list toCISCO
Router(config-ipv6-acl)# deny tcp any any gt 5000
Router(config-ipv6-acl)# permit icmp any any
Router(config)#  interface HundredGigE 0/2/0/2
Router(config-if)# ipv6 access-group tOCISCO ingress
```

The following example shows how to configure the IPv6 access list named toCISCO and apply the access list to the traffic entering theHundredGigE interface 0/2/0/2. Specifically, the deny entry in the list keeps all packets that have a hop-by-hop optional field from entering the HundredGigE interface 0/2/0/2.

```
Router(config)# ipv6 access-list toCISCO
Router(config-ipv6-acl)# deny ipv6 any any hop-by-hop
Router(config)#  interface HundredGigE 0/2/0/2
Router(config-if)# ipv6 access-group tOCISCO ingress
```

dont-fragment

To configure an access list to match on the **dont-fragment** flag.

fragment-type dont-fragment{**capture** | **counter** | **default** | **first-fragment** | **is-fragment** | **last-fragment** | **log** | **log-input** | **set** | **udf** | **<none>**}

Syntax Description

capture	ACL matches on the **dont-fragment** flag, and captures the matched packet.
counter	ACL matches on the **dont-fragment** flag, and displays the counter for the matches.
default	ACL matches on the **dont-fragment** flag, and uses specified default next hop.
first-fragment	ACL matches on the **dont-fragment** flag, and then matches on the **first-fragment** flag.
is-fragment	ACL matches on the **dont-fragment** flag, and then matches on the **is-fragment** flag.
last-fragment	ACL matches on the **dont-fragment** flag, and then matches on the **last-fragment** flag.
log	ACL matches on the **dont-fragment** flag and logs the matches.
log-input	ACL matches on the **dont-fragment** flag and logs the matches, incuding on the input interface.
set	ACL matches on the **dont-fragment** flag and sets a particular action on the matches.
udf	ACL matches on the **dont-fragment** flag, and sets the user-defined fields for the matches.

Command Default

None

Command Modes

ACL configuration mode

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

This command is supported only for IPv4 ACLs.

Example

Use the following sample configuration to match on the **dont-fragment** flag.

```
/* Enter the global configuraton mode and configure an IPv4 access list */
Router# config
Router(config)# ipv4 access-list TEST
Router(config-ipv4-acl)# 10 permit tcp any any

/* Configure an ACE to match on the dont-fragment flag (indicates a non-fragmented packet)
 and forward the packet to the default (pre-configured) next hop  */
Router(config-ipv4-acl)# 20 permit tcp any any fragment-type dont-fragment default
```

```
Router(config-ipv4-acl)# commit
```

enable-set-ttl

To enable ACLs to set or rewrite a TTL value, use the **enable-set-ttl** option with the **hw-module** command in the global configuration mode.

hw-module profile tcam format access-list ipv4 src-addr src-port enable-set-ttl
hw-module profile tcam format access-list ipv4 dst-addr dst-port enable-set-ttl
hw-module profile tcam format access-list ipv6 src-addr src-port next-hdr enable-set-ttl
hw-module profile tcam format access-list ipv6 dst-addr dst-port src-port next-hdr enable-set-ttl

Syntax Description

dst-addr	Destination address. 32 bit qualifier for IPv4 ACLs and 128-bit qualifier for IPv6 ACLs.
dst-port	Destination L4 Port. 16-bit qualifier
frag-bit	Fragmentation bit for IPv4 ACLs. 1-bit qualifier
enable-capture	Enables ACL-based traffic mirroring and disables ACL logging..
enable-set-ttl	Enables the setting or rewriting of the TTL field.
interface-based	Configures ACLs to be unique for an interface.
location	Specifies location of an access list.
next-hdr	Specifies the next header of IPv6 access list, which is an 8-bit qualifier. This option is mandatory.
packet-length	Specifies packet length for IPv4 ACLs, which is a 10-bit qualifier.
payload-length	Specifies payload length for IPv6 ACLs, which is a 16-bit qualifier.
port-range	Specifies IPv4 port range qualifier, 24-bit qualifier
precedence	Specifies DSCP precedence. 10-bit qualifier
proto	Specifies protocol type. 8-bit qualifier
src-addr	Specifies source address. 32-bit qualifier for IPv4 ACLs and 128-bit qualifier for IPv6 ACLs.
src-port	Specifies source L4 port. 16-bit qualifier
tcp-flags	Specifies TCP Flags. 6-bit qualifier for IPv4 ACLs and 8-bit qualifier for IPv6 ACLs.
traffic-class	Specifies traffic class for IPv6 ACLs, which is an 8-bit qualifier.

ttl-match	Enables ACLs to match on specified TTL value.
udf1	Specifies user-defined filter.
udf2	Specifies user-defined filter.
udf3	Specifies user-defined filter.
udf4	Specifies user-defined filter.
udf5	Specifies user-defined filter.
udf6	Specifies user-defined filter.
udf7	Specifies user-defined filter.
udf8	Specifies user-defined filter.

Command Default

None

Command Modes

Global configuration mode

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

If you use either **src-port**, **dst-port**, or **port-range** as one of the optional keywords while setting or modifying the TTL values, you must also use **frag-bit** as one of the other optional keywords to avoid the following error message:

Note A reboot of the line card is required after entering the **hw-module profile** command to activate the command.

```
A SysDB client requested a function that the server or EDM does not currently support:
fragment_bit must be included, if any of the following are include: src-port, dst-port,
port-range, or tcp-flags
```

Enabling TTL Matching and Rewriting for IPv4 ACLs

The following configuration describes how you can enable TTL Matching and Rewriting for IPv4 ACLs.

```
/* Enable TTL matching and rewriting in the global configuration mode by using the hw-module
 command */
Router(config)# hw-module profile tcam format access-list ipv4 dst-addr dst-port proto
port-range enable-set-ttl ttl-match
```

For complete ACL configuration, see the Configuring TTL Matching and Rewriting for IPv4 ACLs section in the *IP Addresses and Services Configuration Guide for NCS 5500 Series Routers*

Enabling TTL Matching and Rewriting for IPv6 ACLs

The following configuration describes how you can enable TTL Matching and Rewriting for IPv4 ACLs.

```
/* Enable TTL matching and rewriting in the global configuration mode by using the hw-module
 command */
Router(config)# hw-module profile tcam format access-list ipv6 dst-addr dst-port src-port
next-hdr enable-set-ttl ttl-match
```

For complete ACL configuration, see the Configuring TTL Matching and Rewriting for IPv6 ACLs section in the *IP Addresses and Services Configuration Guide for NCS 5500 Series Routers*

first-fragment

To configure an ACL to match on the **first-fragment** flag.

fragment-type first-fragment {**capture** | **counter** | **default** | **log** | **log-input** | **set** | **udf** | **<none>**}

Syntax Description

capture	ACL matches on the **first-fragment** flag, and captures the matched packet.
counter	ACL matches on the **first-fragment** flag, and displays the counter for the matches.
default	ACL matches on the **first-fragment** flag, and uses specified default next hop.
log	ACL matches on the **first-fragment** flag and logs the matches.
log-input	ACL matches on the **first-fragment** flag and logs the matches, incuding on the input interface.
set	ACL matches on the **first-fragment** flag and sets a particular action on the matches.
udf	ACL matches on the **first-fragment** flag, and sets the user-defined fields for the matches.

Command Default

None

Command Modes

ACL configuration mode.

Command History

Release	Modification
Release 7.5.1	Added support for IPv6 ACLs.
Release 6.3.2	This command was introduced.

Usage Guidelines

This command is supported for IPv4 and IPv6 ACLs.

Example

Use the following sample configuration to match on the **first-fragment** flag.

```
/* Enter the global configuraton mode and configure an IPv4 access list */
Router# config
Router(config)# ipv4 access-list TEST
Router(config-ipv4-acl)# 10 permit tcp any any

/* Configure an ACE to match on the first-fragment flag (indicates the first fragment of a
 fragmented packet)
 and forward the packet to a next hop of 20.20.20.1  */
Router(config-ipv4-acl)# 40 permit ospf any any fragment-type first-fragment nexthop1 ipv4
 20.20.20.1
Router(config-ipv4-acl)# commit
```

fragment-offset

To enable packet filtering at an ingress or egress interface by specifying fragment-offset as a match condition in an IPv4 or IPv6 ACL, use the **fragment-offset** option in **permit** or **deny** command in IPv4 or IPv6 access-list configuration mode. To disable this feature, use the **no** form of this command.

fragment-offset {**eq** *value* | **gt** *value* | **lt** *value* | **neq** *value* | **range** *lower-limit upper-limit*}

Syntax Description

fragment-offset eq *value*	Filters packets that have a fragment offset equal to the specified limit.
fragment-offset gt *value*	Filters packets that have a fragment offset greater than the specified limit.
fragment-offset lt *value*	Filters packets that have a fragment offset less than the specified limit.
fragment-offset neq *value*	Filters packets that have a fragment offset that does not match the specified limit.
fragment-offset range *lower-limit upper-limit*	Filters packets that have a fragment offset within the specified range.

Command Default

None

Command Modes

IPv4 or IPv6 Access List Configuration mode

Release	Modification
Release 6.2.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

This example shows how to configure an IPv4 access list to filter packets by the fragment-offset condition:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# ipv4 access-list fragment-offset-acl
RP/0/RP0/CPU0:router(config-ipv4-acl)# 10 permit ipv4 any any fragment-offset range 300 400
```

fragment-type

To configure an access list to match on the type of fragment.

fragment-type {**dont-fragment** | **first-fragment** | **is-fragment** | **last-fragment**}

Syntax Description

dont-fragment	ACL matches on the **dont-fragment** flag
first-fragment	ACL matches on the **first-fragment** flag
is-fragment	ACL matches on the **is-fragment** flag
last-fragment	ACL matches on the **last-fragment** flag

Command Default

None

Command Modes

ACL configuration mode

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

This command is supported only for IPv4 access lists.

Example

Use the following sample configuration to configure an ACL to match on the type of fragment..

```
/* Enter the global configuraton mode and configure an IPv4 access list */
Router# config
Router(config)# ipv4 access-list TEST
Router(config-ipv4-acl)# 10 permit tcp any any

/* Configure an ACE to match on the dont-fragment flag (indicates a non-fragmented packet)
 and forward the packet to the default (pre-configured) next hop  */
Router(config-ipv4-acl)# 20 permit tcp any any fragment-type dont-fragment default

/* Configure an ACE to match on the is-fragment flag (indicates a fragmented packet)
 and forward the packet to a next hop of 10.10.10.1  */
Router(config-ipv4-acl)# 30 permit udp any any fragment-type is-fragment nexthop1 ipv4
10.10.10.1

/* Configure an ACE to match on the first-fragment flag (indicates the first fragment of a
 fragmented packet)
 and forward the packet to a next hop of 20.20.20.1  */
```

```
Router(config-ipv4-acl)# 40 permit ospf any any fragment-type first-fragment nexthop1 ipv4
 20.20.20.1


/* Configure an ACE to match on the last-fragment flag (indicates the last fragment of a
fragmented packet)
 and forward the packet to a next hop of 30.30.30.1  */
Router(config-ipv4-acl)# 50 permit icmp any any fragment-type last-fragment nexthop1 ipv4
30.30.30.1
Router(config-ipv4-acl)# commit
```

hw-module profile acl ipv6 single-pass-egress-acl

To configure single-pass on IPv6 Egress ACL use the **hw-module profile acl ipv6 single-pass-egress acl** command in XR config mode. To remove the configuration, use the **no** form of the command.

This command has no keywords or arguments.

Command Default

None

Command Modes

XR Config Mode

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

- You must manually reload the router after configuring this command.
- By default, Cisco NC57 line cards process packets in a single-pass. So, this feature is not applicable to NCS 5700 Series Routers and Cisco NCS 5500 series routers that have the Cisco NC57 line cards installed and operating in the native or compatibility mode.

Task ID

Task ID	Operations
configuration	read, write
root-lr	read, write

Example

The following example shows how to configure single-pass IPv6 egress ACL:

```
Router# configure terminal
Router(config)# hw-module profile acl ipv6 single-pass-egress-acl
Router(config)# commit
```

interface-based

To configure ACLs that are unique for an interface, use the **interface-based** option with the **hw-module** command in the global configuration mode.

hw-module profile tcam format access-list ipv4 src-addr src-port dst-addr dst-port interface-based
hw-module profile tcam format access-list ipv6 src-addr src-port dst-addr dst-port next-hdr interface-based

Syntax Description

dst-addr	Destination address. 32 bit qualifier for IPv4 ACLs and 128-bit qualifier for IPv6 ACLs.
dst-port	Destination L4 Port. 16-bit qualifier
frag-bit	Fragmentation bit for IPv4 ACLs. 1-bit qualifier
enable-capture	Enables ACL-based traffic mirroring and disables ACL logging.
enable-set-ttl	Enables the setting or rewriting of an ACL.
interface-based	Configures ACLs to be unique for an interface.
location	Specifies location of an access list.
next-hdr	Specifies the next header of IPv6 access list, which is an 8-bit qualifier. This option is mandatory.
packet-length	Specifies packet length for IPv4 ACLs, which is a 10-bit qualifier.
payload-length	Specifies payload length for IPv6 ACLs, which is a 16-bit qualifier.
port-range	Specifies IPv4 port range qualifier, 24-bit qualifier
precedence	Specifies DSCP precedence. 10-bit qualifier
proto	Specifies protocol type. 8-bit qualifier
src-addr	Specifies source address. 32-bit qualifier for IPv4 ACLs and 128-bit qualifier for IPv6 ACLs.
src-port	Specifies source L4 port. 16-bit qualifier
tcp-flags	Specifies TCP Flags. 6-bit qualifier for IPv4 ACLs and 8-bit qualifier for IPv6 ACLs.
traffic-class	Specifies traffic class for IPv6 ACLs, which is an 8-bit qualifier.
ttl-match	Enables ACLs to match on specified TTL value.
udf1	Specifies user-defined filter.

udf2	Specifies user-defined filter.
udf3	Specifies user-defined filter.
udf4	Specifies user-defined filter.
udf5	Specifies user-defined filter.
udf6	Specifies user-defined filter.
udf7	Specifies user-defined filter.
udf8	Specifies user-defined filter.

Command Default

None

Command Modes

Global configuration

Command History

Release	Modification
6.3.2	This command was introduced.

Usage Guidelines

ACLs that are shared across interfaces and use the same TCAM space are known as shared ACLs. However, you can configure only 31 unique, shared ACLs. To configure more unique ACLs, ACL sharing must be disabled by using the **interface-based** command. By making the ACLs unique for an interface, you can configure more than 31 ACLs.

Enabling interface-based IPv4 ACLs

```
/* Enable interface-based, unique IPv4 ACLs */
Router(config)# hw-module profile tcam format access-list ipv4 src-addr src-port dst-addr
dst-port interface-based
```

For complete ACL configuration, see the Configuring TTL Matching for IPv4 ACLs section in the *IP Addresses and Services Configuration Guide for NCS 5500 Series Routers*

Enabling interface-based IPv6 ACLs

```
/* Enable interface-based, unique IPv6 ACLs */
Router(config)# hw-module profile tcam format access-list ipv6 src-addr src-port dst-addr
dst-port next-hdr interface-based
```

For complete ACL configuration, see the Configuring TTL Matching for IPv6 ACLs section in the *IP Addresses and Services Configuration Guide for NCS 5500 Series Routers*

ipv4 access-group

To control access to an interface, use the **ipv4 access-group** command in interface configuration mode. To remove the specified access group, use the **no** form of this command.

ipv4 access-group *access-list-name* [**common** *common-acl-name*] { **ingress** | **egress** } [**compress level** *compression-level*] [**interface-statistics**] [**hardware-count**]

Syntax Description

access-list-name	Name of an IPv4 access list as specified by an **ipv4 access-list** command.
common	Configures common ACLs.
ingress	Filters on inbound packets.
egress	Filters on outbound packets.
compress level *compression-level*	Configures compression level for interface ACLs. Compression level values range from zero to three.
interface-statistics	Configures the logging of per interface statistics.
hardware-count	Configures the logging of count of filtered packets.

Command Default

The interface does not have an IPv4 access list applied to it.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.
Release 7.2.1	Support to configure multiple ACLs was added.

Usage Guidelines

Permitted packets are counted only when hardware counters are enabled using the *hardware-count* argument. Denied packets are counted whether hardware counters are enabled, or not.

Filtering of MPLS packets through interface ACL is not supported.

Note For packet filtering applications using the **ipv4 access-group** command, packet counters are maintained in hardware for each direction. If an access group is used on multiple interfaces in the same direction, then packets are counted for each interface that has the *hardware-count* argument enabled.

If the access list permits the addresses, the software continues to process the packet. If the access list denies the address, the software discards the packet and returns an Internet Control Message Protocol (ICMP) host unreachable message.

If the specified access list does not exist, all packets are passed.

By default, the unique or per-interface ACL statistics are disabled.

You can configure common ACLs only in the ingress direction. You cannot configure compression levels for common ACLs.

Task ID

Task ID	Operations
acl	read, write
network	read, write

Examples

The following example shows how to apply filters on packets from HundredGigE interface 0/2/0/2:

```
Router(config)# interface  HundredGigE 0/2/0/2
Router(config-if)# ipv4 access-group p-ingress-filter ingress
```

ipv4 access-list

To define an IPv4 access list by name, use the **ipv4 access-list** command in XR Config mode. To remove all entries in an IPv4 access list, use the **no** form of this command.

ipv4 access-list [*name* | **icmp-off**]
no ipv4 access-list [*name* | **icmp-off**]

Syntax Description

name	Name of the access list. Names cannot contain a space or quotation marks.
icmp-off	Disables generating the ICMP unreachable messages for packets dropped by deny ACEs in the router.

Command Default

No IPv4 access list is defined.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.5.1	Support for icmp-off option was introduced.
Release 6.0	This command was introduced.

Usage Guidelines

Use the **ipv4 access-list** command to configure an IPv4 access list. This command places the router in access list configuration mode, in which the denied or permitted access conditions must be defined with the **deny** or **permit** command.

Use the **ipv4 access-group** command to apply the access list to an interface.

The maximum number of supported port ranges including both IPv4 and IPv6 must not exceed 23. That is, if a configuration that supports 23 unique ranges for IPv4 and 23 unique ranges for IPv6 is applied together, then it results in invalid configuration and causes OOR (out-of-resource) condition.

Task ID

Task ID	Operations
acl	read, write

Examples

This example shows how to define a standard access list named Internetfilter and disable ICMP Unreachable messages at global configuration:

```
Router(config)# ipv4 access-list Internetfilter
Router(config-ipv4-acl)# 10 permit 192.168.34.0 0.0.0.255
Router(config-ipv4-acl)# 20 permit 172.16.0.0 0.0.255.255
Router(config-ipv4-acl)# 30 permit 10.0.0.0 0.255.255.255
Router(config-ipv4-acl)# 39 remark Block BGP traffic from 172.16 net.
Router(config-ipv4-acl)# 40 deny tcp host 172.16.0.0 eq bgp host 192.168.202.203 range 1300
 1400

Router(config)# ipv4 access-list icmp-off
```

ipv4 access-list log-update rate

To specify the rate at which IPv4 access lists are logged, use the **ipv4 access-list log-update rate** command in XR Config mode. To return the update rate to the default setting, use the **no** form of this command.

ipv4 access-list log-update rate *rate-number*
no ipv4 access-list log-update rate *rate-number*

Syntax Description

rate-number	Rate at which IPv4 access hit logs are generated per second on the router. Range is 1 to 1000.

Command Default

Default is 1.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The *rate-number* argument applies to all the IPv4 access-lists configured on the interfaces. That is, at any given time there can be between 1 and 1000 log entries for the system.

Task ID

Task ID	Operations
ipv4	read, write
acl	read, write

Examples

The following example shows how to configure a IPv4 access hit logging rate for the system:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list log-update rate 10
```

ipv4 access-list log-update threshold

To specify the number of updates that are logged for IPv4 access lists, use the **ipv4 access-list log-update threshold** command in XR Config mode. To return the number of logged updates to the default setting, use the **no** form of this command.

ipv4 access-list log-update threshold *update-number*
no ipv4 access-list log-update threshold *update-number*

Syntax Description

update-number	Number of updates that are logged for every IPv4 access list configured on the router. Range is 0 to 2147483647.

Command Default

For IPv4 access lists, 2147483647 updates are logged.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

IPv4 access list updates are logged at 5-minute intervals, following the first logged update. Configuring a lower number of updates (a number lower than the default) is useful when more frequent update logging is desired.

Task ID

Task ID	Operations
basic-services	read, write

Task ID	Operations
acl	read, write

Examples

This example shows how to configure a log threshold of ten updates for every IPv4 access list configured on the router:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list log-update threshold 10
```

ipv6 access-group

To control access to an interface, use the **ipv6 access-group** command in interface configuration mode. To remove the specified access group, use the **no** form of this command.

ipv6 access-group *access-list-name* [**common** *common-acl-name*] { **ingress** | **egress** } [**compress level** *compression-level*] [**interface-statistics**] [**hardware-count**]

Syntax Description

access-list-name	Name of an IPv4 access list as specified by an **ipv4 access-list** command.
common	Configures common ACLs.
ingress	Filters on inbound packets.
egress	Filters on outbound packets.
compress level *compression-level*	Configures compression level for interface ACLs. Compression level values range from zero to three.
interface-statistics	Configures the logging of per interface statistics.
hardware-count	Configures the logging of count of filtered packets.

Command Default

The interface does not have an IPv6 access list applied to it.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Permitted packets are counted only when hardware counters are enabled using the *hardware-count* argument. Denied packets are counted whether hardware counters are enabled, or not.

Filtering of MPLS packets through interface ACL is not supported.

Note For packet filtering applications using the **ipv6 access-group** command, packet counters are maintained in hardware for each direction. If an access group is used on multiple interfaces in the same direction, then packets are counted for each interface that has the *hardware-count* argument enabled.

If the access list permits the addresses, the software continues to process the packet. If the access list denies the address, the software discards the packet and returns an Internet Control Message Protocol (ICMP) host unreachable message.

If the specified access list does not exist, all packets are passed.

By default, the unique or per-interface ACL statistics are disabled.

You can configure common ACLs only in the ingress direction. You cannot configure compression levels for common ACLs.

Task ID

Task ID	Operations
acl	read, write
ipv6	read, write

Examples

The following example shows how to apply filters on packets from HundredGigE interface 0/2/0/2:

```
Router(config)# interface  HundredGigE 0/2/0/2
Router(config-if)# ipv6 access-group p-ingress-filter ingress
```

ipv6 access-list

To define an IPv6 access list and to place the router in IPv6 access list configuration mode, use the **ipv6 access-list** command in interface configuration mode. To remove the access list, use the **no** form of this command.

ipv6 access-list [*name* | **icmp-off**]
no ipv6 access-list [*name* | **icmp-off**]

Syntax Description

name	Name of the IPv6 access list. Names cannot contain a space or quotation mark, or begin with a numeric.

icmp-off	Disables generating the ICMP unreachable messages for packets dropped by deny ACEs in the router.

Command Default

No IPv6 access list is defined.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.5.1	Support for icmp-off option was introduced.
Release 6.0	This command was introduced.

Usage Guidelines

The **ipv6 access-list** command is similar to the **ipv4 access-list** command, except that it is IPv6-specific.

The IPv6 access lists are used for traffic filtering based on source and destination addresses, IPv6 option headers, and optional, upper-layer protocol type information for finer granularity of control. IPv6 access lists are defined by using the **ipv6 access-list** command in mode and their permit and deny conditions are set by using the **deny** and **permit** commands in IPv6 access list configuration mode. Configuring the **ipv6 access-list** command places the router in IPv6 access list configuration mode—the router prompt changes to router (config-ipv6-acl)#. From IPv6 access list configuration mode, permit and deny conditions can be set for the defined IPv6 access list.

See the "Examples" section for an example of a translated IPv6 access control list (ACL) configuration.

Note No more than one IPv6 access list can be applied to an interface per direction.

Note Every IPv6 access list has an implicit **deny ipv6 any any** statement as its last match condition. An IPv6 access list must contain at least one entry for the implicit **deny ipv6 any any** statement to take effect.

Note IPv6 prefix lists, not access lists, should be used for filtering routing protocol prefixes.

Use the **ipv6 access-group** interface configuration command with the *access-list-name* argument to apply an IPv6 access list to an IPv6 interface.

Note An IPv6 access list applied to an interface with the **ipv6 access-group** command filters traffic that is forwarded, not originated, by the router.

Note Every IPv6 ACL has implicit **permit icmp any any nd-na**, **permit icmp any any nd-ns**, and **deny ipv6 any any** statements as its last match conditions. (The former two match conditions allow for ICMPv6 neighbor discovery.) An IPv6 ACL must contain at least one entry for the implicit **deny ipv6 any any** statement to take effect.**permit icmp any any nd-na permit icmp any any nd-ns deny ipv6 any any deny ipv6 any any**.

The IPv6 neighbor discovery process makes use of the IPv6 network layer service; therefore, by default, IPv6 ACLs implicitly allow IPv6 neighbor discovery packets to be sent and received on an interface. In IPv4, the Address Resolution Protocol (ARP), which is equivalent to the IPv6 neighbor discovery process, makes use of a separate data link layer protocol; therefore, by default, IPv4 ACLs implicitly allow ARP packets to be sent and received on an interface.

The maximum number of supported port ranges including both IPv4 and IPv6 must not exceed 23. That is, if a configuration that supports 23 unique ranges for IPv4 and 23 unique ranges for IPv6 is applied together, then it results in invalid configuration and causes OOR (out-of-resource) condition.

Task ID

Task ID	Operations
acl	read, write
ipv6	read, write

Examples

This example shows how to configure the IPv6 access list named list2 and applies the ACL to traffic on interface HundredGigE 0/2/0/2. Specifically, the first ACL entry keeps all packets from the network fec0:0:0:2::/64 (packets that have the site-local prefix fec0:0:0:2 as the first 64 bits of their source IPv6 address) from exiting out of interface HundredGigE 0/2/0/2. The second entry in the ACL permits all other traffic to exit out of interface HundredGigE 0/2/0/2. The second entry is necessary because an implicit deny all condition is at the end of each IPv6 ACL.

```
Router(config)# ipv6 access-list list2
Router(config-ipv6-acl)# 10 deny fec0:0:0:2::/64 any
Router(config-ipv6-acl)# 20 permit any any

Router# show ipv6 access-lists list2

ipv6 access-list list2
  10 deny ipv6 fec0:0:0:2::/64 any
  20 permit ipv6 any any

Router(config)# interface HundredGigE 0/2/0/2
```

Note IPv6 is automatically configured as the protocol type in **permit any any** and **deny any any** statements that are translated from mode to IPv6 access list configuration mode.

Note An IPv6 router does not forward to another network an IPv6 packet that has a link-local address as either its source or destination address (and the source interface for the packet is different from the destination interface for the packet).

This example shows how to disable ICMP Unreachable messages at global configuration:

```
Router(config)# ipv6 access-list icmp-off
```

ipv6 access-list log-update rate

To specify the rate at which IPv6 access lists are logged, use the **ipv6 access-list log-update rate** command in . To return the update rate to the default setting, use the **no** form of this command.

ipv6 access-list log-update rate *rate-number*
no ipv6 access-list log-update rate *rate-number*

Syntax Description

rate-number	Rate at which IPv6 access hit logs are generated per second on the router. Range is 1 to 1000.

Command Default

Default is 1.

Command Modes

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The *rate-number* argument applies to all the IPv6 access-lists configured on the interfaces. That is, at any given time there can be between 1 and 1000 log entries for the system.

Task ID

Task ID	Operations
ipv6	read, write
acl	read, write

Examples

This example shows how to configure a IPv6 access hit logging rate for the system:

```
RP/0/(config)# ipv6 access-list log-update rate 10
```

ipv6 access-list log-update threshold

To specify the number of updates that are logged for IPv6 access lists (ACLs), use the **ipv6 access-list log-update threshold** command in . To return the number of logged updates to the default setting, use the **no** form of this command.

ipv6 access-list log-update threshold *update-number*
no ipv6 access-list log-update threshold *update-number*

Syntax Description

update-number	Number of updates that are logged for every IPv6 access list configured on the router. Range is 0 to 2147483647.

Command Default

For IPv6 access lists, 350000 updates are logged.

Command Modes

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **ipv6 access-list log-update threshold** command is similar to the **ipv4 access-list log-update threshold** command, except that it is IPv6-specific.

IPv6 access list updates are logged at 5-minute intervals, following the first logged update. Configuring a lower number of updates (a number lower than the default) is useful when more frequent update logging is desired.

Task ID

Task ID	Operations
acl	read, write
ipv6	read, write

Examples

This example shows how to configure a log threshold of ten updates for every IPv6 access list configured on the router:

```
RP/0/(config)# ipv6 access-list log-update threshold 10
```

ipv6 access-list maximum ace threshold

To set the maximum number of access control entries (ACEs) for IPv6 access lists, use the **ipv6 access-list maximum ace threshold** command in . To reset the ACE limit for IPv6 access lists, use the **no** form of this command.

ipv6 access-list maximum ace threshold *ace-number*
no ipv6 access-list maximum ace threshold *ace-number*

Syntax Description

ace-number	Maximum number of configurable ACEs allowed. Range is 50000 to 350000.

Command Default

50,000 ACEs are allowed for IPv6 access lists.

Command Modes

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **ipv6 access-list maximum ace threshold** command to set the maximum number of configurable ACEs for IPv6 access lists. Out of resource (OOR) limits the number of ACEs that can be configured in the system. When the maximum number of configurable ACEs is reached, configuration of new ACEs is rejected.

Task ID

Task ID	Operations
acl	read, write
ipv6	read, write

Examples

This example shows how to set the maximum number of ACEs for IPv6 access lists to 75000:

```
Router(config)# ipv6 access-list maximum ace threshold 75000
```

is-fragment

To configure an ACL to match on the **is-fragment** flag.

fragment-type is-fragment{**capture** | **counter** | **default** | **log** | **log-input** | **set** | **udf** | **<none>**}

Syntax Description

capture	ACL matches on the **is-fragment** flag, and captures the matched packet.
counter	ACL matches on the **is-fragment** flag, and displays the counter for the matches.

default	ACL matches on the **is-fragment** flag, and uses specified default next hop.
log	ACL matches on the **is-fragment** flag and logs the matches.
log-input	ACL matches on the **is-fragment** flag and logs the matches, incuding on the input interface.
set	ACL matches on the **is-fragment** flag and sets a particular action on the matches.
udf	ACL matches on the **is-fragment** flag, and sets the user-defined fields for the matches.

Command Default None

Command Modes ACL configuration mode.

Command History

Release	Modification
Release 7.5.1	Added support for IPv6 ACLs.
Release 6.3.2	This command was introduced.

Usage Guidelines This command is supported for IPv4 and IPv6 ACLs.

Example

Use the following sample configuration to match on the **is-fragment** flag.

```
/* Enter the global configuraton mode and configure an IPv4 access list */
Router# config
Router(config)# ipv4 access-list TEST
Router(config-ipv4-acl)# 10 permit tcp any any

/* Configure an ACE to match on the is-fragment flag (indicates a fragmented packet)
 and forward the packet to a next hop of 10.10.10.1  */
Router(config-ipv4-acl)# 30 permit udp any any fragment-type is-fragment nexthop1 ipv4
10.10.10.1
Router(config-ipv4-acl)# commit
```

last-fragment

To configure an access list to match on the **last-fragment** flag.

fragment-type last-fragment {**capture** | **counter** | **default** | **log** | **log-input** | **set** | **udf** | **<none>**}

Syntax Description

capture	ACL matches on the **last-fragment** flag, and captures the matched packet.
counter	ACL matches on the **last-fragment** flag, and displays the counter for the matches.
default	ACL matches on the **last-fragment** flag, and uses specified default next hop.

log	ACL matches on the **last-fragment** flag and logs the matches.
log-input	ACL matches on the **last-fragment** flag and logs the matches, incuding on the input interface.
set	ACL matches on the **dont-fragment** flag and sets a particular action on the matches.
udf	ACL matches on the **last-fragment** flag, and sets the user-defined fields for the matches.

Command Default

None

Command Modes

ACL configuration mode.

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

This command is supported only for IPv4 ACLs.

Example

Use the following sample configuration to match on the **last-fragment** flag.

```
/* Enter the global configuraton mode and configure an IPv4 access list */
Router# config
Router(config)# ipv4 access-list TEST
Router(config-ipv4-acl)# 10 permit tcp any any

/* Configure an ACE to match on the last-fragment flag (indicates the last fragment of a
fragmented packet)
 and forward the packet to a next hop of 30.30.30.1  */
Router(config-ipv4-acl)# 50 permit icmp any any fragment-type last-fragment nexthop1 ipv4
30.30.30.1
Router(config-ipv4-acl)# commit
```

packet-length

Enables filtering of packets at an ingress/egress interface by specifying the packet length as a match condition in a IPv4/IPv6 ACL.

By using the **packet-length** condition in an ACL, IPv4 and IPv6 packets are either processed (permit statement) or dropped (deny statement).

To remove this configuration, use the **no** prefix for the command.

packet-length { **eq** *value* | **gt** *value* | **lt** *value* | **neq** *value* | **range** *lower-limit upper-limit* }

Syntax Description

packet-length eq *value*	Filters packets that have a packet length equal to the specified limit.

packet-length gt *value*	Filters packets that have a packet length greater than the specified limit.
packet-length lt *value*	Filters packets that have a packet length less than the specified limit.
packet-length neq *value*	Filters packets that have a packet length that does not match the specified limit.
packet-length range *lower-limit upper-limit*	Filters packets that have a packet length within the specified range. The IPv4/IPv6 packet length ranges from 0 to 65535.

Command Default

None

Command Modes

Access List Configuration mode

Release	Modification
Release 6.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure an IPv4 access list with the **packet-length** condition.

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# ipv4 access-list pktlen-v4
RP/0/RP0/CPU0:router(config-ipv4-acl)# 10 permit tcp any any packet-length eq 1482
RP/0/RP0/CPU0:router(config-ipv4-acl)# 20 permit udp any any packet-length range 1400 1500
RP/0/RP0/CPU0:router(config-ipv4-acl)# 30 deny ipv4 any any
```

The following example shows how you can configure an IPv6 access list with the **packet-length** condition.

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# ipv6 access-list pktlen-v6
RP/0/RP0/CPU0:router(config-ipv6-acl)# 10 permit tcp any any packet-length eq 1500
RP/0/RP0/CPU0:router(config-ipv6-acl)# 20 permit udp any any packet-length range 1500 1600
RP/0/RP0/CPU0:router(config-ipv6-acl)# 30 deny ipv6 any any
```

For a complete configuration example, see the Configure an ACL to Filter By Packet Length section in the *Cisco ASR 9000 Series Aggregation Services Router IP Addresses and Services Configuration Guide*.

permit (IPv4)

To set conditions for an IPv4 access list, use the **permit** command in access list configuration mode. There are two versions of the **permit** command: **permit** (source), and **permit** (protocol). To remove a condition from an access list, use the **no** form of this command.

[*sequence-number*] **permit** *source* [*source-wildcard*] [{ **log** | **log-input** }]
[*sequence-number*] **permit** *protocol source source-wildcard destination destination-wildcard* [**precedence** *precedence*] [**nexthop** [*ipv4-address1*] [*ipv4-address2*] [*ipv4-address3*]] [**dscp** *dscp* **bitmask**] [**fragments**] [{ **log** | **log-input** }] [**nexthop** [**track** *track-name*] [*ipv4-address1*] [*ipv4-address2*] [*ipv4-address3*] [**ttl** *ttl value* [*value1* . . . *value2*]] [**counter** *counter-name*]
police *rate*
capture
no *sequence-number*

Internet Control Message Protocol (ICMP)
[*sequence-number*] **permit icmp** *source source-wildcard destination destination-wildcard* [*icmp-type*] [*icmp-code*] [**precedence** *precedence*] [**dscp** *dscp*] [**fragments**] [{ **log** | **log-input** }][**counter** *counter-name*]

Internet Group Management Protocol (IGMP)
[*sequence-number*] **permit igmp** *source source-wildcard destination destination-wildcard* [*igmp-type*] [**precedence** *precedence*] [**dscp** *value*] [**fragments**] [{ **log** | **log-input** }][**counter** *counter-name*]

User Datagram Protocol (UDP)
[*sequence-number*] **permit udp** *source source-wildcard* [*operator* {*portprotocol-port*}] *destination destination-wildcard* [*operator* {*portprotocol-port*}] [**precedence** *precedence*] [**dscp** *dscp*] [**fragments**] [{ **log** | **log-input** }][**counter** *counter-name*]

Syntax Description

sequence-number	(Optional) Number of the **permit** statement in the access list. This number determines the order of the statements in the access list. Range is 1 to 2147483644. (By default, the first statement is number 10, and the subsequent statements are incremented by 10.)
source	Number of the network or host from which the packet is being sent. There are three alternative ways to specify the source: • Use a 32-bit quantity in four-part dotted-decimal format. • Use the **any** keyword as an abbreviation for a *source* and *source-wildcard* of 0.0.0.0 255.255.255.255. • Use the **host** *source* combination as an abbreviation for a *source* and *source-wildcard* of *source* 0.0.0.0.

source-wildcard	Wildcard bits to be applied to the source. There are three alternative ways to specify the source wildcard: • Use a 32-bit quantity in four-part dotted-decimal format. Place ones in the bit positions you want to ignore. • Use the **any** keyword as an abbreviation for a *source* and *source-wildcard* of 0.0.0.0 255.255.255.255. • Use the **host** *source* combination as an abbreviation for a *source* and *source-wildcard* of *source* 0.0.0.0.
protocol	Name or number of an IP protocol. It can be one of the keywords **ahp** , **esp** , **gre** , **icmp** , **igmp** , **igrp** , **ip** , **ipinip** , **nos** , **ospf** , **pim** , **pcp** , **sctp** , **tcp** , or **udp** , or an integer from 0 to 255 representing an IP protocol number. To match any Internet protocol (including ICMP, SCTP TCP, and UDP), use the **ip** keyword. ICMP, and TCP allow further qualifiers, which are described later in this table. **Note** Filtering on AHP protocol is not supported.

destination	Number of the network or host to which the packet is being sent. There are three alternative ways to specify the destination: • Use a 32-bit quantity in four-part dotted-decimal format. • Use the **any** keyword as an abbreviation for the *destination* and *destination-wildcard* of 0.0.0.0 255.255.255.255. • Use the **host** *destination* combination as an abbreviation for a *destination* and *destination-wildcard* of *destination* 0.0.0.0.
destination-wildcard	Wildcard bits to be applied to the destination. There are three alternative ways to specify the destination wildcard: • Use a 32-bit quantity in four-part dotted-decimal format. Place ones in the bit positions you want to ignore. • Use the **any** keyword as an abbreviation for a *destination* and *destination-wildcard* of 0.0.0.0 255.255.255.255. • Use the **host** *destination* combination as an abbreviation for a *destination* and *destination-wildcard* of *destination* 0.0.0.0.
nexthop1, nexthop2, nexthop3	Specifies the next hop for this entry. **Note** You must specify the VRF for all nexthops unless the nexthop is in the default VRF.

precedence *precedence*	(Optional) Packets can be filtered by precedence level (as specified by a number from 0 to 7) or by the following names: • **Routine** —Match packets with routine precedence (0) • **priority** —Match packets with priority precedence (1) • **immediate** —Match packets with immediate precedence (2) • **flash** —Match packets with flash precedence (3) • **flash-override** —Match packets with flash override precedence (4) • **critical** —Match packets with critical precedence (5) • **internet** —Match packets with internetwork control precedence (6) • **network** —Match packets with network control precedence (7)
capture	Captures matching traffic. When the acl command is configured on the source mirroring port, if the ACL configuration command does not use the **capture** keyword, no traffic gets mirrored. If the ACL configuration uses the **capture** keyword, but the acl command is not configured on the source port, then the whole port traffic is mirrored and the **capture** action does not have any affect.

dscp *dscp*

(Optional) Differentiated services code point (DSCP) provides quality of service control. The values for *dscp* are as follows:

- 0–63—Differentiated services codepoint value
- af11—Match packets with AF11 dscp (001010)
- af12—Match packets with AF12 dscp (001100)
- af13—Match packets with AF13 dscp (001110)
- af21—Match packets with AF21 dscp (010010)
- af22—Match packets with AF22 dscp (010100)
- af23—Match packets with AF23 dscp (010110)
- af31—Match packets with AF31 dscp (011010)
- af32—Match packets with AF32 dscp (011100)
- af33—Match packets with AF33 dscp (011110)
- af41—Match packets with AF41 dscp (100010)
- af42—Match packets with AF42 dscp (100100)
- af43–Match packets with AF43 dscp (100110)
- cs1—Match packets with CS1 (precedence 1) dscp (001000)
- cs2—Match packets with CS2 (precedence 2) dscp (010000)
- cs3—Match packets with CS3 (precedence 3) dscp (011000)
- cs4—Match packets with CS4 (precedence 4) dscp (100000)
- cs5—Match packets with CS5 (precedence 5) dscp (101000)

- cs6—Match packets with CS6 (precedence 6) dscp (110000)
- cs7—Match packets with CS7 (precedence 7) dscp (111000)
- default—Default DSCP (000000)
- ef—Match packets with EF dscp (101110)

dscp range *dscp dscp*

(Optional) Differentiated services code point (DSCP) provides quality of service control. The values for *dscp* are as follows:

- 0–63—Differentiated services codepoint value
- af11—Match packets with AF11 dscp (001010)
- af12—Match packets with AF12 dscp (001100)
- af13—Match packets with AF13 dscp (001110)
- af21—Match packets with AF21 dscp (010010)
- af22—Match packets with AF22 dscp (010100)
- af23—Match packets with AF23 dscp (010110)
- af31—Match packets with AF31 dscp (011010)
- af32—Match packets with AF32 dscp (011100)
- af33—Match packets with AF33 dscp (011110)
- af41—Match packets with AF41 dscp (100010)
- af42—Match packets with AF42 dscp (100100)
- af43–Match packets with AF43 dscp (100110)
- cs1—Match packets with CS1 (precedence 1) dscp (001000)
- cs2—Match packets with CS2 (precedence 2) dscp (010000)
- cs3—Match packets with CS3 (precedence 3) dscp (011000)
- cs4—Match packets with CS4 (precedence 4) dscp (100000)
- cs5—Match packets with CS5 (precedence 5) dscp (101000)

	• cs6—Match packets with CS6 (precedence 6) dscp (110000) • cs7—Match packets with CS7 (precedence 7) dscp (111000) • default—Default DSCP (000000) • ef—Match packets with EF dscp (101110)
fragments	(Optional) Causes the software to examine noninitial fragments of IPv4 packets when applying this access list entry. When this keyword is specified, fragments are subject to the access list entry.
log	(Optional) Causes an informational logging message about the packet that matches the entry to be sent to the console. (The level of messages logged to the console is controlled by the **logging console** command.) The message includes the access list number, whether the packet was permitted or denied; the protocol, whether it was TCP, UDP, ICMP, or a number; and, if appropriate, the source and destination addresses and source and destination port numbers. The message is generated for the first packet that matches a flow, and then at 5-minute intervals, including the number of packets permitted or denied in the prior 5-minute interval.
log-input	(Optional) Provides the same function as the **log** keyword, except that the log-message also includes the input interface.
ttl	(Optional) Turns on matching against time-to-life (TTL) value.

ttl value [*value1 ... value2*]	(Optional) TTL value used for filtering. Range is 1 to 255. If only *value* is specified, the match is against this value. If both *value1* and *value2* are specified, the packet TTL is matched against the range of TTLs between *value1* and *value2* .
icmp-type	(Optional) ICMP message type for filtering ICMP packets. Range is from 0 to 255.
icmp-code	(Optional) ICMP message code for filtering ICMP packets. Range is from 0 to 255.
igmp-type	(Optional) IGMP message type (0 to 15) or message name for filtering IGMP packets, as follows: • dvmrp • host-query • host-report • mtrace • mtrace-response • pim • precedence • trace • v2-leave • v2-report • v3-report

operator	(Optional) Operator is used to compare source or destination ports. Possible operands are **lt** (less than), **gt** (greater than), **eq** (equal), **neq** (not equal), and **range** (inclusive range). If the operator is positioned after the *source* and *source-wildcard* values, it must match the source port. If the operator is positioned after the *destination* and *destination-wildcard* values, it must match the destination port. If the operator is positioned after the **ttl** keyword, it matches the TTL value. The **range** operator requires two port numbers. All other operators require one port number.
port	Decimal number a TCP or UDP port. Range is 0 to 65535. TCP ports can be used only when filtering TCP. UDP ports can be used only when filtering UDP.
protocol-port	Name of a TCP or UDP port. TCP and UDP port names are listed in the "Usage Guidelines" section. TCP port names can be used only when filtering TCP. UDP port names can be used only when filtering UDP.
established	(Optional) For the TCP protocol only: Indicates an established connection.
match-any	(Optional) For the TCP protocol only: Filters on any combination of TCP flags.
match-all	(Optional) For the TCP protocol only: Filters on all TCP flags.

+ | -	(Required) For the TCP protocol **match-any** , **match-all** : Prefix *flag-name* with + or - . Use the + *flag-name* argument to match packets with the TCP flag set. Use the - *flag-name* argument to match packets when the TCP flag is not set.
flag-name	(Optional) For the TCP protocol **match-any** , **match-all** . Flag names are: **ack** , **fin** , **psh** , **rst** , **syn** , **urg** .
counter	(Optional) Enables accessing ACL counters using SNMP query.
counter-name	Defines an ACL counter name.
police	(Optional) Enables traffic policing for the ACE.
rate	Specify the policing rate in bps, kbps, mbps, or gbps.

Command Default

There is no specific condition under which a packet is denied passing the IPv4 access list.

ICMP message generation is enabled by default.

Command Modes

IPv4 access list configuration

Command History

Release	Modification
Release 7.8.1	The **capture** option was introduced.
Release 7.6.1	The following options were introduced: • **log-input** • **police**
Release 7.5.4	**bitmask** keyword was introduced.
Release 6.3.2	The **vrf** option for **nexthop** was made mandatory.
Release 6.0	This command was introduced.

Usage Guidelines

Use the **permit** command following the **ipv4 access-list** command to specify conditions under which a packet can pass the access list.

By default, the first statement in an access list is number 10, and the subsequent statements are incremented by 10.

You can add **permit**, **deny**, or **remark** statements to an existing access list without retyping the entire list. To add a new **s**tatement anywhere other than at the end of the list, create a new statement with an appropriate entry number that falls between two existing entry numbers to indicate where it belongs.

Note If any ACE in an ACL contains ABF clause, this ACL cannot be applied at any non-zero compression level.

The following is a list of precedence names:

- critical
- flash
- flash-override
- immediate
- internet
- network
- priority
- routine

The following is a list of ICMP message type names:

- administratively-prohibited
- alternate-address
- conversion-error
- dod-host-prohibited
- dod-net-prohibited
- echo
- echo-reply
- general-parameter-problem
- host-isolated
- host-precedence-unreachable
- host-redirect
- host-tos-redirect
- host-tos-unreachable
- host-unknown
- host-unreachable

- information-reply
- information-request
- mask-reply
- mask-request
- mobile-redirect
- net-redirect
- net-tos-redirect
- net-tos-unreachable
- net-unreachable
- network-unknown
- no-room-for-option
- option-missing
- packet-too-big
- parameter-problem
- port-unreachable
- precedence-unreachable
- protocol-unreachable
- reassembly-timeout
- redirect
- router-advertisement
- router-solicitation
- source-quench
- source-route-failed
- time-exceeded
- timestamp-reply
- timestamp-request
- traceroute
- ttl-exceeded
- unreachable

The following is a list of TCP port names that can be used instead of port numbers. Refer to the current *Assigned Numbers* RFC to find a reference to these protocols. You can find port numbers corresponding to these protocols by typing a ? in the place of a port number.

- bgp
- chargen
- cmd
- daytime
- discard
- domain
- echo
- exec
- finger
- ftp
- ftp-data
- gopher
- hostname
- ident
- irc
- klogin
- kshell
- login
- lpd
- nntp
- pim-auto-rp
- pop2
- pop3
- smtp
- sunrpc
- tacacs
- talk
- telnet
- time
- uucp
- whois
- www

The following UDP port names can be used instead of port numbers. Refer to the current *Assigned Numbers* RFC to find a reference to these protocols. You can find port numbers corresponding to these protocols by typing a ? in the place of a port number.

- biff
- bootpc
- bootps
- discard
- dnsix
- domain
- echo
- isakmp
- mobile-ip
- nameserver
- netbios-dgm
- netbios-ns
- netbios-ss
- ntp
- pim-auto-rp
- rip
- snmp
- snmptrap
- sunrpc
- syslog
- tacacs
- talk
- tftp
- time
- who
- xdmcp

Use the following flags in conjunction with the **match-any** and **match-all** keywords and the + and - signs to select the flags to display:

- ack
- fin

- psh
- rst
- syn

For example, **match-all** *+ack +syn* displays TCP packets with both the ack *and* syn flags set, or **match-any** *+ack – - syn* displays the TCP packets with the ack set *or* the syn not set.

Task ID

Task ID	Operations
ipv4	read, write
acl	read, write

Examples

The following example shows how to set a permit condition for an access list named Internetfilter:

```
Router(config)# ipv4 access-list Internetfilter
Router(config-ipv4-acl)# 10 permit 192.168.34.0 0.0.0.255
Router(config-ipv4-acl)# 20 permit 172.16.0.0 0.0.255.255
Router(config-ipv4-acl)# 25 permit tcp host 172.16.0.0 eq bgp host 192.168.202.203 range
1300 1400
Router(config-ipv4-acl)# deny 10.0.0.0 0.255.255.255
```

This example shows how to configure the IPv4 access list named `v4-monitor-acl` that captures incoming (Rx) traffic.

```
Router(config)# ipv4 access-list v4-monitor-acl
Router(config-ipv4-acl)# 10 permit udp 20.1.1.0 0.0.0.255 eq 10 any any capture
Router(config-ipv4-acl)# 20 permit udp 30.1.1.0 0.0.0.255 eq 20 any
Router(config-ipv4-acl)# exit

Router(config)# show ipv4 access-list v4-monitor-acl hardware ingress location 0/1/CPU0
10 permit ipv4 any any capture (268324868 matches)
RP/D0/CB0/CPU0:ios#show ipv4 interface brief | in Up
Wed Mar 30 11:23:05.442 UTC
MgmtEthD0/CB0/CPU0/0 7.25.23.222 Up Up default
HundredGigE12/0/0/3 20.20.20.1 Up Up default
HundredGigE12/0/0/12 30.30.30.1 Up Up default
HundredGigE12/0/0/13 40.40.40.1 Up Up default
```

This example shows how you can configure DSCP bitmask on ingress ERSPAN.

```
Router# config
Router(config)# ipv4 access-list acl1
Router(config-ipv4-acl)# 10 permit ipv4 host 192.0.2.1 any dscp af22 bitmask 0x3f
Router(config-ipv4-acl)# commit
Router(config-ipv4-acl)# exit
Router(config)# interface HundredGigE0/0/0/6
Router(config-if)# ipv4 address 192.0.2.51 255.255.255.0
```

```
Router(config-if)# monitor-session TEST ethernet direction rx-only port-level acl ipv4 acl1
Router(config-if)# commit
```

permit (IPv6)

To set permit conditions for an IPv6 access list, use the **permit** command in IPv6 access list configuration mode. To remove the permit conditions, use the **no** form of this command.

[sequence-number] **permit** *source* { *source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address ipv6-wildcard-mask/prefix-length* } [*operator* { *port* | *protocol-port* }] capture] [**dscp** *value*] [**routing**] [**hop-by-hop**] [**authen**] [**destopts**] [**fragments**] [*packet-length operator packet-length value*] [**log** | **log-input**] [**ttl** *operator ttl value*]
nexthop1 [**vrf** *vrf-name-1*] [**ipv6** *ipv6-address-1*] [**nexthop2** [**vrf** *vrf-name-2*] [**ipv6** *ipv6-address-2*] [**nexthop3** [**vrf** *vrf-name-3*] [**ipv6** *ipv6-address-3*]]]
counter *counter-name*
[sequence-number] **permit** *protocol* { *source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address ipv6-wildcard-mask/prefix-length* } { *source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address* } [*operator* { *port* | *protocol-port* }] [**dscp** *value* [**bitmask** *value*] [**routing**] [**hop-by-hop**] [**authen**] [**destopts**] [**fragments**] [*packet-length operator packet-length value*] [**log** | **log-input**] [**ttl** *operator ttl value*]
nexthop1[**track** *track-name-1*] [**vrf** *vrf-name-1*] [**ipv6** *ipv6-address-1*] [**nexthop2**[**track** *track-name-2*] [**vrf** *vrf-name-2*] [**ipv6** *ipv6-address-2*] [**nexthop3**[**track** *track-name-3*] [**vrf** *vrf-name-3*] [**ipv6** *ipv6-address-3*]]] [**police** *rate*]
counter *counter-name*
no *sequence-number*

Internet Control Message Protocol (ICMP)
[sequence-number] **permit icmp** { *source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address ipv6-wildcard-mask/prefix-length* } { *source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address* } { *destination-ipv6-prefix/ prefix-length* | *any* | *host destination-ipv6-address ipv6-wildcard-mask/prefix-length* } [*icmp-type*] [*icmp-code*] [**dscp** *value*] [**routing**] [**hop-by-hop**] [**authen**] [**destopts**] [**fragments**] [**log** | **log-input**] [**counter** *counter-name*]

Transmission Control Protocol (TCP)
[sequence-number] **permit tcp** { *source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address ipv6-wildcard-mask/prefix-length* } [*operator* { *port* | *protocol-port* }] { *destination-ipv6-prefix/ prefix-length* | *any* | *host destination-ipv6-address ipv6-wildcard-mask/prefix-length* } [*operator* { *port* | *protocol* | *port* }] [**dscp** *value*] [**routing**] [**hop-by-hop**] [**authen**] [**destopts**] [**fragments**] [**established**] { **match-any | match-all | + | -** } [*flag-name*] [**log** | **log-input**] [**counter** *counter-name*]

User Datagram Protocol (UDP)
[sequence-number] **permit tcp** { *source-ipv6-prefix/ prefix-length* | *any* | *host source-ipv6-address ipv6-wildcard-mask/prefix-length* } [*operator* { *port* | *protocol-port* }] { *destination-ipv6-prefix/ prefix-length* | *any* | *host destination-ipv6-address ipv6-wildcard-mask/prefix-length* } [*operator* { *port* | *protocol* | *port* }] [**dscp** *value*] [**routing**] [**hop-by-hop**] [**authen**] [**destopts**] [**fragments**] [**established**] [*flag-name*] [**log** | **log-input**] [**counter** *counter-name*]

Syntax Description

sequence-number	(Optional) Number of the **permit** statement in the access list. This number determines the order of the statements in the access list. Range is from 1 to 2147483644. (By default, the first statement is number 10, and the subsequent statements are incremented by 10.)
protocol	Name or number of an Internet protocol. It can be one of the keywords **ahp**, **esp**, **gre** , **icmp**, **igmp**, **igrp**, **isinip**, **ipv6**, **nos**, **ospf**, **pcp**, **sctp**, **tcp**, or **udp**, or an integer that ranges from 0 to 255, representing an IPv6 protocol number.
source-ipv6-prefix / *prefix-length*	Source IPv6 network or class of networks about which permit conditions are to be set. This argument must be in the form documented in RFC 2373, where the address is specified in hexadecimal using 16-bit values between colons.
any	An abbreviation for the IPv6 prefix ::/0.
capture	Captures matching traffic. When the acl command is configured on the source mirroring port, if the ACL configuration command does not use the **capture** keyword, no traffic gets mirrored. If the ACL configuration uses the **capture** keyword, but the acl command is not configured on the source port, then the whole port traffic is mirrored and the **capture** action does not have any effect.

host *source-ipv6-address*	Source IPv6 host address about which to set permit conditions. This *source-ipv6-address* argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
ipv6-wildcard-mask	IPv6 wildcard mask. The IPv6 wildcard mask can take any IPv6 address value which is used instead of prefix length.
vrf *vrf-name*	Specifies VPN routing and forwarding (VRF) instance.
nexthop1, nexthop2, nexthop3	Specifies the next hop for this entry. **Note** You must specify the VRF for all nexthops unless the nexthop is in the default VRF.
track *track-name*	Specifies object tracking name for the corresponding next hop.

operator {*port* | *protocol-port*}	(Optional) Operand that compares the source or destination ports of the specified protocol. Operands are **lt** (less than), **gt** (greater than), **eq** (equal), **neq** (not equal), and **range** (inclusive range). If the operator is positioned after the *source-ipv6-prefix / prefix-length* argument, it must match the source port. If the operator is positioned after the *destination-ipv6-prefix / prefix-length* argument, it must match the destination port. The **range** operator requires two port numbers. All other operators require one port number. The *port* argument is the decimal number of a TCP or UDP port. A port number is a number whose range is from 0 to 65535. The *protocol-port* argument is the name of a TCP or UDP port. TCP port names can be used only when filtering TCP. UDP port names can be used only when filtering UDP.
destination-ipv6-prefix / prefix-length	Destination IPv6 network or class of networks about which permit conditions are to be set. This argument must be in the form documented in RFC 2373, where the address is specified in hexadecimal using 16-bit values between colons.
host *destination-ipv6-address*	Specifies the destination IPv6 host address about which permit conditions are to be set. This *destination-ipv6-address* argument must be in the form documented in RFC 2373, where the address is specified in hexadecimal using 16-bit values between colons.

dscp *value*	(Optional) Matches a differentiated services code point (DSCP) value against the traffic class value in the Traffic Class field of each IPv6 packet header. Range is from 0 to 63.
routing	(Optional) Matches source-routed packets against the routing extension header within each IPv6 packet header.
hop-by-hop	(Optional) Supports Jumbo-grams. With the Router Alert option, it is an integral part in the operation of Multicast Listener Discovery (MLD). Router Alert [3] is an integral part in the operations of IPv6 Multicast through MLD and RSVP for IPv6.
authen	(Optional) Matches if the IPv6 authentication header is present.
destopts	(Optional) Matches if the IPv6 destination options header is present.
fragments	(Optional) Matches noninitial fragmented packets where the fragment extension header contains a nonzero fragment offset. The **fragments** keyword is an option available only if the *operator* [*port-number*] arguments are not specified.

log	(Optional) Causes an informational logging message about the packet that matches the entry to be sent to the console. (The level of messages logged to the console is controlled by the **logging console** command.) The message includes the access list name and sequence number, and whether the packet is permitted; the protocol, and whether it is TCP, UDP, ICMP, or a number; and, if appropriate, the source and destination addresses and source and destination port numbers. The message is generated for the first matching packet, and then at 5-minute intervals, including the number of packets permitted in the prior 5-minute interval.
log-input	(Optional) Provides the same function as the **log** keyword, except that the log-message also includes the input interface.
ttl	(Optional) Turns on matching against time-to-live (TTL) value.
operator	(Optional) Operand that compares the source or destination ports of the specified protocol. Operands are **lt** (less than), **gt** (greater than), **eq** (equal), **neq** (not equal), and **range** (inclusive range).
ttl value [*value1 value2*]	(Optional) TTL value used for filtering. Range is from 1 to 255. If only *value* is specified, the match is against this value. If both *value1* and *value2* are specified, the packet TTL is matched against the range of TTLs between *value1* and *value2* .
icmp-type	(Optional) ICMP message type for filtering ICMP packets. Range is from 0 to 255.
icmp-code	(Optional) ICMP message code for filtering ICMP packets. Range is from 0 to 255.

established	(Optional) For the TCP protocol only: Indicates an established connection.
match-any	(Optional) For the TCP protocol only: Filters on any combination of TCP flags.
match-all	(Optional) For the TCP protocol only: Filters on all TCP flags.
+ | -	(Required) For the TCP protocol **match-any** , **match-all** : Prefix *flag-name* with + or - . Use the + *flag-name* argument to match packets with the TCP flag set. Use the - *flag-name* argument to match packets when the TCP flag is not set.
flag-name	(Required) For the TCP protocol **match-any**, **match-all**. Flag names are: **ack**, **fin**, **psh**, **rst**, **syn**, **urg**.
counter	(Optional) Enables accessing ACL counters using SNMP query.
counter-name	Defines an ACL counter name.
police	(Optional) Enables traffic policing for the ACE.
rate	Specify the policing rate in bps, kbps, mbps, or gbps.

Command Default

No IPv6 access list is defined.

ICMP message generation is enabled by default.

Command Modes

IPv6 access list configuration

Command History

Release	Modification
Release 7.8.1	The **capture** option was introduced.
Release 7.6.1	The following options were introduced: • **log-input** • **police**

Release	Modification
Release 7.5.4	**bitmask** keyword was introduced.
Release 6.3.2	The **vrf** option for **nexthop** was made mandatory.
Release 6.0	This command was introduced.

Usage Guidelines

The **permit** (IPv6) command is similar to the **permit** (IPv4) command, except that it is IPv6-specific.

Use the **permit** (IPv6) command following the **ipv6 access-list** command to define the conditions under which a packet passes the access list.

Specifying **ipv6** for the *protocol* argument matches against the IPv6 header of the packet.

By default, the first statement in an access list is number 10, and the subsequent statements are numbered in increments of 10.

You can add **permit**, **deny, or remark** statements to an existing access list without retyping the entire list. To add a new statement anywhere other than the end of the list, create a new statement with an appropriate entry number that falls between two existing entry numbers to indicate where it belongs.

Both the *source-ipv6-prefix/prefix-length* and *destination-ipv6-prefix/prefix-length* arguments are used for traffic filtering (the source prefix filters traffic based upon the traffic source; the destination prefix filters traffic based upon the traffic destination).

Note IPv6 prefix lists, and not access lists, should be used for filtering routing protocol prefixes.

The **fragments** keyword is an option available only if the *operator* [*port* | *protocol-port*] arguments are not specified.

Task ID

Task ID	Operations
acl	read, write

Examples

This example shows how to configure the IPv6 access list named v6-abf-acl and apply the access list to inbound traffic on HundredGigE interface 0/0/2/0.

```
Router(config)# ipv6 access-list v6-abf-acl
Router(config-ipv6-acl)# 10 permit ipv6 any any
Router(config-ipv6-acl)# 20 permit ipv4 any any
Router(config)# interface HundredGigE 0/0/2/0
Router(config-if)# ipv6 access-group v6-abf-acl ingress
```

The following example shows how to configure the IPv6 access list named toCISCO and apply the access list to the traffic entering theHundredGigE interface 0/2/0/2. Specifically, the permit entry in the list allows all packets that have a hop-by-hop optional field from entering the HundredGigE interface 0/2/0/2.

```
Router(config)# ipv6 access-list toCISCO
Router(config-ipv6-acl)# permit ipv6 any any hop-by-hop
Router(config)#  interface HundredGigE 0/2/0/2
Router(config-if)# ipv6 access-group tOCISCO ingress
```

This example shows how to configure the IPv6 access list named Test with ACL-based policing applied to each ACEs.

```
Router(config)# ipv6 access-list Test
Router(config-ipv6-acl)# 10 permit fec0:0:0:2::/64 any police 10 gbps
Router(config-ipv6-acl)# 20 permit any any police 1274 kbps

Router# show ipv6 access-lists Test hardware ingress location 0/1/CPU0
10 permit fec0:0:0:2::/64 any (Accepted: 24303 packets, Dropped: 0 packets)
20 permit any any (Accepted: 13 packets, Dropped: 0 packets)
```

This example shows how to configure the IPv4 access list named `v6-monitor-acl` that captures incoming (Rx) traffic.

```
Router(config)# ipv4 access-list v6-monitor-acl
Router(config-ipv4-acl)# 10 permit udp 20.1.1.0 0.0.0.255 eq 10 any any capture
Router(config-ipv4-acl)# 20 permit udp 30.1.1.0 0.0.0.255 eq 20 any
Router(config-ipv4-acl)# exit

Router(config)# show ipv4 access-list v6-monitor-acl hardware ingress location 0/1/CPU0
ipv6 access-list v6-monitor-acl
10 permit ipv6 any any capture (224202945 matches)
Router#sh run int HundredGigE12/0/0/3
Wed Mar 30 11:47:01.155 UTC
interface HundredGigE12/0/0/3
ipv4 address 20.20.20.1 255.255.255.0
ipv6 address 2020::1/64
monitor-session mon1 ethernet direction rx-only port-level
acl
```

The following example shows how you can configure DSCP bitmask on ingress ERSPAN.

```
Router# config
Router(config)# ipv6 access-list acl1
Router(config-ipv6-acl)# 10 permit ipv6 host 2001:DB8::2/32 any dscp 33 bitmask 0x3f
Router(config-ipv6-acl)# commit
Router(config-ipv6-acl)# exit
Router(config)# interface HundredGigE 0/0/10/3
Router(config-if)# ipv6 address 2001:DB8::1/32
Router(config-if)# monitor-session TEST ethernet direction rx-only port-level acl ipv6 acl1
Router(config-if)# commit
```

remark (IPv4)

To write a helpful comment (remark) for an entry in an IPv4 access list, use the **remark** command in IPv4 access list configuration mode. To remove the remark, use the **no** form of this command.

[*sequence-number*] **remark** *remark*
no *sequence-number*

Syntax Description

sequence-number	(Optional) Number of the **remark** statement in the access list. This number determines the order of the statements in the access list. Range is 1 to 2147483646. (By default, the first statement is number 10; subsequent statements are incremented by 10.)
remark	Comment that describes the entry in the access list, up to 255 characters long.

Command Default

The IPv4 access list entries have no remarks.

Command Modes

IPv4 access list configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **remark** command to write a helpful comment for an entry in an IPv4 access list. To remove the remark, use the **no** form of this command.

The remark can be up to 255 characters; anything longer is truncated.

If you know the sequence number of the remark you want to delete, you can remove it by entering the **no** *sequence-number* command.

Task ID

Task ID	Operations
ipv4	read, write
acl	read, write

Examples

In the following example, the user1 subnet is not allowed to use outbound Telnet:

```
RP/0/RP0/CPU0:router(config)# ipv4 access-list telnetting
RP/0/RP0/CPU0:router(config-ipv4-acl)# 10 remark Do not allow user1 to telnet out
RP/0/RP0/CPU0:router(config-ipv4-acl)# 20 deny tcp host 172.16.2.88 255.255.0.0 any eq
telnet
RP/0/RP0/CPU0:router(config-ipv4-acl)# 30 permit icmp any any
RP/0/RP0/CPU0:router# show ipv4 access-list telnetting

ipv4 access-list telnetting
  0 remark Do not allow user1 to telnet out
```

```
20 deny tcp 172.16.2.88 255.255.0.0 any eq telnet out
30 permit icmp any any
```

remark (IPv6)

To write a helpful comment (remark) for an entry in an IPv6 access list, use the **remark** command in IPv6 access list configuration mode. To remove the remark, use the **no** form of this command.

[*sequence-number*] **remark** *remark*
no *sequence-number*

Syntax Description

sequence-number	(Optional) Number of the **remark** statement in the access list. This number determines the order of the statements in the access list. Range is 1 to 2147483646. (By default, the first statement is number 10, and the subsequent statements are incremented by 10.)
remark	Comment that describes the entry in the access list, up to 255 characters long.

Command Default

The IPv6 access list entries have no remarks.

Command Modes

IPv6 access list configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **remark** (IPv6) command is similar to the **remark** (IPv4) command, except that it is IPv6-specific.

Use the **remark** command to write a helpful comment for an entry in an IPv6 access list. To remove the remark, use the **no** form of this command.

The remark can be up to 255 characters; anything longer is truncated.

If you know the sequence number of the remark you want to delete, you can remove it by entering the **no** *sequence-number* command.

Task ID

Task ID	Operations
acl	read, write

Examples

In this example, a remark is added:

```
RP/0/(config)# ipv6 access-list Internetfilter
RP/0/(config-ipv6-acl)# 10 permit ipv6 3333:1:2:3::/64 any
RP/0/(config-ipv6-acl)# 20 permit ipv6 4444:1:2:3::/64 any
RP/0/(config-ipv6-acl)# 30 permit ipv6 5555:1:2:3::/64 any
RP/0/(config-ipv6-acl)# 39 remark Block BGP traffic from a given host
```

```
RP/0/(config-ipv6-acl)# 40 deny tcp host 6666:1:2:3::10 eq bgp host 7777:1:2:3::20 range
1300 1400
RP/0/# show ipv6 access-list Internetfilter

ipv6 access-list Internetfilter
  10 permit ipv6 3333:1:2:3::/64 any
  20 permit ipv6 4444:1:2:3::/64 any
  30 permit ipv6 5555:1:2:3::/64 any
  39 remark Block BGP traffic from a given host
  40 deny tcp host 6666:1:2:3::10 eq bgp host 7777:1:2:3::20 range host 6666:1:2:3::10 eq
bgp host 7777:1:2:3::20 range 1300 1400
```

ttl-match

To enable ACLs to match on a specified TTL value, use the **ttl-match** option with the **hw-module** command in the global configuration mode.

hw-module profile tcam format access-list ipv4 src-addr src-port enable-set-ttl ttl-match
hw-module profile tcam format access-list ipv4 dst-addr dst-port enable-set-ttl ttl-match
hw-module profile tcam format access-list ipv6 src-addr src-port next-hdr enable-set-ttl ttl-match
hw-module profile tcam format access-list ipv6 dst-addr dst-port src-port next-hdr enable-set-ttl ttl-match

Syntax Description

dst-addr	Destination address. 32 bit qualifier for IPv4 ACLs and 128-bit qualifier for IPv6 ACLs.
dst-port	Destination L4 Port. 16-bit qualifier
frag-bit	Fragmentation bit for IPv4 ACLs. 1-bit qualifier
enable-capture	Enables ACL-based traffic mirroring and disables ACL logging..
enable-set-ttl	Enables the setting or rewriting of an ACL.
interface-based	Configures ACLs to be unique for an interface.
location	Specifies location of an access list.
next-hdr	Specifies the next header of IPv6 access list, which is an 8-bit qualifier. This option is mandatory.
packet-length	Specifies packet length for IPv4 ACLs, which is a 10-bit qualifier.
payload-length	Specifies payload length for IPv6 ACLs, which is a 16-bit qualifier.
port-range	Specifies IPv4 port range qualifier, 24-bit qualifier
precedence	Specifies DSCP precedence. 10-bit qualifier
proto	Specifies protocol type. 8-bit qualifier

src-addr	Specifies source address. 32-bit qualifier for IPv4 ACLs and 128-bit qualifier for IPv6 ACLs.
src-port	Specifies source L4 port. 16-bit qualifier. This is a mandatory option.
tcp-flags	Specifies TCP Flags. 6-bit qualifier for IPv4 ACLs and 8-bit qualifier for IPv6 ACLs.
traffic-class	Specifies traffic class for IPv6 ACLs, which is an 8-bit qualifier.
ttl-match	Enables ACLs to match on specified TTL value.
udf1	Specifies user-defined filter.
udf2	Specifies user-defined filter.
udf3	Specifies user-defined filter.
udf4	Specifies user-defined filter.
udf5	Specifies user-defined filter.
udf6	Specifies user-defined filter.
udf7	Specifies user-defined filter.
udf8	Specifies user-defined filter.

Command Default

None

Command Modes

Global configuration mode

Command History

Release	Modification
6.3.2	This command was introduced.

Usage Guidelines

Using TTL matching for ACLs is known to have the following limitations.

- TTL matching is supported only for ingress ACLs.
- TTL rewrite using the set ttl command, cannot be used with ACL logging.
- If a TTL rewrite is applied to the outer IPv4/IPv6 header of an IP-in-IP header, then when the outer IPv4/IPv6 header is decapsulated, (by GRE decapsulation) the TTL rewrite is also applied to the inner IPv4/IPv6 header.

Enabling TTL Matching and Rewriting for IPv4 ACLs

The following configuration describes how you can enable TTL Matching and Rewriting for IPv4 ACLs.

```
/* Enable TTL matching and rewriting in the global configuration mode by using the hw-module
 command */
Router(config)# hw-module profile tcam format access-list ipv4 dst-addr dst-port proto
port-range enable-set-ttl ttl-match
```

For complete ACL configuration, see the Configuring TTL Matching and Rewriting for IPv4 ACLs section in the *IP Addresses and Services Configuration Guide for NCS 5500 Series Routers*

Enabling TTL Matching and Rewriting for IPv6 ACLs

The following configuration describes how you can enable TTL Matching and Rewriting for IPv4 ACLs.

```
/* Enable TTL matching and rewriting in the global configuration mode by using the hw-module
 command */
Router(config)# hw-module profile tcam format access-list ipv6 dst-addr dst-port src-port
next-hdr enable-set-ttl ttl-match
```

For complete ACL configuration, see the Configuring TTL Matching and Rewriting for IPv6 ACLs section in the *IP Addresses and Services Configuration Guide for NCS 5500 Series Routers*

tx-scale-enhanced acl-permit

To get the permitted statistics of the routing traffic that are allowed by an ACL for increasing the Tx scale, use the **tx-scale-enhanced acl-permit** command. Statistics of the routing sessions that are not allowed by an ACL are enabled by default.

hw-module profile stats tx-scale-enhanced acl-permit

Syntax Description

hw-module	Configures the hardware module.
profile	Configures the profile of the hardware module.
stats	Configures the statistics profile.
tx-scale-enhanced	Increases the Tx scale.
acl-permit	Enables the statistics of the routing traffic that are permitted by an ACL.

Command Default

If you do not configure the **tx-scale-enhanced acl-permit** command, the statistics for the routing traffic permitted by an ACL are not enabled.

Command History

Release	Modification
Release 6.2.1	This command was introduced.

Usage Guidelines

- The permit statistics of the routing traffic allowed by an ACL are available only for NCS 5500 routers after you execute the **tx-scale-enhanced acl-permit** command and reboot the line cards.
- QoS stats are not supported (disabled) when acl-permit stats are enabled.
- You need not configure this command for NC57-24DD and NC57-18DD-SE line cards because both the permitted and denied statistics of the routing traffic that are allowed by an ACL are available by default for these line cards.

Task ID

Task ID	Operations
configuration	read, write
root-lr	read, write

Examples

The following example shows you how to configure the**tx-scale-enhanced acl-permit** command:

```
Router# configure
Router(config)# hw-module profile stats tx-scale-enhanced acl-permit
Tuw Aug  14 15:31:47.505 UTC
In order to activate/deactivate this stats profile, you must manually reload the chassis/all
 line cards
Router(config)# commit
Tue Aug 14 15:31:50.103 UTC
LC/0/4/CPU0:Aug 14 15:31:50.218 UTC: fia_driver[245]:
%FABRIC-FIA_DRVR-4-STATS_HW_PROFILE_MISMATCH : Mismatch found, reload LC to activate the
new stats profile
Router(config)#
```

set qos-group

To set the quality of service (QoS) group identifiers on packets, use the **set qos-group** command in policy map class configuration mode. To leave the QoS group values unchanged, use the **no** form of this command.

set qos-group *qos-group-value*
no set qos-group *qos-group-value*

Syntax Description

qos-group-value	QoS group ID. An integer from 1 to 7, to be marked on the packet. The *qos-group-value* is used to select a CoSQ and eventually to a VOQ

Command Default

No group ID is specified.

Command Modes

Policy map class configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **set qos-group** command is supported only in the ingress direction.

The **set qos-group** will be used as internal priority to choose the queue on the egress port.

In the ingress policy-map, in order to designate the traffic class to a certain CoSQ other than CoSQ 0, the class-map needs to have an explicit set qos-group x statement, where 'x' is the CoSQ in the range of 0 to 7. The default COSQ is 0. In the egress policy-map, a class-map with a corresponding match qos-group x will allow further Quality of Service actions to be applied to the traffic class. For example,

```
class-map prec1
  match prec 1

policy-map test-ingress
  class prec1
    set qos-group 1
    police rate percent 50


class-map qg1
  match qos-group 1


policy-map test-egress
  class qg1
    shape average percent 70
```

Task ID

Task ID	Operations
qos	read, write

Examples

This example sets the QoS group to 5 for packets that match the MPLS experimental bit 1:

```
Router(config)# class-map class1
Router(config-cmap)# match mpls experimental topmost 1
Router(config-cmap)# exit

Router(config)# policy-map policy1
Router(config-pmap)# class class1
Router(config-pmap-c)# set qos-group 5
Router(config-pmap-c)# exit
Router(config-pmap)# exit

Router(config)# HundredGigE interface 0/1/0/0
Router(config-if)# service-policy input policy1
```

set ttl

To set or rewrite the TTL field, use the **set ttl** command in global configuration mode.

set ttl *value*

Syntax Description

value	Value of TTL to be set. Range: 0-255

Command Default

No group ID is specified.

Command Modes

Global configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Task ID

Task ID	Operations
ttl	read, write

Usage Guidelines

Using TTL matching for ACLs is known to have the following limitations.

- TTL matching is supported only for ingress ACLs.
- TTL rewrite using the set ttl command, cannot be used with ACL logging.
- If a TTL rewrite is applied to the outer IPv4/IPv6 header of an IP-in-IP header, then when the outer IPv4/IPv6 header is decapsulated, (by GRE decapsulation) the TTL rewrite is also applied to the inner IPv4/IPv6 header.

Setting the TTL value to less than 50 for an ACL:

The following example describes how you can set TTL values for IPv4 ACLs.

```
/* Enter the global configuration mode and configure an IPv4 access list */
Router# config
Router(config)# ipv4 access-list abc
Router(config-ipv4-acl)# 20 permit tcp any any

/* Set the ACL with an either greater than (gt) or lesser  than (lt)  TTL value. The range
 is 0-255 */
Router(config-ipv4-acl)# 20 permit tcp any any ttl lt 50 set
Router(config-ipv4-acl)# commit
```

show access-lists afi-all

To display the contents of current IPv4 and IPv6 access lists, use the **show access-lists afi-all** command in XR EXEC mode.

show access-lists afi-all

Syntax Description This command has no keywords or arguments.

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
acl	read

Examples This sample output is from the **show access-lists afi-all** command:

```
RP/0/RP0/CPU0:router# show access-lists afi-all

ipv4 access-list test_ipv4
 10 permit ipv4 any any
 20 deny tcp any eq 2000 any eq 2000
 30 permit tcp any eq 3000 any eq 3000
ipv6 access-list test_ipv6
 10 permit ipv6 any any
 20 permit tcp any eq 3000 any eq 3000
```

show access-lists ipv4

To display the contents of current IPv4 access lists, use the **show access-lists ipv4** command in XR EXEC mode.

show access-lists ipv4 [{ *access-list-name* **hardware** { **ingress** | **verify** } [**resource-check location** *loc*] [**interface** *type interface-path-id*] { **sequence** *number* | **location** *node-id* } | **summary** [*access-list-name*] | *access-list-name* [*sequence-number*] | **maximum** [**detail**] [**usage pfilter** { **location** *node-id* | **all** }]}]

Syntax Description

access-list-name	(Optional) Name of a particular IPv4 access list. The name cannot contain spaces or quotation marks, but can include numbers.
hardware	(Optional) Identifies the access list as an access list for an interface.
ingress	(Optional) Specifies an inbound interface.
verify	(Optional) Verifies the ACL configured. **Note** The **verify** keyword is not supported on NC57-24DD and NC57-18DD-SE line cards.
interface	(Optional) Displays interface statistics.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
sequence *number*	(Optional) Sequence number of a particular IPv4 access list. Range is 1 to 2147483644.
location *node-id*	(Optional) Location of a particular IPv4 access list. The *node-id* argument is entered in the *rack/slot/module* notation.
summary	(Optional) Displays a summary of all current IPv4 access lists.

sequence-number	(Optional) Sequence number of a particular IPv4 access list. Range is 1 to 2147483644.
maximum	(Optional) Displays the current maximum number of configurable IPv4 access control lists (ACLs) and access control entries (ACEs).
detail	(Optional) Displays TCAM entries.
usage	(Optional) Displays the usage of the access list on a given line card.
pfilter	(Optional) Displays the packet filtering usage for the specified line card.
all	(Optional) Displays the location of all the line cards.
resource-check	(Optional) Displays the TCAM resource usage with compression level. **Note** This option is only available on the NC57-18DD-SE and NC57-24DD line cards for hybrid ACLs.
location *loc*	Displays location for a particular IPv4 access list. The *loc* argument is entered in the *rack/slot/module* notation.

Command Default

The default displays all IPv4 access lists.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.10.1	Added **resource-check** option to display the TCAM usage for hybrid ACLs.
Release 7.9.1	The ACL counters displays statistics in bytes.
Release 7.6.1	Added counters for packets allowed and dropped according to policing rate per ACE.
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show access-lists ipv4** command to display the contents of all IPv4 access lists. To display the contents of a specific IPv4 access list, use the *name* argument. Use the *sequence-number* argument to specify the sequence number of the access list.

Use the **hardware , ingress** and **location** keywords to display the access list hardware contents and counters for all interfaces that use the specified access list in a given direction. To display the contents of a specific access list entry, use the **sequence** *number* keyword and argument. The access group for an interface must be configured using the **ipv4 access-group** command for access list hardware counters to be enabled.

Use the **show access-lists ipv4 summary** command to display a summary of all current IPv4 access lists. To display a summary of a specific IPv4 access list, use the *name* argument.

Use the **show access-list ipv4 usage** command to display a summary of all interfaces and access lists programmed on the specified line card.

Use the **resource-check** keyword to display a TCAM usage for hybrid ACLs on the NC57-18DD-SE and NC57-24DD line cards.

Task ID

Task ID	Operations
acl	read

Examples

In the following example, the contents of all IPv4 access lists are displayed:

```
Router# show access-lists ipv4


ipv4 access-list test_ipv4
 10 permit ipv4 any any
 20 deny tcp any eq 2000 any eq 2000
 30 permit tcp any eq 3000 any eq 3000
```

In the following example, the contents of an access list named Test that has ACL-based policing is configured is displayed:

```
Router(config)# show ipv4 access-list Test hardware ingress location 0/1/CPU0
10 permit 192.168.34.0 0.0.0.255 (Accepted: 130 packets, Dropped: 0 packets)
20 permit 172.16.0.0 0.0.255.255 (Accepted: 1005 packets, Dropped: 0 packets)
30 permit 10.0.0.0 0.255.255.255 (Accepted: 10303 packets, Dropped: 7 packets)
```

This table describes the significant fields shown in the display.

Table 7: show access-lists ipv4 hardware Field Descriptions

Field	Description
ACL name	Name of the ACL programmed in hardware.
Sequence Number	Each ACE sequence number is programmed into hardware with all the fields that are corresponding to the values set in ACE.
Grant	Depending on the ACE rule, the grant is set to deny, permit, or both.
Logging	Logging is set to on if ACE uses a log option to enable logs.

Field	Description
Per ace icmp	If Per ace icmp is set to on in the hardware, ICMP is unreachable, is rate-limited, and is generated. The default is set to on.
Hits	Hardware counter for that ACE.

In the following example, a summary of all IPv4 access lists are displayed:

```
Router# show access-lists ipv4 summary

ACL Summary:
  Total ACLs configured: 3
  Total ACEs configured: 11
```

This table describes the significant fields shown in the display.

Table 8: show access-lists ipv4 summary Field Descriptions

Field	Description
Total ACLs configured	Number of configured IPv4 ACLs.
Total ACEs configured	Number of configured IPV4 ACEs.

This example displays the packet filtering usage for the specified line card:

```
Router# show access-lists ipv4 usage pfilter location 0/RP0/CPU0


 Interface : TenGigE0/0/0/10/0
Input ACL : Common-ACL : N/A ACL : test_ipv4
Output ACL : N/A
```

Note To display the packet filtering usage for bundle interfaces, use the **show access-lists ipv4 usage pfilter location all** command.

This example displays the ACL contents:

```
Router# show access-lists IPv4-ABF hardware ingress location 0/6/CPU0

Wed Feb 19 13:36:26.663 PST
ipv4 access-list IPv4-ABF
100 permit tcp host 27.0.0.2 any eq 8080 (6854367 matches) (next-hop: addr=21.0.0.2, vrf
name=vrf1)
110 permit tcp any eq https any (6858321 matches) (next-hop: addr=200.1.1.2, vrf name=vrf2)
120 permit ipv4 any any (6940396 matches) (next-hop: addr=50.0.0.1, vrf name=default)
```

In the following example, the statistics IPv4 access lists are displayed in bytes and packet counts:

```
Router:ios# show access-lists ipv4 ac hardware ingress location 0/0/CPU0
ipv4 access-list ac
 10 permit ipv4 any 2.2.0.0 0.0.255.255 dscp af11 (477 matches) (30528 byte matches)
 20 permit ipv4 any 2.2.0.0 0.0.255.255 police 5 gbps (Accepted: 464 matches, Dropped: 0)
(Accepted: 29696 byte matches, Dropped: 0 bytes)
```

In the following example, the internal TCAM entries for IPv4 access lists with compression level 3 are displayed for ingress traffic:

```
Router#show access-lists ipv4 acl_NTP hardware ingress resource-check location 0/6/CPU0
Wed Jan 25 03:33:42.945 UTC
ACL name : acl_NTP
ACL compression level : 3
Internal TCAM Entries required : 8
```

In the following example, the IPv4 access list is displayed using **detail** keyword:

```
Router# show access-lists ipv4 objv4acl hardware ingress detail location 0/0/CPU0
objv4acl Details:
Sequence Number: 10
NPU ID: 0
Number of DPA Entries: 1
ACL ID: 2
ACE Action: PERMIT
ACE Logging: DISABLED
ABF Action: 0(ABF_NONE)
Hit Packet Count: 477 Byte Count: 30528
Source Address: 0.0.0.1 (Mask 255.255.255.254)
Destination Address: 0.0.0.1 (Mask 255.255.255.254)
DPA Entry: 1
        Entry Index: 0
        DPA Handle: 0x8E08F0A8
        DSCP: 0x28 (Mask 0xFC)
Sequence Number: IMPLICIT DENY
NPU ID: 0
Number of DPA Entries: 1
ACL ID: 2
ACE Action: DENY
ACE Logging: DISABLED
ABF Action: 0(ABF_NONE)
Hit Packet Count: 0 Byte Count: 0
Source Address: 0.0.0.2 (Mask 255.255.255.253)
Destination Address: 0.0.0.2 (Mask 255.255.255.253)
DPA Entry: 1
        Entry Index: 0
        DPA Handle: 0x8E08F390
```

show access-lists ipv6

To display the contents of current IPv6 access lists, use the **show access-lists ipv6** command in .

show access-lists ipv6 [{ *access-list-name* **hardware** { **ingress** | **verify** } [**resource-check location** *loc*] [**interface** *type interface-path-id*] { **sequence** *number* | **location** *node-id* } | **summary** [*access-list-name*] | *access-list-name* [*sequence-number*] | **maximum** [**detail**] [**usage pfilter** { **location** *node-id* | **all** }]}]

Syntax Description

access-list-name	(Optional) Name of a particular IPv6 access list. The name cannot contain a spaces or quotation marks, but can include numbers.
hardware	(Optional) Identifies the access list as an access list for an interface.
ingress	(Optional) Specifies an inbound interface.
verify	Verifies the ACL configured. **Note** The **verify** keyword is not supported on NC57-24DD and NC57-18DD-SE line cards.
interface	(Optional) Displays interface statistics.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	(Optional) Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0/CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
sequence *number*	(Optional) Sequence number of a particular IPv6 access list. Range is 1 to 2147483644.
location *node-id*	(Optional) Location of a particular IPv6 access list. The *node-id* argument is entered in the *rack/slot/module* notation.
summary	(Optional) Displays a summary of all current IPv6 access lists.
sequence-number	(Optional) Sequence number of a particular IPv6 access list. Range is 1 to 2147483644.
maximum	(Optional) Displays the current maximum number of configurable IPv6 access control lists (ACLs) and access control entries (ACEs).
detail	(Optional) Displays TCAM entries.
usage	(Optional) Displays the usage of the access list on a given line card.

pfilter	(Optional) Displays the packet filtering usage for the specified line card.
all	(Optional) Displays the location of all the line cards.
resource-check	(Optional) Displays the TCAM resource usage with compression level for a particular IPv6 access list. The *loc* argument is entered in the *rack/slot/module* notation. **Note** This option is only available on the NC57-18DD-SE and NC57-24DD line cards for hybrid ACLs.
location *loc*	Displays location for a particular IPv6 access list. The *loc* argument is entered in the *rack/slot/module* notation.

Command Default

Displays all IPv6 access lists.

Command Modes

Command History

Release	Modification
Release 7.10.1	Added **resource-check** option to display the TCAM usage for hybrid ACLs.
Release 7.9.1	The ACL counters displays statistics in bytes.
Release 7.6.1	Added counters for packets allowed and dropped according to policing rate per ACE.
Release 6.0	This command was introduced.

Usage Guidelines

The **show access-lists ipv6** command is similar to the **show access-lists ipv4** command, except that it is IPv6 specific.

Use the **show access-lists ipv6** command to display the contents of all IPv6 access lists. To display the contents of a specific IPv6 access list, use the *name* argument. Use the *sequence-number* argument to specify the sequence number of the access list.

Use the **hardware , ingress** and **location** keywords to display the access list hardware contents and counters for all interfaces that use the specified access list in a given direction. To display the contents of a specific access list entry, use the **sequence** *number* keyword and argument. The access group for an interface must be configured using the **ipv6 access-group** command for access list hardware counters to be enabled.

Use the **show access-lists ipv6 summary** command to display a summary of all current IPv6 access lists. To display a summary of a specific IPv6 access list, use the *name* argument.

Use the **show access-list ipv6 usage** command to display a summary of all interfaces and access lists programmed on the specified line card.

Use the **resource-check** keyword to display a TCAM usage for hybrid ACLs on the NC57-18DD-SE and NC57-24DD line cards.

Task ID

Task ID	Operations
acl	read

Examples

In the following example, the IPv6 ACL is configured with the source IPv6 wildcard mask FF:0:FFFF:AA:20 and the destination wildcard mask 0:FFFF:2233::FFFF, the show command displays these wildcard mask:

```
Router# config
Router(config)# ipv6  access-list acl1
Router(config-ipv6-acl)# permit 1:2::3 FF:0:FFFF:AA:20:: 4:5::6 0:FFFF:2233::FFFF
Router(config-ipv6-acl)# commit
Router# show run ipv6 access-list
ipv6 access-list ACL1
 10 permit ipv6 1:2::3 ff:0:ffff:aa:20:: 4:5::6 0:ffff:2233::ffff
```

In the following example, the contents of all IPv6 access lists are displayed:

```
Router# show access-lists ipv6

ipv6 access-list test_ipv6
 10 permit ipv6 any any
 20 permit tcp any eq 3000 any eq 3000
```

In the following example, the contents of an access list named Internetfilter is displayed:

```
Router# show access-lists ipv6 Internetfilter

ipv6 access-list Internetfilter
  3 remark Block BGP traffic from a given host
  4 deny tcp host 6666:1:2:3::10 eq bgp host 7777:1:2:3::20 range 1300 1404 deny tcp host
171.69.2.88 255.255.0.0 any eq telnet
  20 permit ipv6 3333:1:2:3::/64 any
  25 permit ipv6 4444:1:2:3::/64 any
  30 permit ipv6 5555:1:2:3::/64 any
```

In the following example, the contents of an access list named Test that has ACL-based policing is configured is displayed:

```
Router# show ipv6 access-lists Test hardware ingress location 0/1/CPU0
10 permit fec0:0:0:2::/64 any (Accepted: 24303 packets, Dropped: 0 packets)
20 permit any any (Accepted: 13 packets, Dropped: 0 packets)
```

In the following example, a summary of all IPv6 access lists is displayed:

```
Router# show access-lists ipv6 summary

ACL Summary:
  Total ACLs configured: 3
  Total ACEs configured: 11
```

This table describes the significant fields shown in the display.

Table 9: show access-lists ipv6 summary Command Field Descriptions

Field	Description
Total ACLs configured	Number of configured IPv6 ACLs.
Total ACEs configured	Number of configured IPV6 ACEs.

This example displays the packet filtering usage for the specified line card:

```
Router# show access-lists ipv6 usage pfilter location 0/0/CPU0

Interface : TenGigE0/0/0/10/0
    Input  ACL : Common-ACL : N/A  ACL : test_ipv6
    Output ACL : N/A
```

In the following example, the statistics IPv6 access lists are displayed in bytes and packet counts:

```
Router# show ipv6 access-lists Test hardware ingress location 0/1/CPU0
ipv6 access-list Test
10 permit fec0:0:0:2::/64 any (24303 matches) (2459695 byte matches)
20 permit any any (13 matches) (246 byte matches)
```

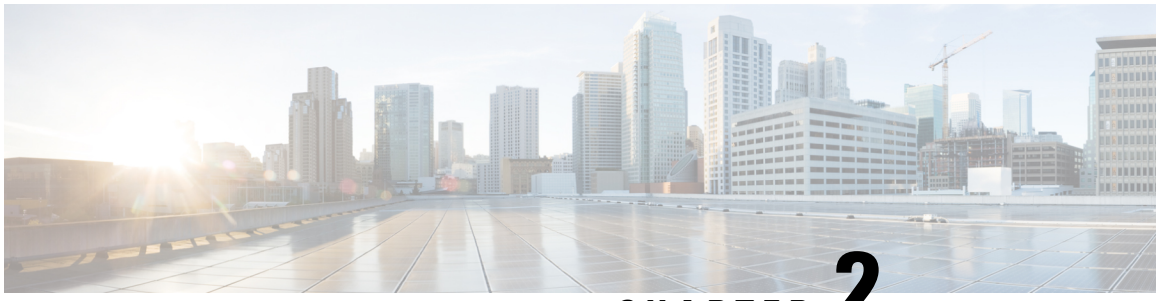
In the following example, the IPv6 access list is displayed using **detail** keyword:

```
Router# show access-lists ipv6 v6t1 hardware ingress detail location 0/0/CPU0
v6t1 Details:
Sequence Number: 10
NPU ID: 0
Number of DPA Entries: 1
ACL ID: 1
ACE Action: PERMIT
ACE Logging: DISABLED
ABF Action: 0(ABF_NONE)
Hit Packet Count: 0 Byte Count: 0
Source Address: 0:0:0:0::
 Source Address Mask: 0:0:0:0::
Destination Address: 2222:0:0:0::
 Destination Address Mask: ffff:ffff:ffff:ffff::
DPA Entry: 1
        Entry Index: 0
        DPA Handle: 0x8E3000A8
        DSCP: 0x28 (Mask 0xFC)
Sequence Number: 20
NPU ID: 0
Number of DPA Entries: 1
ACL ID: 1
ACE Action: PERMIT
ACE Logging: DISABLED
ABF Action: 0(ABF_NONE)
Hit Packet Count: 0 Byte Count: 0
TCP Flags: 0x01 (Mask 0x01)
Protocol: 0x06 (Mask 0xFF)
Source Address: 0:0:0:0::
 Source Address Mask: 0:0:0:0::
Destination Address: 2222:0:0:0::
 Destination Address Mask: ffff:ffff:ffff:ffff::
DPA Entry: 1
        Entry Index: 0
        DPA Handle: 0x8E300390
Sequence Number: IMPLICIT NDNA PERMIT
NPU ID: 0
Number of DPA Entries: 1
ACL ID: 1
ACE Action: PERMIT
ACE Logging: DISABLED
ABF Action: 0(ABF_NONE)
Hit Packet Count: 0 Byte Count: 0
Protocol: 0x3A (Mask 0xFF)
```

```
Source Address: 0:0:0:0::
 Source Address Mask: 0:0:0:0::
Destination Address: 0:0:0:0::
 Destination Address Mask: 0:0:0:0::
DPA Entry: 1
        Entry Index: 0
        DPA Handle: 0x8E300678
Sequence Number: IMPLICIT NDNS PERMIT
NPU ID: 0
Number of DPA Entries: 1
ACL ID: 1
ACE Action: PERMIT
ACE Logging: DISABLED
ABF Action: 0(ABF_NONE)
Hit Packet Count: 0 Byte Count: 0
Protocol: 0x3A (Mask 0xFF)
Source Address: 0:0:0:0::
 Source Address Mask: 0:0:0:0::
Destination Address: 0:0:0:0::
 Destination Address Mask: 0:0:0:0::
DPA Entry: 1
        Entry Index: 0
        DPA Handle: 0x8E300960
Sequence Number: IMPLICIT DENY
NPU ID: 0
Number of DPA Entries: 1
ACL ID: 1
ACE Action: DENY
ACE Logging: DISABLED
ABF Action: 0(ABF_NONE)
Hit Packet Count: 0 Byte Count: 0
Source Address: 0:0:0:0::
 Source Address Mask: 0:0:0:0::
Destination Address: 0:0:0:0::
 Destination Address Mask: 0:0:0:0::
DPA Entry: 1
        Entry Index: 0
        DPA Handle: 0x8E300C48
```

In the following example, the internal TCAM entries for IPv6 access lists with compression level 3 are displayed for ingress traffic:

```
Router#show access-lists ipv6 acl_NTP_ipv6 hardware ingress resource-check location 0/6/CPU0

Wed Jan 25 03:33:42.945 UTC
ACL name : acl_NTP_ipv6
ACL compression level : 3
Internal TCAM Entries required : 8
```



CHAPTER 2

ARP Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This chapter describes the commands used to configure and monitor the Address Resolution Protocol (ARP) on NCS 5000 routers.

For detailed information about ARP concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

arp

To add a permanent entry in the Address Resolution Protocol (ARP) cache, use the **arp** command in the appropriate command mode. To remove an entry from the ARP cache, enter the **no** form of this command.

arp [**vrf** *vrf-name*] *ip-address hardware-address encapsulation-type* [**alias**]
no arp [**vrf** *vrf-name*] *ip-address hardware-address encapsulation-type* [**alias**]

Syntax Description

vrf	(Optional) Specifies VPN routing and forwarding (VRF) instance.
vrf-name	(Optional) VRF instance that identifies a VPN.
ip-address	IPv4 (network layer) address for which a permanent entry is added to the ARP cache. Enter the IPv4 address in a four-part dotted-decimal format that corresponds to the local data-link address (a 32-bit address).
hardware-address	Hardware (data link layer) address that the IPv4 address is linked to. Enter the local data-link address (a 48-bit address), such as 0800.0900.1834.
encapsulation-type	Encapsulation type. The encapsulation types are: • arpa • srp • srpa • srpb For Ethernet interfaces, this is typically the arpa keyword.

alias	(Optional) Causes the software to respond to ARP requests as if it were the owner of both the specified IP address and hardware address, whether proxy ARP is enabled or not.

Command Default

No entries are permanently installed in the ARP cache.

Command Modes

XR Config mode

Host-tracking configuration

Command History

Release	Modification
Release 6.0	This command was introduced.
Release 24.1.1	This command was made available in the host-tracking configuration mode.

Usage Guidelines

The software uses ARP cache entries to translate 32-bit IP addresses into 48-bit hardware addresses.

Because most hosts support dynamic resolution, you generally need not specify static ARP cache entries.

Static entries are permanent entries that map a network layer address (IPv4 address) to a data-link layer address (MAC address). If the **alias** keyword is specified when creating the entry, the interface to which the entry is attached will act as if it is the owner of the specified addresses, that is, it will respond to ARP request packets for this network layer address with the data link layer address in the entry.

The software does not respond to any ARP requests received for the specified IP address unless proxy ARP is enabled on the interface on which the request is received. When proxy ARP is enabled, the software responds to ARP requests with its own local interface hardware address.

To remove all nonstatic entries from the ARP cache, enter the clear arp-cache, on page 106 in the appropriate configuration mode.

Task ID

Task ID	Operations
cef	read, write

Examples

The following is an example of a static ARP entry for a typical Ethernet host:

```
Router# configure
Router(config)# arp 192.168.7.19 0800.0900.1834 arpa
```

The following is an example of configuring ARP in host-tracking configuration mode:

```
Router#(config)# interface BVI1
Router#(config-if)# host-routing
Router#(config-if)# vrf vrf_1
Router#(config-if)# ipv4 address 10.0.0.1 255.255.0.0
Router#(config-if)# mac-address 0.dc1.dc2
```

```
Router#(config-if)# host-tracking
Router#(config-if-host-tracking)# bgp-gateway
Router#(config-if-host-tracking)# arp
Router#(config-if-host-tracking-arp)# bfd fast-detect
Router#(config-if-host-tracking-arp)#
```

arp cache-limit

To configure a limit on ARP cache entries on the router, use the **arp cache-limit** command in interface configuration mode.

arp cache-limit *limit*

Syntax Description

limit Specify the value for the cache entries. The supported range in the router is 0–127999.

Note The arp cache resources vary depending on the hardware resources available in a router. Ensure the cache-limit configured such that the available resources in the router are able to accomodate the entries.

Command Default

By default, the ARP cache limit per interface in the router is 127999.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.9.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows how to set the ARP cache limit for an interface:

```
Router# configure
Router(config)# interface HundredGigE 0/0/0/0
Router(config-if)#arp cache-limit 3900
Router(config-if)#commit
```

arp gratuitous ignore

To ignore receipt of gratuitous Address Resolution Protocol (ARP) packets, use the **arp gratuitous ignore** command in interface configuration mode. To receipt gratuitous ARP packets, use the no form of this command.

arp gratuitous ignore
no arp gratuitous ignore

Syntax Description

This command has no keywords or arguments.

Command Default Disabled

Command Modes Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
cef	write

Examples This example shows how to configure **arp gratuitous ignore** command:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# arp gratuitous ignore
```

arp learning

To enable the dynamic learning of ARP entries for a local subnet or all subnets, use the **arp learning** command.

To disable this command, use the **no** prefix or the **disable** option for this command.

arp learning local
no arp learning local
arp learning disable
no arp learning disable

Syntax Description

local	Enables the dynamic learning of ARP entries for local subnets. When arp learning local is configured on an interface or sub-interface, it learns only the ARP entries from ARP packets on the same subnet.
disable	Disables the dynamic learning of all ARP entries.

Command Default This command has no keywords or arguments.

Command Modes Sub-interface configuration mode

```
RP/0/RP0/CPU0:router(config)#interface GigabitEthernet 0/0/0/1
RP/0/RP0/CPU0:router(config-if)# ipv4 address 12.1.3.4 255.255.255.0
```

```
RP/0/RP0/CPU0:router(config-if)# arp learning local
RP/0/RP0/CPU0:router(config-if)# no shut
RP/0/RP0/CPU0:router(config-if)# commit

RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/0/0/1
RP/0/RP0/CPU0:router(config-if)# ipv4 address 12.1.3.4 255.255.255.0
RP/0/RP0/CPU0:router(config-if)# arp learning disable
RP/0/RP0/CPU0:router(config-if)# commit
```

arp purge-delay

To delay purging Address Resolution Protocol (ARP) entries when an interface goes down, use the **arp purge-delay** command in interface configuration mode. To turn off the purge delay feature, use the **no** form of this command.

arp purge-delay *value*
no arp purge-delay *value*

Syntax Description

value	Sets the purge delay time in seconds. Range is 1 to 65535.

Command Default

Default value is off.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **arp purge-delay** command to delay purging ARP entries when an interface goes down. If the interface comes up within the delay time, then the ARP entries are restored to prevent packet loss with Equal Cost Multipath (ECMP) configured.

Task ID

Task ID	Operations
cef	read, write

Examples

The following is an example of setting the purge delay to 50 seconds:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/0/0/0
RP/0/RP0/CPU0:router(config-if)# arp purge-delay 50
```

arp timeout

To specify the duration of dynamic entries learned on an interface remain in the Address Resolution Protocol (ARP) cache, enter the **arp timeout** command in interface configuration mode. To remove the **arp timeout** command from the configuration file and restore the system to its default condition with respect to this command, enter the **no** form of this command.

arp timeout *seconds*
no arp timeout *seconds*

Syntax Description

seconds	Indicates the time, in seconds, for which an entry remains in the ARP cache. Range is 30 to 4294967295.

Command Default

Entries remain in the ARP cache for 14,400 seconds (4 hours).

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was supported.

Usage Guidelines

This command is ignored when issued on interfaces that do not use ARP. Also, ARP entries that correspond to the local interface or that are statically configured by the user never time out.

The **arp timeout** command applies only to the interface that is entered. When the timeout is changed for an interface the change applies only to that interface.

The **show interfaces** command displays the ARP timeout value in hours:minutes:seconds, as follows:

```
ARP type: ARPA, ARP Timeout 04:00:00
```

Task ID

Task ID	Operations
cef	read, write

Examples

The following example shows how to set the ARP timeout to 3600 seconds to allow entries to time out more quickly than the default:

```
RP/0/RP0/CPU0:router#configure
RP/0/RP0/CPU0:router(config)#interface HundredGigE 0/0/0/0
RP/0/RP0/CPU0:router(config-if)# arp timeout 3600
```

clear arp-cache

To delete all dynamic entries from the Address Resolution Protocol (ARP) cache, clear the fast-switching cache, and clear the IP route cache, use the **clear arp-cache** command in XR EXEC mode.

clear arp-cache {**traffic** *type interface-path-id* | **location** *node-id*}

Syntax Description

traffic	Deletes traffic statistics on the specified interface.
t ype	Interface type. For more information, use the question mark (?) online help function.
interface- path-id	Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
location *node-id*	Clears the ARP entries for a specified location. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

When issued without keywords or arguments, the **clear arp-cache** command clears all entries in the ARP cache.

Task ID

Task ID	Operations
cef	execute

Examples

The following example shows how to remove traffic statistic entries from the ARP cache that match the specified interface:

```
RP/0/RP0/CPU0:router# clear arp-cache traffic tengige 0/1/0/0 location 0/1/CPU0
```

The following example shows how to remove entries from the ARP cache that match the specified location:

```
RP/0/RP0/CPU0:router# clear arp-cache location 0/1/CPU0
```

local-proxy-arp

To enable local proxy Address Resolution Protocol (ARP) on an interface, enter the **local-proxy-arp** command in interface configuration mode. To disable local proxy ARP on the interface, enter the **no** form of this command.

local-proxy-arp
no local-proxy-arp

Syntax Description

This command has no keywords or arguments.

Command Default

Local proxy ARP is disabled on all interfaces.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

When local proxy ARP is enabled, the networking device responds to ARP requests that meet all the following conditions:

- The target IP address in the ARP request, the IP address of the ARP source, and the IP address of the interface on which the ARP request is received are on the same Layer 3 network.
- The next hop for the target IP address is through the same interface as the request is received.

Typically, local proxy ARP is used to resolve MAC addresses to IP addresses in the same Layer 3 network such as, private VLANs that are Layer 2-separated. Local proxy ARP supports all types of interfaces supported by ARP and unnumbered interfaces.

Using the **no** form of the command removes the specified command from the configuration file and restores the system to its default condition with respect to the command.

Task ID

Task ID	Operations
cef	read, write

priority-timeout

To configure the timer to time out a high-priority Direct Attached Gateway Redundancy (DAGR) route and reverting to normal priority, use the **priority-timeout** command in DAGR peer interface configuration mode.

priority-timeout *time*

Syntax Description

time	Time in seconds after which a high-priority route reverts to a normal priority route. The range of values is 1 to 10000.

Command Default

Default for *time* is 20 seconds.

Command Modes

DAGR peer interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

When this function is applied, the DAGR group configuration is updated in the database.

The new timer values take effect the next time the timer is set. No immediate timer restarts are triggered on the basis of this event.

Task ID

Task ID	Operations
cef	write

Examples

The following example configures a priority timeout of 25 seconds:

```
RP/0/RP0/CPU0:router(config-if-dagr-peer)# priority-timeout 25
RP/0/RP0/CPU0:router(config-if-dagr-peer)#
```

proxy-arp

To enable proxy Address Resolution Protocol (ARP) on an interface, enter the **proxy-arp** command in interface configuration mode. To disable proxy ARP on the interface, enter the **no** form of this command.

proxy-arp
no proxy-arp

Syntax Description

This command has no keywords or arguments.

Command Default

Proxy ARP is disabled on all interfaces.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

When proxy ARP is disabled, the networking device responds to ARP requests received on an interface only if one of the following conditions is met:

- The target IP address in the ARP request is the same as the interface IP address on which the request is received.
- The target IP address in the ARP request has a statically configured ARP alias.

When proxy ARP is enabled, the networking device also responds to ARP requests that meet all of the following conditions:

- The target IP address is not on the same physical network (LAN) on which the request is received.
- The networking device has one or more routes to the target IP address.
- All of the routes to the target IP address go through interfaces other than the one on which the request is received.

Using the **no** form of the command removes the specified command from the configuration file and restores the system to its default condition with respect to the command.

Task ID

Task ID	Operations
cef	read, write

Examples

The following example shows how to enable proxy ARP on HundredGigE interface 0/0/0/0:

```
RP/0/RP0/CPU0:router#(config)# interface  HundredGigE 0/0/0/0
RP/0/RP0/CPU0:router#(config-if)# proxy-arp
```

route distance

To configure route distance for a given Direct Attached Gateway Redundancy (DAGR) group, use the **route distance** command in DAGR peer interface configuration mode.

route distance normal *normal-distance* **priority** *priority-distance*

Syntax Description

normal *normal-distance*	Sets normal route (administrative) distance. Range is 0 to 256.
priority *priority-distance*	Sets priority route (administrative) distance. Range is 0 to 256.

Command Default

Default for *normal-distance* default is 150 and the default for *priority-distance* is 5.

Command Modes

DAGR peer interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The default setting for a priority distance takes precedence over that of a typical Internet Gateway Protocol (IGP). The normal distance setting does not.

When this setting is applied, the DAGR group is updated in the database.

Task ID

Task ID	Operations
cef	write

Examples

The following example configures a DAGR group peer with a normal route distance of 48 and priority route distance of 5:

```
RP/0/RP0/CPU0:router(config-if-dagr-peer)# route distance normal 48 priority 5
RP/0/RP0/CPU0:router(config-if-dagr-peer)#
```

route metric

To configure normal and priority route metrics for a given Direct Attached Gateway Redundancy (DAGR) group, use the **route metric** command in DAGR peer interface configuration mode.

route metric normal *normal-metric* **priority** *priority-metric*

Syntax Description

normal *normal-metric*	Sets a normal value for routes installed in the Routing Information Base (RIB). The range of values is 0 to 256.

priority *priority-metric*	Sets a priority value for routes installed in the RIB. The range of values is 0 to 256.

Command Default

The default for *normal-metric* is 100, and the default for *priority-metric* is 90.

Command Modes

DAGR peer interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The route metric values are of less significance than the **route distance** command values. Setting a route metric allows the configuration of values for routers installed in the RIB.

When this setting is applied, the DAGR group is updated in the database.

Task ID

Task ID	Operations
cef	write

Examples

The following example configures a DAGR group peer with a normal metric of 48 and a priority metric of 5:

```
RP/0/RP0/CPU0:router(config-if-dagr-peer)# route metric normal 48 priority 5
RP/0/RP0/CPU0:router(config-if-dagr-peer)#
```

show arp

To display the Address Resolution Protocol (ARP), enter the **show arp** command in XR EXEC mode.

show arp `vrf` *vrf-name* [{*ip-address hardware-address interface-path-id*}] **location** *node-id*

Syntax Description

vrf	(Optional) Specifies VPN routing and forwarding (VRF) instance.
vrf-name	(Optional) VRF instance that identifies a VPN.
ip-address	(Optional) The ARP entries you want to display.
hardware-address	(Optional) The ARP entries that match the 48-bit MAC address are displayed.

interface- path-id	(Optional) Either a physical interface instance or a virtual interface instance as follows:
	• Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation.
	  • *rack*: Chassis number of the rack.
	  • *slot*: Physical slot number of the modular services card or line card.
	  • *module*: Module number. A physical layer interface module (PLIM) is always 0.
	  • *port*: Physical port number of the interface.
	• Virtual interface instance. Number range varies depending on interface type.
	For more information about the syntax for the router, use the question mark (?) online help function.

location *node-id*	(Optional) Displays the ARP entry for a specific location. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

The active RSP is the default location.

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

ARP establishes correspondences between network addresses (an IP address, for example) and Ethernet hardware addresses. A record of each correspondence is kept in a cache for a predetermined amount of time and then discarded.

For **show arp** *interface-type interface-instance* form, the **location** *node-id* keyword and argument is mandatory for Bundle and VLAN-on-Bundle interfaces to indicate which location the cache entries for the bundle should be displayed. For physical interfaces, specifying the **location** *node-id* keyword and argument is optional since the interface can only exist on one node.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show arp** command with no location specified:

```
RP/0/RP0/CPU0:router# show arp

0/7/CPU0
------------------------------------------------------------------------------
Address         Age        Hardware Addr    State      Type   Interface
33.1.1.2         -         e4c7.2284.f863   Interface  ARPA   TenGigE0/7/0/3
34.1.1.2         -         e4c7.2284.f863   Interface  ARPA   TenGigE0/7/0/3.1
65.79.1.1        -         e4c7.2284.f887   Interface  ARPA   TenGigE0/7/0/39
```

```
--------------------------------------------------------------------------------
0/RP0/CPU0
--------------------------------------------------------------------------------
Address         Age        Hardware Addr    State      Type   Interface
12.1.24.208     00:00:03  0016.9cf2.3800   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.0.1        00:53:00  0000.0c07.ac07   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.0.2        00:00:01  0026.0bdd.0000   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.0.3        00:00:05  0026.0bdc.ffc0   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.13.2       02:41:25  0015.17d6.684b   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.36.19      00:33:28  0014.a841.0ffc   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.44.1       00:54:57  6c20.5618.96aa   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.44.2       01:46:47  6c20.5618.982e   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.44.3       02:46:28  4c4e.35b6.57e8   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.44.100     02:45:10  4c4e.35b6.57e8   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.44.101     02:45:05  6c20.5618.96aa   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.49.41      00:03:16  6400.f142.134c   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.49.43      01:10:36  6400.f142.134c   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.49.121     02:54:42  0020.b007.6700   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.49.122     01:51:05  0020.b007.6700   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.49.123     00:31:59  0033.b515.68ff   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.49.254     00:24:09  0003.310a.a039   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.54.10         -      e050.07fa.ef05   Interface   ARPA MgmtEth0/RP0/CPU0/0
12.7.54.11         -      e050.07fa.ef05   Interface   ARPA MgmtEth0/RP0/CPU0/0
12.7.54.12      01:24:34  4c4e.35b6.4af8   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.57.1       00:06:21  10f3.11b6.c634   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.57.2       00:05:58  6400.f142.1500   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.57.8       01:59:01  0024.c4d8.c2cc   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.57.9       00:54:16  6400.f142.0bbe   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.57.10      01:25:07  6400.f142.115a   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.57.11      00:59:03  0022.56d8.36a0   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
12.7.57.13      00:22:16  000a.b8b7.fff8   Dynamic     ARPA MgmtEth0/RP0/CPU0/0
```

The following is sample output from the **show arp** command with the *interface-type interface-instance* argument:

```
RRP/0/RP0/CPU0:router# show arp tenGigE 0/0/0/1

--------------------------------------------------------------------------------
0/RP0/CPU0
--------------------------------------------------------------------------------
Address         Age        Hardware Addr   State      Type  Interface
20.30.1.1       -          c472.95a6.2a86  Interface  ARPA  TenGigE0/0/0/1
20.30.1.2       00:04:58   6c9c.ed2c.a060  Dynamic    ARPA  TenGigE0/0/0/1


RRP/0/RP0/CPU0:router# show arp mgmtEth 0/RP1/CPU0/0

Address      Age        Hardware Addr    State     Type   Interface
10.4.9.2     00:35:55   0030.7131.abfc   Dynamic   ARPA   MgmtEth0/RP1/CPU0/0
10.4.9.1     00:35:55   0000.0c07.ac24   Dynamic   ARPA   MgmtEth0/RP1/CPU0/0
10.4.9.99    00:49:12   0007.ebea.44d0   Dynamic   ARPA   MgmtEth0/RP1/CPU0/0
10.4.9.199     -        0001.c9eb.dffe   Interface ARPA   MgmtEth0/RP1/CPU0/0
```

The following is sample output from the **show arp** command with the *hardware-address* designation:

```
RP/0/RP0/CPU0:router# show arp 0005.5f1d.8100

Address Age Hardware Addr State Type Interface
172.16.7.2 - 0005.5f1d.8100 Interface ARPA HundredGigE0/0/0/2
```

The following is sample output from the **show arp** command with the **location** keyword and *node-id* argument:

```
RP/0/RP0/CPU0:router# show arp location 0/2/CPU0

Address Age Hardware Addr State Type Interface
192.168.15.1 - 00dd.00ee.00ff Alias ARPA
192.168.13.1 - 00aa.00bb.00cc Static ARPA
172.16.7.1 00:35:49 0002.fc0e.9600 Dynamic ARPA HundredGigE0/1/0/2
172.16.7.2 - 0005.5f1d.8100 Interface ARPA HundredGigE0/1/0/2
```

This table describes the significant fields shown in the display.

Table 10: show arp Command Field Descriptions

Field	Description
Address	Displays the network address that corresponds to the hardware address.
Age	Displays the age in hours:minutes:seconds of the cache entry. A hyphen (-) means the address is local.
Hardware Addr	Displays the LAN hardware address of a MAC address that corresponds to the network address.
State	Displays the current state of the cache entry. Values are: • Dynamic • Interface • Alias • Static • "-" (indicates global static and alias entries)
Type	Displays the encapsulation type the Cisco IOS XR software is using for the network address in this entry. Value is ARPA.
Interface	Displays the interface associated with this network address.
ARP statistics	Displays ARP packet and error statistics.
ARP cache	Displays general information about the IP address and MAC address association entries in the ARP cache.
IP Packet drop count for node */*/*	Displays the number of IP packets dropped because the buffer ran out of space before an ARP response was received. **Note** */*/* represents the node ID in the format *rack/slot/module*.

show arp idb

To display the ARP database statistics for an interface, use the **show arp idb** command in EXEC mode.

show arp idb *interface-name* **location** *node-id*

Syntax Description

interface-name	Name of the interface
node-id	Location of the interface. LC node for physical interfaces, RP or LC node for virtual interfaces

Command Default

There is no default location, location needs to be provided in the CLI.

Command History

Release	Modification
Release 3.3.0	This command was introduced.

Usage Guidelines

The **show arp idb** command is useful to verify the IP addresses, Mac address, ARP configuration(s) applied on the interface and the entry statistics.

For **show arp idb** *interface-type interface-instance* form, the **location** *node-id* keyword and argument is mandatory for Bundle and VLAN-on-Bundle interfaces to indicate which location the cache entries for the bundle should be displayed.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show arp idb** command:

```
RP/0/0/CPU0:ios#show arp idb GigabitEthernet 0/0/0/0 location 0/0/CPU0
Mon Jan 30 10:32:15.387 IST
GigabitEthernet0/0/0/0 (0x00000060):
IDB Client: default
IPv4 address 1.1.1.1, Vrf ID 0x60000000
VRF Name default
Dynamic learning: Enable
Dynamic entry timeout: 14400 secs
Drop adjacency timeout: Disable
Purge delay: off
Cache limit: 128000
Incomplete glean count: 1
```

Complete glean count: 0

Complete protocol count: 0

Dropped glean count: 0

Dropped protocol count: 0

IPv4 caps added (state up)

MPLS caps not added

Interface not virtual, not client fwd ref,

Proxy arp not configured, not enabled

Local Proxy arp not configured

Packet IO layer is NetIO

Srg Role : DEFAULT

Idb Flag : 49292

IDB is Complete

IDB Flag Description:

[CAPS | COMPLETE | IPV4_CAPS_CREATED | SPIO_ATTACHED |

SPIO_SUPPORTED]

Idb Flag Ext : 0x0

Idb Oper Progress : NONE

Client Resync Time : Jan 30 10:07:10.736787

Total entries : 9

| Event Name | Time Stamp | S, M

| idb-create | Jan 30 10:07:10.784 | 1, 0

| idb-state-up | Jan 30 10:07:10.784 | 0, 0

| caps-state-update | Jan 30 10:07:10.784 | 0, 1

| address-update | Jan 30 10:07:10.784 | 0, 0

| idb-complete | Jan 30 10:07:10.784 | 0, 0

| idb-entry-create | Jan 30 10:07:10.784 | 0, 0

| idb-caps-add | Jan 30 10:07:10.784 | 0, 0

| idb-caps-add-cb | Jan 30 10:07:10.784 | 0, 0

| idb-last-garp-sent | Jan 30 10:07:11.808 | 0, 0

show arp traffic

To display Address Resolution Protocol (ARP) traffic statistics, enter the **show arp traffic** command in XR EXEC mode.

show arp traffic [**vrf** *vrf-name*] [*interface-path-id*] [**location** *node-id*]

Syntax Description

vrf	(Optional) Specifies VPN routing and forwarding (VRF) instance.
vrf-name	(Optional) VRF instance that identifies a VPN.

interface- path-id	(Optional) Either a physical interface instance or a virtual interface instance as follows:
	• Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation.
	  • *rack*: Chassis number of the rack.
	  • *slot*: Physical slot number of the modular services card or line card.
	  • *module*: Module number. A physical layer interface module (PLIM) is always 0.
	  • *port*: Physical port number of the interface.
	• Virtual interface instance. Number range varies depending on interface type.
	For more information about the syntax for the router, use the question mark (?) online help function.

location *node-id*	(Optional) Displays the ARP entry for a specific location. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

The active RSP is the default location.

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

ARP establishes correspondences between network addresses (an IP address, for example) and Ethernet hardware addresses. A record of each correspondence is kept in a cache for a predetermined amount of time and then discarded.

For **show arp traffic,** *interface-instance*, the **location***node-id* keyword and argument is mandatory for Bundle and VLAN-on-Bundle interfaces to indicate which location the cache entries for the bundle should be displayed. For physical interfaces, specifying the **location** *node-id* keyword and argument is optional since the interface can only exist on one node.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show arp traffic** command:

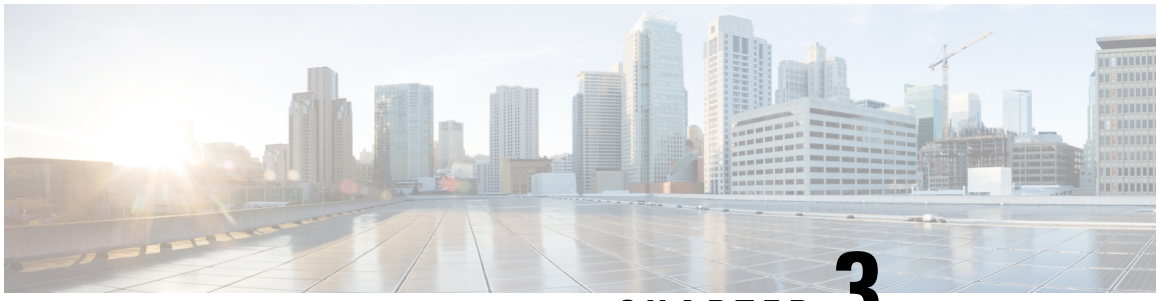
```
RP/0/RP0/CPU0:router# show arp traffic
```

```
show arp traffic
Thu Dec 10 09:51:38.761 UTC

------------------------------------------------------------------------------
0/6/CPU0
------------------------------------------------------------------------------

ARP statistics:
  Recv: 163 requests, 79 replies
  Sent: 14138 requests, 177 replies (0 proxy, 0 local proxy, 14 gratuitous)
  Resolve requests rcvd: 7204
  Resolve requests dropped: 295
  Errors: 0 out of memory, 0 no buffers, 0 out of sunbet

ARP cache:
  Total ARP entries in cache: 22
  Dynamic: 11, Interface: 11, Standby: 0
  Alias: 0,   Static: 0,    DHCP: 0

  IP Packet drop count for node 0/6/CPU0: 6909

  Total ARP-IDB:19


------------------------------------------------------------------------------
0/2/CPU0
------------------------------------------------------------------------------

ARP statistics:
  Recv: 162532 requests, 243 replies
  Sent: 15879 requests, 162561 replies (0 proxy, 0 local proxy, 29 gratuitous)
  Resolve requests rcvd: 47593
  Resolve requests dropped: 0
  Errors: 0 out of memory, 0 no buffers, 0 out of sunbet

ARP cache:
  Total ARP entries in cache: 125
  Dynamic: 112, Interface: 13, Standby: 0
  Alias: 0,   Static: 0,    DHCP: 0

  IP Packet drop count for node 0/2/CPU0: 44804

  Total ARP-IDB:13
```

The following is sample output from the **show arp traffic** command with the **location** keyword and *node-id* argument:

```
RP/0/RP0/CPU0:router# show arp traffic location 0/4/CPU0

Thu Dec 10 09:51:56.209 UTC

ARP statistics:
  Recv: 364474 requests, 96 replies
  Sent: 14131 requests, 364499 replies (0 proxy, 0 local proxy, 25 gratuitous)
  Resolve requests rcvd: 5699
  Resolve requests dropped: 94
  Errors: 0 out of memory, 0 no buffers, 0 out of sunbet

ARP cache:
  Total ARP entries in cache: 18
  Dynamic: 9, Interface: 9, Standby: 0
```

```
Alias: 0,   Static: 0,    DHCP: 0

IP Packet drop count for node 0/4/CPU0: 5603

Total ARP-IDB:18
```



CHAPTER 3

DHCP Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This chapter describes the commands used to configure and monitor the Direct Host Control Protocol (DHCP) on Cisco NCS 5500 Series routers.

For detailed information about ARP concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

allow-client-id-change

To ensure the client has only one binding with the DHCP IPv4 server, use the **allow-client-id-change** command in DHCP IPv4 Server Profile mode.

allow-client-id-change

Command Default

No default behaviour or values

Command Modes

DHCP IPv4 Serevr Profile Configuration Mode

Command History

Release	Modification
Release 5.3.1	This command was introduced.

Usage Guidelines

Not applicable

The following example shows how to use the **allow-client-id-change** command:

```
Router# configure

Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile ISP1 server
Router(config-dhcpv4-server-profile)# allow-client-id-change
Router(config-dhcpv4-server-profile)# commit
Router(config-dhcpv4--server-profile)# exit
```

clear dhcp ipv4 client

To clear the DHCP client binding information configured on a given interface and set the binding information again, use the **clear dhcp ipv4 client** command in XR EXEC mode.

clear dhcp ipv4 client *interface-name interface-number*

Syntax Description

interface-name	Specifies DHCP IPv4 client enabled interface name.
interface-number	Specifies DHCP IPv4 client enabled interface number.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

Use the **clear dhcp ipv4 client** command to clear the DHCP client binding information for the specified interface.

Task ID

Task ID	Operations
IP-Services	Execution

Examples

The following example shows how to clear the DHCP client binding information:

```
Router# clear dhcp ipv4 client mgmtEth 0/0/CPU0/0
Fri Jun  6 08:24:14.558 UTC
RP/0/0/CPU0:ios#show dhcp ipv4 client
Fri Jun  6 08:24:17.377 UTC

    Interface name         IP Address      Binding State         Lease Time Rem
----------------------    ------------    ---------------    ----------------------
MgmtEth0/0/CPU0/0          11.11.11.5       BOUND             3598 secs (00:59:58)

RP/0/0/CPU0:ios#show dhcp ipv4 client mgmtEth 0/0/CPU0/0 statistics
Fri Jun  6 08:24:19.397 UTC

Client Interface name           : MgmtEth0/0/CPU0/0
-------------------------------------------------
     CLIENT COUNTER(s)          |        VALUE
-------------------------------------------------
Num discovers sent              :          1
Num requests sent               :          1
Num releases sent               :          1
Num offers received             :          1
Num acks received               :          1
-------------------------------------------------
```

clear dhcp ipv4 client statistics

To clear DHCP client binding statistics information for a given interface, use the **clear dhcp ipv4 client statistics** command in XR EXEC mode.

clear dhcp ipv4 client <*interface-name*> *interface-number* **statistics**

Syntax Description

interface-name	Specifies DHCP IPv4 client enabled interface name.
interface-number	Specifies DHCP IPv4 client enabled interface number.
statistics	Clears DHCP IPv4 statistical information for the specified interface.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

Use the **clear dhcp ipv4 client statistics** command to clear the DHCP client binding statistics information for the specified interface.

Task ID

Task ID	Operations
IP-Services	Execution

Examples

The following example shows how to clear the DHCP client binding statistics information:

```
RP/0/0/CPU0:ios#show dhcp ipv4 client mgmtEth 0/0/CPU0/0 statistics
Fri Jun  6 08:23:04.822 UTC

Client Interface name           : MgmtEth0/0/CPU0/0
-------------------------------------------------
     CLIENT COUNTER(s)          |        VALUE
-------------------------------------------------
Num discovers sent              :         11
Num requests sent               :          3
Num releases sent               :          2
Num offers received             :          3
Num acks received               :          3
-------------------------------------------------

RP/0/0/CPU0:ios#clear dhcp ipv4 client mgmtEth 0/0/CPU0/0 statistics
Fri Jun  6 08:23:11.852 UTC
RP/0/0/CPU0:ios#show dhcp ipv4 client mgmtEth 0/0/CPU0/0 statistics
Fri Jun  6 08:23:13.682 UTC

Client Interface name           : MgmtEth0/0/CPU0/0
```

```
-------------------------------------------------
     CLIENT COUNTER(s)           |        VALUE
-------------------------------------------------
-------------------------------------------------

RP/0/0/CPU0:ios#show dhcp ipv4 client
Fri Jun  6 08:23:16.862 UTC

    Interface name         IP Address      Binding State         Lease Time Rem
----------------------    ------------    ---------------    ----------------------
MgmtEth0/0/CPU0/0          11.11.11.5       BOUND             3562 secs (00:59:22)
```

Related Commands

Commands	Description
show dhcp ipv4 client	This command displays DHCP IPv4 client information.
clear dhcp ipv4 proxy statistics	This command clears DHCP proxy binding statistics information for a given interface.
clear dhcp ipv4 proxy statistics	This command clears DHCP server binding statistics information for a given interface.

clear dhcp ipv4 server binding

To clear all client bindings in server, use the **clear dhcp ipv4 server binding** command in XR EXEC mode.

clear dhcp ipv4 server binding [**location** *node-ID*] [**interface** *type interface-path-ID*] [**mac-address** *address*]

Syntax Description

location *node-ID*	Clears detailed client binding information for a specified node.
interface *type interface-path-ID*	Clears client binding by interface. Specifies the interface type. For more information, use the question mark (?) online help function. Physical interface or virtual interface. Use the show interfaces command to see a list of all interfaces currently configured on the router. **Note** For more information about the syntax for the router, use the question mark (?) online help function.
mac-address *address*	Clears detailed client binding information per mac-address.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	execute

Example

This is a sample output from the **clear dhcp ipv4 server binding** command:

```
Router# clear dhcp ipv4 server binding
```

Related Commands

Command	Description
clear dhcp ipv4 server statistics, on page 127	Clears DHCP server statistics.

clear dhcp ipv4 server statistics

To clear DHCP server statistics, use the **clear dhcp ipv4 server statistics** command in XR EXEC mode.

clear dhcp ipv4 server statistics [[**raw** [**all**] [**location** *node-ID*]]

Syntax Description

raw	Clears debug statistics.
all	Clears debug statistics for base mode.
include-zeroes	Clears debug statistics that are zero.
location *node-ID*	Clears DHCP server statistics information for a specified node.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	execute
root-system	read, write

Example

This is a sample output from the **clear dhcp ipv4 server statistics** command:

```
Router# clear dhcp ipv4 server statistics
```

Related Commands

Command	Description
clear dhcp ipv4 server binding, on page 126	Clears all client bindings in server.

clear dhcp ipv6 client

To clear the DHCPv6 client binding information configured on a given interface and set the binding information again, use the **clear dhcp ipv6 client** command in XR EXEC mode.

clear dhcp ipv6 client interface-type <*interfaceName*> { **binding** | **statistics** }

Syntax Description

interface-type <*interfaceName*>	Clears and restarts the DHCP IPv6 information of the specified interface.
binding	Clears client binding.
statistics	Clears client binding statistics.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines Use the **clear dhcp ipv6 client** command to clear the DHCP client binding information for the specified interface.

Task ID

Task ID	Operations
IP-Services	Execution

Examples

The following example shows how to clear the DHCP client binding information:

```
Router# clear dhcp ipv6 client mgmtEth 0/0/CPU0/0 binding
Fri Jun  6 08:24:14.558 UTC
Router# show dhcp ipv6 client
Fri Jun  6 08:24:17.377 UTC

    Interface name         IP Address      Binding State         Lease Time Rem
----------------------    ------------    ---------------    ----------------------
MgmtEth0/0/CPU0/0          2001:DB8::1       BOUND             3598 secs (00:59:58)

RP/0/0/CPU0:ios# show dhcp ipv6 client mgmtEth 0/0/CPU0/0 statistics
Fri Jun  6 08:24:19.397 UTC

Client Interface name           : MgmtEth0/0/CPU0/0
-------------------------------------------------
     CLIENT COUNTER(s)          |        VALUE
-------------------------------------------------
Num discovers sent              :          1
Num requests sent               :          1
Num releases sent               :          1
Num offers received             :          1
Num acks received               :          1
-------------------------------------------------
```

Related Commands

Command	Description
show dhcp ipv6 client, on page 175	This command displays the DHCP IPv6 client binding information on a given interface.

clear dhcp ipv6 relay binding

To clear DHCPv6 relay binding, use the **clear dhcp ipv6 relay binding** command in XR EXEC mode.

clear dhcp ipv6 relay binding [**client-duid** *client-duid-number*][**interface** *type interface-path-id*] [**vrf** *vrf-name*] [**location** *node-id*]

Syntax Description

client-duid *client-duid-number*	(Optional) Clears DHCPv6 relay client binding information. The argument *client-duid-number* is the client's DHCP Unique Identifier (DUID) number. **Note** Use the **show dhcp ipv6 relay binding** command to see the client DUID number.
interface *type interfac-path-id*	(Optional) Clears DHCPv6 relay client binding information for an interface. Specifies a physical interface or a virtual interface. **Note** Use the **show interfaces** command to see a list of all possible interfaces currently configured on the router.
vrf *vrf-name*	(Optional) Clears DHCPv6 relay client binding information for a VPN routing and forwarding (VRF) instance.
location *node-id*	(Optional) Clears DHCPv6 relay client binding information for a specified node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

None.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	execute

Task ID	Operation
root-system	read, write

This example shows how to clear DHCPv6 relay binding:

```
Router# clear dhcp ipv6 relay binding
```

clear dhcp ipv6 proxy binding

To clear Dynamic Host Configuration Protocol (DHCP) relay bindings for prefix delegation, use the **clear dhcp ipv6 proxy binding** command in XR EXEC mode.

clear dhcp ipv6 proxy binding {*client-duid* | *interface* | *location*}

Syntax Description

client-duid	Specifies the DHCP unique identifier.
interface	Specifies the interface.
location	Specifies the node location.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	execute

Example

This is a sample output from the **clear dhcp ipv6 proxy binding** command:

```
Router# clear dhcp ipv6 proxy binding
```

clear dhcp ipv6 relay statistics

To clear DHCPv6 relay statistics, use the **clear dhcp ipv6 relay statistics** command in XR EXEC mode.

clear dhcp ipv6 relay statistics [**vrf** *vrf-name*][**location** *node-id*][**debug** {*all* | *location*}]

Syntax Description

vrf *vrf-name*	(Optional) Clears DHCPv6 relay statistics information for a VPN routing and forwarding (VRF) instance.
location *node-id*	(Optional) Clears DHCPv6 relay statistics information for a specified node. The *node-id* argument is entered in the *rack/slot/module* notation.
debug {*all* | *location*} *node-id*	(Optional) Clears DHCPv6 relay statistics information for base mode or a specified location.

Command Default

None.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	execute
root-system	read, write

This example shows how to clear DHCPv6 relay statistics:

```
Router# clear dhcp ipv6 relay statistics
```

client-mac-mismatch

To enable DHCP MAC address verification.

client-mac-mismatch action drop

Syntax Description

action	Specifies an action for the router when the DHCP MAC address is a not a match.

drop	Drops the packet with the mismatched DHCP MAC address.

Command Default None

Command Modes DHCP Relay Profile Configuration Mode

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines Enables MAC address verification. If MAC address in the DHCPv4 protocol header does not match the L2 header source MAC address in the DHCPv4 relay profile, the frame is dropped.

Example

Use the following example to configure DHCP MAC address verification.

```
Router# configure

Router(config)# dhcp ipv4
/* Configures DHCP for IPv4 and enters the DHCPv4 configuration submode. */

Router(config-dhcpv4)# profile client relay
/* Enables DHCP relay profile */

Router(config-dhcpv4)# client-mac-mismatch action drop
/* Enables MAC address verification. If MAC address in the DHCPv4 protocol header does not
 match the L2 header source MAC address in the DHCPv4 relay profile,
 the frame is dropped  */

Router(config-dhcpv4-relay-profile)# commit

Router(config-dhcpv4-relay-profile)# exit
```

default-router

To configure the default-router, use the **default-router** command in the DHCPv4 server profile sub-mode. To deconfigure the name of the default-router or the IP address, use the **no** form of this command.

default-router *address1address2...address8*
no default-router *address1address2...address8*

Syntax Description

address1address2...address8	Name of the router or IP address. Upto 8 routers can be configured.

Command Default None

Command Modes DHCPv4 Server Profile

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read, write

Example

This is a sample output from the **default-router** command:

```
Router# config
Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile DHCP_SERVER_PROFILE server
Router(config-dhcpv4-server-profile)# default-router 10.20.1.2
```

delete-binding-on-discover disable

To ensure old binding is reassigned to the same client, when using **allow-client-id-change** command, use the **delete-binding-on-discover disable** command in DHCP IPv4 Server Profile Class Configuration submode.

delete-binding-on-discover disable

Command Default

No default behaviour or values

Command Modes

DHCP IPv4 Server Profile Class Configuration submode

Command History

Release	Modification
Release 6.5.2	This command was introduced.

Usage Guidelines

You must also configure the **allow-client-id-change** command so that DHCP IPv4 server allows changing the client id on new discovery request for **delete-binding-on-discover disable** command to operate.

The following example shows how to use the **delete-binding-on-discover disable** command:

```
Router# configure
Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile ISP1 server
Router(config-dhcpv4-server-profile)# allow-client-id- change
Router(config-dhcpv4-server-profile)# class ISP1_CLASS
Router(config-dhcpv4-server-profile-class)# lease 0 1 0
```

```
Router(config-dhcpv4-server-profile-class)# pool ISP1_CLASS_POOL
Router(config-dhcpv4-server-profile-class)# delete-binding-on-discover disable
Router(config-dhcpv4-server-profile-class)# exit
Router(config-dhcpv4-server-profile)# commit
```

dhcp ipv4

To enable Dynamic Host Configuration Protocol (DHCP) for IPv4 and to enter DHCP IPv4 configuration mode, use the **dhcp ipv4** command in Global Configuration mode. To disable DHCP for IPv4 and exit the DHCP IPv4 configuration mode, use the **no** form of this command.

dhcp ipv4
no dhcp ipv4

Syntax Description This command has no keywords or arguments.

Command Modes None

Command Modes Global Configuration mode

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines Use the **dhcp ipv4** command to enter DHCP IPv4 configuration mode.

Task ID

Task ID	Operations
ip-services	read, write

Examples This example shows how to enable DHCP for IPv4:

```
RP0/CPU0:Router# dhcp ipv4
RP0/CPU0:Router# (config-dhcpv4)#
```

dhcp ipv6

To enable Dynamic Host Configuration Protocol (DHCP) for IPv6 and to enter DHCP IPv6 configuration mode, use the **dhcp ipv6** command in XR Config mode. To disable the DHCP for IPv6, use the **no** form of this command.

dhcp ipv6

Syntax Description This command has no keywords or arguments.

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines Use the **dhcp ipv6** command to enter DHCP IPv6 configuration mode.

Task ID

Task ID	Operations
ip-services	read, write

Examples This example shows how to enable DHCP for IPv6:

```
Router(config)# dhcp ipv6
Router(config-dhcpv6)#
```

dns-server

To configure the Domain Name System (DNS) servers, use the **dns-server** command in DHCPv4 server profile configuration and DHCPv4 server profile class sub-mode. To remove the DNS servers use the no form of this command.

dns-server *address1 address2 .....address8*
no dns-server *address1 address2.....address8*

Syntax Description

address1, address2...address8	Specifies the server IPv4 address. Upto 8 server addresses can be configured. The servers are listed in order of preference *address1* is the most preferred server, *address2* is the next most preferred server, and so on.

Command Default None.

Command Modes DHCPv4 Server Profile

DHCPv4 Server Profile Class Sub-mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read, write

This example shows how to configure DNS server address:

```
Router# config
Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile DHCP_SERVER_PROFILE server
Router(config-dhcpv4-server-profile)# dns-server 192.168.155.9
```

domain-name

To configure domain name that DHCP clients will use to resolve DNS names, use the **domain-name** command in DHCP IPv4 server profile configuration mode.

domain-name *domain-name*

Syntax Description

domain-name	Specify DHCP server domain name for the client.

Command Default None

Command Modes DHCP IPv4 Server Profile configuration

DHCP IPv4 Server Profile Class sub-mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read, write

This example shows how to define cisco.com as domain name for DHCP server:

```
Router# config
Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile DHCP_SERVER_PROFILE server
Router(config-dhcpv4-server-profile)# domain-name cisco.com
```

duplicate-mac-allowed

To allow duplicate client MAC addresses across different VLANs and interfaces, use the **duplicate-mac-allowed** command in the DHCP IPv4 configuration mode. To disallow duplicate client MAC addresses, use the **no** form of this command.

duplicate-mac-allowed [{**exclude-vlan** | **include-giaddr**}]

Syntax Description

exclude-vlan	Excludes VLANs from the client key; only MAC address and interface form the client key.
include-giaddr	Enables support for duplicate sessions having the same MAC address but different *gi-address* values, mainly in the case of routed sessions.

Command Default

By default, duplicate MAC address support is disabled.

Command Modes

DHCP IPv4 configuration

Command History

Release	Modification
Release 6.3.2	Modified the command to include **include-giaddr** option as part of DHCP L3 snooping feature in BNG.
Release 6.1.2	This command was introduced in BNG, with an addition of **exclude-vlan** option to exclude VLANs from the client key.

Usage Guidelines

You can enable duplicate MAC addresses on relay, proxy, server, and snoop DHCP modes.

Do not enable the **duplicate-mac-allowed** command for mobile subscribers.

With **exclude-vlan** option enabled, both inner and outer VLANs get excluded. You cannot exclude just one of them.

The **include-giaddr** option is used for DHCP L3 snooping feature in BNG. It is supported only on Cisco IOS XR 64-bit operating system.

Task ID

Task ID	Operation
ip-services	read, write

Example

This examples shows how to allow duplicate client MAC addresses across different VLANs and interfaces, using the **duplicate-mac-allowed** command:

```
Router# configure
Router(config)# dhcp ipv4
Router(config-dhcpv4)# duplicate-mac-allowed exclude-vlan
```

This examples shows how to enable support for duplicate sessions having the same MAC address but different *gi-address* values, for DHCP L3 snooping in BNG:

```
Router# configure
Router(config)# dhcp ipv4
Router(config-dhcpv4)# duplicate-mac-allowed include-giaddr
```

Related Commands

Command	Description
dhcp ipv4 , on page 135	Enables Dynamic Host Configuration Protocol (DHCP) for IPv4 and enters DHCP IPv4 configuration mode.

giaddr policy

To configure how Dynamic Host Configuration Protocol (DHCP) IPv4 Relay processes BOOTREQUEST packets that already contain a nonzero giaddr attribute, use the **giaddr policy** command in DHCP IPv4 profile relay configuration submode. To restore the default giaddr policy, use the **no** form of this command.

giaddr policy {**replace** | **drop**}
no giaddr policy {**replace** | **drop**}

Syntax Description

replace	Replaces the existing giaddr value with a value that it generates.
drop	Drops the packet that has an existing nonzero giaddr value.

Command Default

DHCP IPv4 relay retains the existing nonzero giaddr value in the DHCP IPv4 packet received from a client value.

Command Modes

DHCP IPv4 profile relay configuration

DHCP IPv4 profile proxy configuration

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

The **giaddr policy** command affects only the packets that are received from a DHCP IPv4 client that have a nonzero giaddr attribute.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to use the **giaddr policy** command:

```
Router# config
Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile client relay
Router(config-dhcpv4-relay-profile)# giaddr policy drop
```

Related Commands

Command	Description
dhcp ipv4 , on page 135	Enables DHCP for IPv4 and enters DHCP IPv4 configuration mode.
helper-address, on page 141	Configures the DHCP relay agent to relay packets to a specific DHCP Server.
profile (DHCP), on page 153	Configures a relay profile for the DHCP IPv4 component.
relay information check , on page 157	Configures a DHCP server to validate the relay agent information option in forwarded BOOTREPLY messages.
relay information option , on page 158	Enables the system to insert a DHCP relay agent information option in forwarded BOOTREQUEST messages to a DHCP server.
relay information option allow-untrusted , on page 159	Configures the DHCP component to not drop BOOTREQUEST messages that have the relay information option set and the giaddr set to zero.
relay information policy	Configures how a relay agent processes BOOTREQUEST messages that already contain a relay information option.

handle-jumbo-packet

To enable the router to process incoming DHCPv6 packets greater than 1280 bytes and upto 12800 bytes, use the **handle-jumbo-packet** command in **DHCP IPv6** configuration mode. If the incoming DHCPv6 packet size is greater that 12800 bytes, the router drops the packet.

handle-jumbo-packet

Syntax Description

This command has no keywords or arguments.

Command Default

Disabled.

Command Modes DHCP IPv6 configuration mode

Command History

Release	Modification
Release 7.4.1	This command was introduced.

Usage Guidelines

Task ID

Task ID	Operation
ip-services	read, write

Example

This example shows how to use this command to process packets upto 12800 bytes:

```
Router# config
Router(config)# dhcp ipv6
Router(config-dhcpv6)# handle-jumbo-packet
Router(config-dhcpv6)# commit
```

helper-address

To configure the Dynamic Host Configuration Protocol (DHCP) IPv4 relay agent to relay DHCP packets to a specific DHCP server, use the **helper-address** command in an DHCP IPv4 relay profile configuration mode. Use the **no** form of this command to clear the address.

helper-address [**vrf** *vrf-name*] [*address*] [**giaddr** *gateway-address*]
no helper-address [**vrf** *vrf-name*] [*address*] [**giaddr** *gateway-address*]

Syntax Description

vrf-name	(Optional) Specifies the name of a particular VRF.
address	IPv4 in four part, dotted decimal format.
giaddr *gateway-address*	(Optional) Specifies the gateway address to use in packets relayed to server. This keyword is applicable for IPv4 helper address.

Command Default Helper address is not configured.

Command Modes DHCP IPv4 relay profile configuration

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines A maximum of upto eight helper addresses can be configured.

Task ID

Task ID	Operations
ip-services	read, write

Examples

This example shows how to set the helper-address for a VRF using the **helper address** command in DHCP IPv4 relay profile class configuration mode:

```
RP/0/CPU0:router(config)#  dhcp ipv4
RP/0/CPU0:router(config-dhcpv4)# profile profile1 relay
RP/0/CPU0:router(config-dhcpv4-relay-profile)# helper-address vrf my-server-vrf 10.1.1.1
```

Related Commands

Command	Description
dhcp ipv4	Enables Dynamic Host Configuration Protocol (DHCP) for IPv4 and enters DHCP IPv4 configuration mode.
relay information check	Configures a DHCP server to validate the relay agent information option in forwarded BOOTREPLY messages.
relay information option	Enables the system to insert a DHCP relay agent information option in forwarded BOOTREQUEST messages to a DHCP server.
relay information option allow-untrusted	Configures the DHCP component to not drop BOOTREQUEST messages that have the relay information option set and the giaddr set to zero.

helper-address (ipv6)

To configure the Dynamic Host Configuration Protocol (DHCP) IPv6 relay agent for prefix delegation to relay DHCP packets to a specific DHCP server, use the **helper-address** command in the DHCP IPv6 profile configuration submode. Use the **no** form of this command to clear the address.

helper-address *ipv6-address* [**interface** *type* *interface-path-id*]
no helper-address *ipv6-address* [**interface** *type* *interface-path-id*]

Syntax Description

ipv6-address	The IPv6 address assigned to the interface. This argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal format using 16-bit values between colons.
interface *type*	Interface type. For more information, use the question mark (?) online help function.

interface-path-id	(Optional) Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between value s is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0/CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

DHCP IPv6 profile configuration

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read, write

Example

This is a sample output that shows how to set the helper-address using the **helper-address** command

```
Router# config
```

```
Router(config)# dhcp ipv6
Router(config-dhcpv6)# profile p1 proxy
Router(config-dhcpv6-profile)# helper-address 2001:db8::3 GigabitEthernet 0/2/0/0
```

Related Commands

Command	Description
dhcp ipv6, on page 135	Enables Dynamic Host Configuration Protocol (DHCP) for IPv6.

hop-count-seed

To configure the hop-count in relay-forward message for a DHCP relay agent as zero, use the `hop-count-seed` command in the DHCP IPv6 configuration mode. By default, hop-count in relay-forward message for DHCP relay agents is set to one.

hop-count-seed
no hop-count-seed

Syntax Description

This command has no keywords or arguments.

Command Default

If this command is not configured, by default, hop-count in relay-forward message for DHCP relay agents is set to one.

Command Modes

DHCP IPv6 configuration

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

Use this command only on routers that are configured as DHCP relay agents. You can only configure this command in the DHCP IPv6 mode and not on DHCP IPv4 mode.

Task ID

Task ID	Operations
ip-services	read, write

The following is an example of the **hop-seed-count** command:

```
Router# config
Router(config)# dhcp ipv6
Router(dhcp-ipv6)# hop-count-seed
```

iana-route-add

To enable route addition for identity association for non temporary address (IANA), use the **iana-route-add** command in DHCPv6 relay profile configuration submode. To disable route addition to IANA, use the **no** form of this command.

iana-route-add
no iana-route-add

Syntax Description

This command has no keywords or arguments.

Command Default

Disabled.

Command Modes

DHCP IPv6 relay profile configuration submode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

The DHCPv6 relay is capable of installing routes for multiple identity association for prefix delegation (IAPD) options within a DHCPv6 message. The route addition for IAPD is enabled by default. The DHCPv6 relay is capable of installing routes for IANA as well, but this feature is disabled by default. Users can enable the route addition to IANA feature by using **iana-route-add** command in DHCPv6 relay profile configuration submode.

Task ID

Task ID	Operation
ip-services	read, write

Example

This example shows how to enable route addition to IANA:

```
Router# config
Router(config)# dhcp ipv6
Router(config-dhcpv6)# profile client relay
Router(config-dhcpv6-relay-profile)# iana-route-add
```

ipv6 address dhcp-client-options

To configure the DHCPv6 client options, use the **ipv6 address dhcp-client-options** command in the interface configuration submode.

ipv6 address dhcp-client-options { **duid linked-layer-address** | **options** { **15** *user-class-id* | **16** *vendor-id* | **23** | **24** } | **rapid-commit** | **timers** { **release-timeout** *release-timeout-value* | **req-max-rt** *req-max-rt-value* | **req-timeout** *req-timeout-value* | **sol-max-delay** *sol-max-delay-value* | **sol-max-rt** *sol-max-rt-value* | **sol-time-out** *sol-time-out-value* } }

Syntax Description

duid	Enables DHCPv6 client to communicate with the DHCPv6 server through the link layer address.
rapid-commit	Obtains configuration parameters from the DHCPv6 server through a rapid two-step exchange (solicit and reply) instead of the default four-step exchange (solicit, advertise, request, and reply).
options	Configures DHCPv6 options that can be configured on a DHCPv6 client other than **duid** or **rapid-commit** options.
timers	Configures the different timer values for DHCP client configurations.
release-timeout *release-timeout-value*	Configures the retransmission timeout value for the initial release message in seconds.
req-max-rt *req-max-rt-value*	Configures the maximum retransmission timeout value for the request message.
req-timeout *req-timeout-value*	Configures the initial request timeout value of the request message.
sol-max-delay *sol-max-delay-value*	Configures the maximum delay time of the first solicit message.
sol-max-rt *sol-max-rt-value*	Configures the maximum solicit retransmission time.
sol-max-rt *sol-max-rt-value*	Configures the intial timeout value of the solicit message.

Command Default

None

Command Modes

Interface Configuration

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Task ID

Task ID	Operation
ipv6	read, write
network	read, write

Example

The following example shows you how to configure the **release-timeout** timer option:

```
Router# configure
Router(config)# interface BVI 10
Router(config-if)# ipv6 address dhcp-client-options
```

```
Router(config-dhcpv6-client)# timers release-timeout 3
Router(config-dhcpv6-client)# commit
```

Related Commands

Command	Descrip
clear dhcp ipv6 client, on page 128	Clears the DHCPv6 client binding information configured on a given interface and sets the binding information again.
show dhcp ipv6 client, on page 175	Displays DHCP IPv6 client binding information.
show tech-support dhcp ipv6 client, on page 186	Retrieves the DHCP client show tech support information.

lease (DHCPv4 Server)

To configure the lease for an IP address assigned from the pool, use the **lease** command in the DHCPv4 server profile submode. To deconfigure, use the **no** form of this command.

lease { **infinite** | *days* }
no lease { **infinite** | *days* }

Syntax Description

infinite	Configures an infinite lease.
days	Configures lease for the specified number of days. The number of days can range from 0 to 365.

Command Default

None

Command Modes

DHCPv4 Server Profile

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read, write

Example

This is a sample output from the **lease** command:

```
Router# config
Router#(config)# dhcp ipv4
Router#(config-dhcpv4)# profile P1 server
```

```
Router#(config-dhcpv4-server-profile)# lease infinite
```

limit lease

To configure the limit on a lease per-circuit-id, per-interface, or per-remote-id, use the **limit lease** command in the DHCPv4 server profile submode. To deconfigure, use the **no** form of this command.

limit lease {**per-circuit-id** | **per-interface** | **per-remote-id** } *value*
no limit lease {**per-circuit-id** | **per-interface** | **per-remote-id** } *value*

Syntax Description

per-circuit-id	Inserts the limit lease type circuit-id.
per-interface	Inserts the limit lease type interface.
per-remote-id	Inserts the limit lease type remote-id.
value	Value of limit lease count. Range is from 1 to 240000.

Command Default

None

Command Modes

DHCPv4 Server Profile

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read, write

Example

This is a sample output from the **limit lease** command:

```
Router# config
Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile P1 server
Router(config-dhcpv4-server-profile)# limit lease per-circuit-id 23
```

netbios-name-server

To configure net bios name servers, use the **netbios-name-server** command in the DHCPv4 server profile submode. To deconfigure, use the **no** form of this command.

netbios-name server *address1address2...address8*
no netbios-name server *address1address2...address8*

Syntax Description

address1address2...address8	Name of the server or IP address.

Command Default

None

Command Modes

DHCPv4 Server Profile

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read, write

Example

This is a sample configuration for the **netbios-name-server** command:

```
Router# config
Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile DHCP_SERVER_PROFILE server
Router(config-dhcpv4-server-profile)# netbios-name-server 10.20.3.5
```

netbios-node-type

To configure the type of net bios node, use the **netbios-node-type** command in the DHCPv4 server profile submode. To deconfigure, use the **no** form of this command.

netbios-node-type {*number* | *b-node* | *h-node* | *m-node* | *p-node* }

Syntax Description

number	Hexadecimal number.
b-node	broadcast node.

h-node	hybrid node.
m-node	mixed node.
p-node	peer-to-peer node.

Command Default None

Command Modes DHCPv4 Server Profile

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No manually configured prefix delegations exist.

Task ID

Task ID	Operation
ip-services	read, write

Example

This is a sample output from the **bootfile** command:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# dhcp ipv4
RP/0/RP0/CPU0:router(config-dhcpv4)# profile DHCP_SERVER_PROFILE server
RP/0/RP0/CPU0:router(config-dhcpv4-server-profile)# netbios-node-type p-node
```

option

To configure the DHCP option code, use the **option** command in the DHCPv4 server profile submode. To deconfigure, use the **no** form of this command.

The DHCP options which are not commonly used are configured in a raw format using **option** command.

option *option-code* {**ascii** *string* | **hex** *string* | **ip** *address*}
no option *option-code* {**ascii** *string* | **hex** *string* | **ip** *address*}

Syntax Description

option-code	Specifies the DHCP option code.
ascii *string*	Specifies the data as an NVT ASCII string.
hex *string*	Specifies the data as a hex string.

ip *address*	Specifes the hostname or the IP Address.

Command Default

None

Command Modes

DHCPv4 Server Profile

DHCPv4 Server Profile Class Sub-mode

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines

DHCP server profile class sub-mode supports configuring DHCP options except few that are listed in the table below:

Table 11: Not Supported DHCP Options under DHCPv4 Server Profile Class Sub-mode

Pad	10
Hostname	12
Requested Address	50
Over Load	52
Message Type	53
Server Identifier	54
Renewal Time	58
Rebind Time	59
Client Identifier	61
Relay Information	82
End	255

Task ID

Task ID	Operation
ip-services	read, write

Example

This is a sample output from the **option** command:

```
Router# config
Router(config)# dhcp ipv4
```

```
Router(config-dhcpv4)# profile DHCP_SERVER_PROFILE server
Router(config-dhcpv4-server-profile)# option 23 ip 10.20.34.56
Router(config-dhcpv4-server-profile)# option 16 hex 20187634
Router(config-dhcpv4-server-profile)# option 17 ascii /users/cisco/
```

pool

To enable distributed address pool service on IPv4 or IPv6 profile and to enter the pool IPv4 or IPv6 configuration submode, use the **pool ipv4** or **pool ipv6** command in the Global Configuration mode. To disable this feature, use the **no** form of this command.

pool {[**ipv4***pool-name*{*address-range* | **exclude** | **network***utilization-mark*}] | [**ipv6** {*address-range* | | **exclude** | | **network** | *prefix-length* | *prefix-range* | *utilization-mark*} | [**vrf** {[**all ipv6** *ipv6-pool-name*] | [*vrf-name*{[**ipv4** *ipv4-pool-name* {*address-range* | **exclude** | **network***utilization-mark*}] | [**ipv6** *ipv6-pool-name*{*address-range* | **exclude** | **network***prefix-lengthprefix-rangeutilization-mark*}}]}]}
no pool ipv4

Syntax Description

address-range	Specifies the address-range of the pool.
exclude	Specifies the address to be excluded from the pool.
network	Specifies the network of the pool.
utilization-mark	Specifies the utilization-mark of the pool.
prefix-length	Specifies the prefix-length to be used for the pool.
prefix-range	Specifies the prefix-range to be used for the pool.

Command Default

None

Command Modes

Global Configuration

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines

Use the **pool ipv4** command to enter IPv4 pool configuration submode.

Task ID

Task ID	Operation
ip-services	read, write

This is an example of configuring the **pool ipv4** command in the Global Configuration mode:

```
Router# configure
```

```
Router(config)# pool ipv4 pool1
Router(config-pool-ipv4)# address-range 10.10.10.1 10.10.10.254
```

Related Commands

Commands	Description
pool vrf	Enables distributed address pool service on vrf, ipv4, and ipv6.
exclude	Specifies a range of IP addresses that distributed address pool service should not assign to clients.
address-range	Specifies a range of IP addresses.

profile (DHCP)

To configure a DHCP relay profile, DHCP snooping profile, DHCP base profile or a DHCP proxy profile for the Dynamic Host Configuration Protocol (DHCP) IPv4 or IP6 component and to enter the profile mode, use the **profile** command in DHCP IPv4 or DHCP IPv6 configuration mode. To disable this feature and exit the profile mode, use the **no** form of this command.

profile *name* **relay**
no profile *name* **relay**

Syntax Description

name	Name that uniquely identifies the relay or snoop profile.

relay	Configures a DHCP relay profile. A DHCP relay agent is a host that forwards DHCP packets between clients and servers. When the clients and servers are not on the same physical subnet, the relay agents are used to forward requests and replies between them. A DHCP relay agent is any host that forwards DHCP packets between clients and servers. Relay agents are used to forward requests and replies between clients and servers when they are not on the same physical subnet. Relay agent forwarding is distinct from the normal forwarding of an IP router, where IP datagrams are switched between networks rather transparently. By contrast, relay agents receive DHCP messages and then generate a new DHCP message to send out on another interface. The relay agent sets the gateway IP address (giaddr field of the DHCP packet) and, if configured, adds the relay agent information option (option82) in the packet and forwards it to the DHCP server. The reply from the server is forwarded back to the client after removing option 82.

Command Default

None

Command Modes

DHCP IPv4 configuration

DHCP IPv6 configuration

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ip-services	read, write

Examples

This example shows how to use the **profile** command to configure DHCP IPv6 relay profile:

```
RP/0/RP0/CPU0:router(config)# dhcp ipv6
RP/0/RP0/CPU0:router(config-dhcpv6)# profile client relay
RP/0/RP0/CPU0:router(config-dhcpv6-relay-profile)#
```

This example shows how to use the **profile** command to configure DHCP IPv4 relay profile:

```
RP/0/RP0/CPU0:router(config)# dhcp ipv4
RP/0/RP0/CPU0:router(config-dhcpv4)# profile client relay
RP/0/RP0/CPU0:router(config-dhcpv4-relay-profile)#
```

relay information authenticate

To specify relay agent information option to the policy plane for authentication purposes, use the **relay information authenticate** command in the DHCP IPv4 proxy profile configuration mode. To disable the relay option, use the **no** form of this command.

relay information authenticate {**received** | **inserted**}

Syntax Description

received	Authenticate using received relay agent information option.
inserted	Authenticate using inserted relay agent information option.

Command Default

None

Command Modes

DHCP IPv4 proxy profile configuration

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ip-services	read, write

Examples

This example shows how to specify the received relay agent information option for authentication using the **relay information authenticate** command in DHCP IPv4 proxy profile configuration mode:

```
Router# config
Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile myprofile proxy
Router(config-dhcpv4-proxy-profile)# relay information authenticate received
```

Related Commands

Command	Description
dhcp ipv4	Enables Dynamic Host Configuration Protocol (DHCP) for IPv4 and enters DHCP IPv4 configuration mode.
relay information check	Configures a DHCP server to validate the relay agent information option in forwarded BOOTREPLY messages.
relay information option	Enables the system to insert a DHCP relay agent information option in forwarded BOOTREQUEST messages to a DHCP server.
relay information option allow-untrusted	Configures the DHCP component to not drop BOOTREQUEST messages that have the relay information option set and the giaddr set to zero.
relay information option circuit-id	Enables the system to insert a circuit-id information option in forwarded BOOTREQUEST messages to a DHCP server.
relay information option remote-id	Enables the system to insert a remote-id information option in forwarded BOOTREQUEST messages to a DHCP server.
relay information option vpn	Enables the system to insert vpn information option in forwarded BOOTREQUEST messages to a DHCP server.
relay information option vpn-mode	Enables the system to insert a vpn-mode information option in forwarded BOOTREQUEST messages to a DHCP server.

Command	Description
relay information policy	Configures how a relay agent processes BOOTREQUEST messages that already contain a relay information option.

relay information check

To configure a Dynamic Host Configuration Protocol (DHCP) IPv4 Relay to validate the relay agent information option in forwarded BOOTREPLY messages, use the **relay information check** command in DHCP IPv4 relay profile configuration submode. To disable this feature, use the **no** form of this command.

relay information check
no relay information check

Syntax Description

This command has no keywords or arguments.

Command Default

DHCP validates the relay agent information option.

Command Modes

DHCP IPv4 relay profile configuration

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ip-services	read, write
basic-services	read, write

This example shows how to use the **relay information check** command:

```
RP/0/CPU0:router# config
RP/0/CPU0:router(config)# dhcp ipv4
RP/0/CPU0:router(config-dhcpv4)# profile client relay
RP/0/CPU0:router(config-dhcpv4-relay-profile)# relay information check
```

Related Commands

Command	Description
dhcp ipv4	Enables Dynamic Host Configuration Protocol (DHCP) for IPv4 and enters DHCP IPv4 configuration mode.

Command	Description
helper-address	Configures the DHCP relay agent to relay packets to a specific DHCP Server.
relay information check	Configures a DHCP server to validate the relay agent information option in forwarded BOOTREPLY messages.
relay information option	Enables the system to insert a DHCP relay agent information option in forwarded BOOTREQUEST messages to a DHCP server.
relay information option allow-untrusted	Configures the DHCP component to not drop BOOTREQUEST messages that have the relay information option set and the giaddr set to zero.

relay information option

To configure Dynamic Host Configuration Protocol (DHCP) IPv4 relay to insert relay agent information option in forwarded BOOTREQUEST messages to a DHCP server, use the **relay information option** command in DHCP IPv4 relay profile relay configuration. To disable inserting relay information into forwarded BOOTREQUEST messages, use the **no** form of this command.

relay information option
no relay information option

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

DHCP IPv4

relay

profile

configuration

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines

The **relay information option** command automatically adds the circuit identifier suboption and the remote ID suboption to the DHCP relay agent information option.

The **relay information option** command enables a DHCP server to identify the user (for example, cable access router) sending the request and initiate appropriate action based on this information. By default, DHCP does not insert relay information.

The upstream DHCP server or DHCP relay interface must be configured to accept this type of packet using the **relay information option allow-untrusted** configuration. This configuration prevents the server or relay from dropping the DHCP message.

Task ID

Task ID	Operations
ip-services	read, write
basic-services	read, write

This example shows how to use the **relay information option** command:

```
RP/0/CPU0:router# config
RP/0/CPU0:router(config)# dhcp ipv4
RP/0/CPU0:router(config-dhcpv4)# profile client relay
RP/0/CPU0:router(config-dhcpv4-relay-profile)# relay information option
```

Related Commands

Command	Description
dhcp ipv4	Enables DHCP for IPv4 and enters DHCP IPv4 configuration mode.
helper-address	Configures the DHCP relay agent to relay packets to a specific DHCP Server.
relay information check	Configures a DHCP server to validate the relay agent information option in forwarded BOOTREPLY messages.
relay information option allow-untrusted	Configures the DHCP component to not drop BOOTREQUEST messages that have the relay information option set and the giaddr set to zero.

relay information option allow-untrusted

To configure the Dynamic Host Configuration Protocol (DHCP) IPv4 relay not to drop discard BOOTREQUEST packets that have the relay information option set and the giaddr set to zero, use the **relay information option allow-untrusted** command in DHCP IPv4 relay profile configuration submode. To restore the default behavior, which is to discard the BOOTREQUEST packets that have the relay information option and set the giaddr set to zero, use the **no** form of this command.

relay information option allow-untrusted
no relay information option allow-untrusted

Syntax Description

This command has no keywords or arguments.

Command Default

The packet is dropped if the relay information is set and the giaddr is set to zero.

Command Modes

DHCP IPv4

relay

profile

configuration

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines

According to RFC 3046, relay agent receiving a DHCP packet from an untrusted circuit with giaddr set to zero but with a relay agent information option already present in the packet shall discard the packet and increment an error count. This configuration prevents relay from dropping the DHCP message.

Task ID

Task ID	Operations
ip-services	read, write
basic-services	read, write

Examples

This example shows how to use the **relay information option allow-untrusted** command:

```
RP/0/CPU0:router# config
RP/0/CPU0:router(config)# dhcp ipv4
RP/0/CPU0:router(config-dhcpv4)# profile client relay
RP/0/CPU0:router(config-dhcpv4-relay-profile)# relay information option allow-untrusted
```

Related Commands

Command	Description
dhcp ipv4	Enables Dynamic Host Configuration Protocol (DHCP) for IPv4 and enters DHCP IPv4 configuration mode.
helper-address	Configures the DHCP relay agent to relay packets to a specific DHCP Server.
relay information check	Configures a DHCP server to validate the relay agent information option in forwarded BOOTREPLY messages.
relay information option	Enables the system to insert a DHCP relay agent information option in forwarded BOOTREQUEST messages to a DHCP server.

secure-arp

To allow DHCP to add an ARP cache entry when DHCP assigns an IP address to a client in IP subscriber sessions, use the **secure-arp** command in DHCP IPv4 profile proxy configuration or DHCP IPv4 server profile mode. To disallow DHCP to add an ARP cache entry when DHCP assigns an IP address to a client, use the **no** form of this command.

secure-arp
no secure-arp

Syntax Description This command has no keywords or arguments.

Command Default By default, secure ARP support is disabled.

Command Modes DHCP IPv4 proxy profile configuration

DHCP IPv4 Server Profile

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines In standalone DHCP sessions, the DHCP server adds an ARP entry when it assigns an IP address to a client. However, for IP subscriber sessions, DHCP server does not add an ARP entry. Although ARP establishes correspondences between network addresses, an untrusted device can spoof IP an address not assigned to it posing a security threat for IP subscriber sessions.

Secure ARP allows DHCP to add an ARP cache entry when DHCP assigns an IP address to a client in IP subscriber sessions. This is to prevent untrusted devices from spoofing IP addresses not assigned to them. Secure ARP is disabled by default.

Task ID

Task ID	Operation
ip-services	read, write

Example

This examples shows how to allow DHCP to add an ARP cache entry when DHCP assigns an IP address to a client using the **secure-arp** command in DHCP IPv4 server profile configuration:

```
Router# configure
Router(config)# dhcp ipv4
Router(config-dhcpv4)# profile profile1 server
Router(config-dhcpv4-server-profile)# secure-arp
Router(config-dhcpv4-server-profile)#
```

show dhcp ipv4 client

To display DHCP client binding information, use the **show dhcp ipv4 client** command in XR EXEC mode.

show dhcp ipv4 client <*interfaceName*> [**detail**] [**debug**]

Syntax Description

interfaceName	Displays the DHCP IPv4 address of the specified interface.
detail	(Optional) Specifies detailed results.

debug	(Optional) Displays internal debugging information.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

Use the **show dhcp ipv4 client** command to display the DHCP IPv4 for the specified client.

Task ID

Task ID	Operations
IP-Services	read

Examples

The following example shows how to display DHCP IPv4 binding information:

```
Router# show dhcp ipv4  client
Mon May  6 16:35:32.581 UTC

    Interface name                    IP Address           Binding State         Lease
Time Rem
----------------------               ------------         ---------------
----------------------
MgmtEth0_0_CPU0_0                   192.168.190.130            BOUND           1688 secs
(00:28:08)

Router#
Router# show dhcp ipv4  client binding ?
  MgmtEth          Ethernet/IEEE 802.3 interface(s)
  detail           Show detailed client binding information
  |                Output Modifiers
  <cr>
Router# show dhcp ipv4  client   detail
Mon May  6 16:35:56.579 UTC

-----------------------------------------------------
Client Interface name         : MgmtEth0_0_CPU0_0
Client Interface handle       : 0x1280
Client Interface VRF name     : default
Client ChAddr                 : 000c.292f.950e
Client ID                     : MgmtEth0_0_CPU0_0
Client State                  : BOUND
Client IP Address (Dhcp)      : 192.168.190.130
Client IP Address Mask        : 255.255.255.0
Client Lease Time Allocated   : 1800 secs (00:30:00)
Client Lease Time Remaining   : 1664 secs (00:27:44)
Client Selected Server Addr   : 192.168.190.254
-----------------------------------------------------

Router#
Router# show dhcp ipv4  client binding detail ?
  MgmtEth          Ethernet/IEEE 802.3 interface(s)
  debug            Show detailed debug level client binding information
  |                Output Modifiers
```

```
  <cr>
Router# show dhcp ipv4  client detail debug
Mon May  6 16:36:43.836 UTC

-----------------------------------------------------
Client Interface name         : MgmtEth0_0_CPU0_0
Client Interface handle       : 0x1280
Client Interface VRF name     : default
Client ChAddr                 : 000c.292f.950e
Client ID                     : MgmtEth0_0_CPU0_0
Client State                  : BOUND
Client IP Address (Dhcp)      : 192.168.190.130
Client IP Address Mask        : 255.255.255.0
Client Lease Time Allocated   : 1800 secs (00:30:00)
Client Lease Time Remaining   : 1617 secs (00:26:57)
Client Selected Server Addr   : 192.168.190.254
Client Interface VRF id       : 0x60000000
Client Interface VRF Table id : 0xe0000000
Client XID                    : 0xa7f
Client Timers Running         : 0x2 (T1_RENEW_TIMER)
Client Renew Time Allocated   : 900 secs (00:15:00)
Client Renew Time Adjusted    : 900 secs (00:15:00)
Client Rebind Time Allocated  : 1575 secs (00:26:15)
Client Rebind Time Adjusted   : 1575 secs (00:26:15)
Client Checkpoint object id   : 0x80002fd8
Client IPv4 MA configured     : TRUE
-----------------------------------------------------

Router#
Router# show dhcp ipv4 client  mgmtEth 0/0/CPU0/0
Mon May  6 16:49:54.382 UTC

    Interface name         IP Address      Binding State         Lease Time Rem
----------------------    ------------    ---------------    ----------------------
MgmtEth0_0_CPU0_0          192.168.190.130  BOUND             1727 secs (00:28:47)
RP/0/0/CPU0:ios#
```

show dhcp ipv4 client statistics

To display DHCP client statistical information, use the **show dhcp ipv4 client statistics** command in XR EXEC mode.

show dhcp ipv4 client *interfaceName interface-number* **statistics**

Syntax Description

interfaceName	Displays the DHCP IPv4 statistical information of the specified interface.
statistics	Applies a statistics template and enable statistics collection.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

Use the **show dhcp ipv4 client statistics** command to display the DHCP IPv4 statistical information for the specified client.

Task ID

Task ID	Operations
IP-Services	read

Examples

The following example shows how to display the DHCP IPv4 statistics information:

```
RP/0/0/CPU0:ios#show dhcp ipv4 client binding mgmtEth 0/0/CPU0/0 statistics
Mon May  6 16:49:46.402 UTC

-----------------------------------------------------
Client Interface name         : MgmtEth0_0_CPU0_0
Client State                  : BOUND
-----------------------------------------------------
               TOTAL STATISTICS
-----------------------------------------------------
DISCOVERS SENT                : 1
OFFERS    SENT                : 1
OFFERS    RECEIVED            : 1
ACKS      RECEIVED            : 1
RELEASE   SENT                : 1
RESYNC    SENT TO IM          : 1
IPV4_MA   CFG SENT            : 1
IPV4_MA   CFG SUCCESS         : 1
INIT      TIMER STARTED       : x
T1-RENEW  TIMER STARTED       : x
T2_REBIND TIMER STARTED       : x
LEASE     TIMER STARTED       : x
INIT      TIMER STOPPED       : x
T1-RENEW  TIMER STOPPED       : x
T2_REBIND TIMER STOPPED       : x
LEASE     TIMER STOPPED       : x

-----------------------------------------------------
               ERROR COUNTERS
-----------------------------------------------------
OFFERS    IGNORED             : 1
ACK       IGNORED             : 1
DECLINE   SENT                : 1
NACK      RECEIVED            : 1
INVALID   OFFERS RECEIVED     : 1
INVALID   ACKS RECEIVED       : 1
IPV4_MA   CFG FAILED          : 0
IPV4_MA   CFG FAILED REASON   : "..."
IM        RESYNC ERROR REASON : "..."
```

show dhcp ipv4 proxy interface

To display the proxy interface information for Dynamic Host Configuration Protocol (DHCP) IPv4, use the **show dhcp ipv4 proxy interface** command in XR EXEC mode.

show dhcp ipv4 proxy interface [*interface-type interface-name*] [**detail**]

Syntax Description

interface-type	Type of the proxy interface.
interface-name	Name of the proxy interface.
detail	Displays the detailed information of proxy interface.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was supported for BNG.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

This is a sample output from the **show dhcp ipv4 proxy interface** command:

```
Router# show dhcp ipv4 proxy interface bundle-Ether 70.16 detail
Sat Jan  5 14:25:53.484 UTC

Interface:          Bundle-Ether70.16
VRF:                default
Mode:               Proxy
Profile Name:       proxy1
Lease Limit:        per circuit id from AAA 2

Lease Count Details:
Circuit id from AAA                                                 Count
c2                                                                  1
```

This table describes the significant fields shown in the display.

Table 12: show dhcp ipv4 proxy interface Command Field Descriptions

Field	Description
Lease Limit	Specifies the lease limit value sent from AAA server.
Count	Specifies the number of sessions on the router having the specific Circuit-ID received from the AAA server.

show dhcp ipv4 proxy statistics

To display DHCP proxy statistics, use the **show dhcp ipv4 proxy statistics** command in EXEC mode.

show dhcp ipv4 proxy statistics{**raw** | **include-zeroes** | **details**}

Syntax Description

raw	Displays debug statistics.
include-zeroes	Displays debug statistics that are zero.
details	Displays DHCP server statistics details.

Command Default

None.

Command Modes

EXEC

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Example

This is a sample output from the **show dhcp ipv4 proxy statistics** command:

```
RP/0/CPU0:router# show dhcp ipv4 proxy statistics
           VRF         |    RX     |      TX      |      DR      |
-------------------------------------------------------------------------------
          default      |     0     |       0      |       0      |
```

Related Commands

Command	Description
show dhcp ipv4 server binding	Displays DHCP client bindings for server.
show dhcp ipv4 server profile	Displays DHCP server profile information.

show dhcp ipv4 relay profile

To display Dynamic Host Configuration Protocol (DHCP) relay agent status, use the **show dhcp ipv4 relay profile** command in EXEC mode.

show dhcp ipv4 relay profile

Syntax Description

This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes EXEC mode

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines This command displays the relay profiles created for DHCP IPv4.

Task ID

Task ID	Operations
ip-services	read

Examples The following is sample output from the **show dhcp ipv4 relay profile** command:

```
Router# show dhcp ipv4 relay profile

DHCP IPv4 Relay Profiles
--------------------------
r1
r2
```

Related Commands

Command	Description
show dhcp ipv4 relay profile name	Displays Dynamic Host Configuration Protocol (DHCP) relay agent status, specific to a relay profile.

show dhcp ipv4 relay profile name

To display Dynamic Host Configuration Protocol (DHCP) relay agent status, specific to a relay profile, use the **show dhcp ipv4 relay profile name** command in EXEC mode.

show dhcp ipv4 relay profile [**name** *profile-name*]

Syntax Description

name *profile-name*	(Optional) Name that uniquely identifies the relay profile.

Command Default If *name* is not specified, displays a list of configured DHCP profile names.

No default behavior or values

Command Modes EXEC mode

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ip-services	read

Examples The following is sample output from the **show dhcp ipv4 relay profile name** command:

```
Router# show dhcp ipv4 relay profile name r1

DHCP IPv4 Relay Profile r1:

Helper Addresses:
10.10.10.1, vrf default
Information Option: Disabled
Information Option Allow Untrusted: Disabled
Information Option Policy: Replace
Information Option Check: Disabled
Giaddr Policy: Keep
Broadcast-flag Policy: Ignore

VRF References:
default
Interface References:
FINT0_RP0_CPU0
MgmtEth0_RP0_CPU0_0
```

show dhcp ipv4 relay statistics

To display the Dynamic Host Configuration Protocol (DHCP) IPv4 relay agent packet statistics information for VPN routing and forwarding (VRF) instances, use the **show dhcp ipv4 relay statistics** command in EXEC mode.

show dhcp [**vrf** {*vrf-name* | **default**}] **ipv4 relay statistics**

Syntax Description

vrf *vrf-name*	(Optional) Name that uniquely identifies the VRF.
default	(Optional) Displays the relay statistics information for the default VRF.

Command Default No default behavior or values

Command Modes EXEC mode

Command History

Release	Modification
Release 6.1.2	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ip-services	read

Examples

The following is sample output from the **show dhcp ipv4 relay statistics** command when none of the optional keywords or arguments are used command :

```
Router#  show dhcp ipv4 relay statistics

                  VRF                 |       RX       |       TX       |        DR       |
-------------------------------------------------------------------------------------------
                default               |             0  |             0  |             0  |
```

The following is sample output from the show dhcp ipv4 relay statistics command using the **vrf** and **default** keywords:

```
Router#  show dhcp vrf default ipv4 relay statistics
01 Sep 6 07:10:35.873 UTC

DHCP IPv4 Relay Statistics for VRF default:

     TYPE          |    RECEIVE    |    TRANSMIT   |     DROP       |
-----------------------------------------------------------------------
DISCOVER           |             0  |             0  |             0  |
OFFER              |             0  |             0  |             0  |
REQUEST            |             0  |             0  |             0  |
DECLINE            |             0  |             0  |             0  |
ACK                |             0  |             0  |             0  |
NAK                |             0  |             0  |             0  |
RELEASE            |             0  |             0  |             0  |
INFORM             |             0  |             0  |             0  |
LEASEQUERY         |             0  |             0  |             0  |
LEASEUNASSIGNED    |             0  |             0  |             0  |
LEASEUNKNOWN       |             0  |             0  |             0  |
LEASEACTIVE        |             0  |             0  |             0  |
BOOTP-REQUEST      |             0  |             0  |             0  |
BOOTP-REPLY        |             0  |             0  |             0  |
BOOTP-INVALID      |             0  |             0  |             0  |
```

show dhcp ipv4 server binding

To display DHCP client bindings for server, use the **show dhcp ipv4 server binding** command in EXEC mode.

show dhcp ipv4 server binding { **detail** | **location** *node-ID* | **interface** *type interface-path-ID* | **vrf** *vrf-name* | **ip-address** *address* | **mac-address** *address* | **srg** | **srg-master** | **srg-slave** | **summary**}

Syntax Description

detail	Displays detailed client binding information for all clients.
location *node-ID*	Displays detailed client binding information for a specified node.

interface *type interface-path-ID*	Displays client binding by interface. Specifies the interface type. For more information, use the question mark (?) online help function. Physical interface or virtual interface. Use the show interfaces command to see a list of all interfaces currently configured on the router. **Note** For more information about the syntax for the router, use the question mark (?) online help function.
vrf *vrf-name*	Displays client binding by vrf name.
ip-address *address*	Displays detailed client binding information per IP address or mac-address.
mac-address *address*	Displays detailed client binding information per mac-address.
srg	Displays client binding by SRG group.
srg-master	Displays client binding by SRG master.
srg-slave	Displays client binding by SRG slave.

Command Default None.

Command Modes EXEC

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Example

This is a sample output from the **show dhcp ipv4 server binding** command:

```
Router# show dhcp ipv4 server binding detail

Thu Aug  1 11:37:34.784 IST
MAC Address:                ca01.4b16.0000
VRF:                        default
IP Address:                 10.10.10.7
Server IP Address:          10.10.10.2
ReceivedCircuit ID:         -
InsertedCircuit ID:         -
ReceivedRemote ID:          -
InsertedRemote ID:          -
ReceivedVSISO:              -
```

```
Auth. on received relay info:TRUE
ParamRequestOption:          -
SavedOptions:                -
Profile:                     TEST
Selected Profile:            TEST
State:                       BOUND
Lease:                       1800 secs (00:30:00)
Lease remaining:             1744 secs (00:29:04)
Client ID:
0x00-0x63-0x69-0x73-0x63-0x6F-0x2D-0x63-0x61-0x30-0x31-0x2E-0x34-0x62-0x31-0x36-0x2E-0x30-0x30-0x30-0x30-0x2D-0x50-0x6F-0x31-0x30-0x2E-0x31
Access Interface:            Bundle-Ether10.1
Access VRF:                  default
VLAN Id:                     100
Subscriber Label:            0x41
Subscriber Interface:        Bundle-Ether10.1.ip2
Srg State:                   NONE
Srg Group Id:                0
Event History:
Session Start:               Aug  1 10:38:05.426
PACKET_DISCOVER              :     0.001s
DPM_SUCCESS                  :     0.114s
DAPS_SUCCESS                 :     0.118s
PACKET_REQUEST               :     0.818s
LEASE_DPM_SUCCESS            :     1.181s
OTHER                        :    45.005s
```

Related Commands

Command	Description
show dhcp ipv4 server profile	Displays DHCP server profile information.
show dhcp ipv4 server statistics	Display DHCP server statistics.

show dhcp ipv4 server disconnect-history

To display DHCP server profile information with ipv4 binding for disconnect history, use the **show dhcp ipv4 server interface** command in EXEC mode.

show dhcp ipv4 server interface{**detail** | **location** | **mac-address**}

Syntax Description

detail	Displays detailed DHCP server profile information for server.
location	Displays detailed DHCP server profile information for node location.
mac-address	Displays detailed DHCP server profile information for client disconnect history information.

Command Default

None.

Command Modes

EXEC

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Example

This is a sample output from the **show dhcp ipv4 server interface** command:

```
RP/0/0/CPU0:ios#show dhcp ipv4 server disconnect-history
Thu Aug 15 16:24:51.736 IST
Codes: Amb - Ambiguous VLAN, B - Base, R - Relay, P - Proxy,
       SR - Server, S - Snoop, C - Client, INV - Invalid
       CID - Circuit Id, RID - Remote Id, INTF - Interface

Interface             Mode Profile Name                            Amb Lease Limit
------------------------------------------------------------------------------------
```

show dhcp ipv4 server interface

To display DHCP server profile information with ipv4 binding for interfaces, use the **show dhcp ipv4 server interface** command in EXEC mode.

show dhcp ipv4 server interface{ **Bundle-Ether** | **FastEthernet** | **FiftyGigE** | **FortyGigE** | **GigabitEthernet** | **HundredGigE** | **MgmtEth** | **PW-Ether** | **TenGigE** | **TwentyFiveGigE** }

Syntax Description

BVI	Displays Bridge-Group Virtual Interface.
Bundle-Ether	Displays aAggregated Ethernet interface(s).
FastEthernet	Displays detailed DHCP server profile information for FastEthernet/IEEE 802.3 interface(s).
FiftyGigE	Displays detailed DHCP server profile information for FiftyGigabitEthernet/IEEE 802.3 interface(s).
FortyGigE	Displays detailed DHCP server profile information for FortyGigabitEthernet/IEEE 802.3 interface(s).
GigabitEthernet	Displays detailed DHCP server profile information for GigabitEthernet/IEEE 802.3 interface(s).
HundredGigE	Displays detailed DHCP server profile information for HundredGigabitEthernet/IEEE 802.3 interface(s)e.
MgmtEth	Displays detailed DHCP server profile information for Ethernet/IEEE 802.3 interface(s).
PW-Ether	Displays detailed DHCP server profile information for PWHE ethernet interface.

TenGigE	Displays detailed DHCP server profile information for TenGigabitEthernet/IEEE 802.3 interface(s).
TwentyFiveGigE	Displays detailed DHCP server profile information for TwentyFiveGigabitethernet/IEEE 802.3 interface(s).

Command Default None.

Command Modes EXEC

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Example

This is a sample output from the **show dhcp ipv4 server interface** command:

```
RP/0/0/CPU0:ios#show dhcp ipv4 server interface
Thu Aug 15 16:24:51.736 IST
Codes: Amb - Ambiguous VLAN, B - Base, R - Relay, P - Proxy,
       SR - Server, S - Snoop, C - Client, INV - Invalid
       CID - Circuit Id, RID - Remote Id, INTF - Interface

Interface             Mode Profile Name                          Amb Lease Limit
------------------------------------------------------------------------------
```

show dhcp ipv4 server profile

To display DHCP server profile information with ipv4 binding, use the **show dhcp ipv4 server profile** command in EXEC mode.

show dhcp ipv4 server profile name *profile-name* [**location** *node-ID*]

Syntax Description

profile-name	Name of the profile.
location *node-ID*	Displays detailed DHCP server profile information for a specified node.

Command Default None.

Command Modes EXEC

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Example

This is a sample output from the **show dhcp ipv4 server profile** command:

```
Router# show dhcp ipv4 server profile name foo

Profile:   foo
VRF References:
Interface References: GigabitEthernet0/2/0/0
```

Related Commands

Command	Description
show dhcp ipv4 server binding	Displays DHCP client bindings for server.
show dhcp ipv4 server statistics	Displays DHCP server statistics.
show dhcp ipv4 server interface	Displays DHCP client bindings for server with respect to interfaces.
show dhcp ipv4 server disconnect-history	

show dhcp ipv4 server statistics

To display DHCP server statistics, use the **show dhcp ipv4 server statistics** command in EXEC mode.

show dhcp ipv4 server statistics [[**raw** {[| **all**] [| **include-zeroes**] [| **location** *node-ID*]]}

Syntax Description

raw	Displays debug statistics.
all	Displays debug statistics for base mode.
include-zeroes	Displays debug statistics that are zero.
location *node-ID*	Displays DHCP server statistics information for a specified node.

Command Default None.

Command Modes EXEC

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Example

This is a sample output from the **show dhcp ipv4 server statistics** command:

```
Router# show dhcp ipv4 server statistics
              VRF         |       RX       |      TX      |       DR       |
-------------------------------------------------------------------------------------
             default      |        0       |       0      |        0       |
```

Related Commands

Command	Description
show dhcp ipv4 server binding	Displays DHCP client bindings for server.
show dhcp ipv4 server profile	Displays DHCP server profile information.
show dhcp ipv4 server interface	Displays DHCP server profile information for interface.
show dhcp ipv4 server disconnect-history	Displays DHCP server profile information with respect to disconnect-history.

show dhcp ipv6 client

To display DHCP IPv6 client binding information, use the **show dhcp ipv6 client** command in XR EXEC mode.

show dhcp ipv6 client <*interfaceName*> [**detail**] [**debug**]

Syntax Description

interfaceName	Displays the DHCP IPv6 address of the specified interface.
detail	(Optional) Specifies detailed results.
debug	(Optional) Displays internal debugging information.

Command Default

No default behavior or values

XR EXEC mode

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

Use the **show dhcp ipv6 client** command to display the DHCP IPv6 for the specified client.

Task ID

Task ID	Operations
IP-Services	read

Examples

The following example shows how to display DHCP IPv6 binding information:

```
RP/0/0/CPU0:ios#show dhcp ipv6  client
Mon May  6 16:35:32.581 UTC

    Interface name          IP Address        Binding State         Lease Time Rem
----------------------     ------------      ---------------   ----------------------
MgmtEth0_0_CPU0_0          2001:DB8::1        BOUND             1688 secs (00:28:08)

RP/0/0/CPU0:ios#
RP/0/0/CPU0:ios# show dhcp ipv6  client binding ?
  MgmtEth          Ethernet/IEEE 802.3 interface(s)
  detail           Show detailed client binding information
  |                Output Modifiers
  <cr>
Router# show dhcp ipv6  client   detail
Mon May  6 16:35:56.579 UTC

-----------------------------------------------------
Client Interface name         : MgmtEth0_0_CPU0_0
Client Interface handle       : 0x1280
Client Interface VRF name     : default
Client ChAddr                 : 000c.292f.950e
Client ID                     : MgmtEth0_0_CPU0_0
Client State                  : BOUND
Client IP Address (Dhcp)      : 2001:DB8::1
Client IP Address Mask        : 2001:db8:abcd:0012::0/64
Client Lease Time Allocated   : 1800 secs (00:30:00)
Client Lease Time Remaining   : 1664 secs (00:27:44)
Client Selected Server Addr   : 2001:DB8::2
-----------------------------------------------------

Router#
Router# show dhcp ipv6  client binding detail ?
  MgmtEth          Ethernet/IEEE 802.3 interface(s)
  debug            Show detailed debug level client binding information
  |                Output Modifiers
  <cr>
Router# show dhcp ipv6  client detail debug
Mon May  6 16:36:43.836 UTC

-----------------------------------------------------
Client Interface name         : MgmtEth0_0_CPU0_0
Client Interface handle       : 0x1280
```

```
Client Interface VRF name     : default
Client ChAddr                 : 000c.292f.950e
Client ID                     : MgmtEth0_0_CPU0_0
Client State                  : BOUND
Client IP Address (Dhcp)      : 2001:DB8::1
Client IP Address Mask        : 2001:db8:abcd:0012::0/64
Client Lease Time Allocated   : 1800 secs (00:30:00)
Client Lease Time Remaining   : 1617 secs (00:26:57)
Client Selected Server Addr   : 2001:DB8::2
Client Interface VRF id       : 0x60000000
Client Interface VRF Table id : 0xe0000000
Client XID                    : 0xa7f
Client Timers Running         : 0x2 (T1_RENEW_TIMER)
Client Renew Time Allocated   : 900 secs (00:15:00)
Client Renew Time Adjusted    : 900 secs (00:15:00)
Client Rebind Time Allocated  : 1575 secs (00:26:15)
Client Rebind Time Adjusted   : 1575 secs (00:26:15)
Client Checkpoint object id   : 0x80002fd8
Client IPv6 MA configured     : TRUE
----------------------------------------------------

Router#
Router# show dhcp ipv6 client  mgmtEth 0/0/CPU0/0
Mon May  6 16:49:54.382 UTC

    Interface name         IP Address      Binding State         Lease Time Rem
----------------------    ------------    ---------------    ----------------------
MgmtEth0_0_CPU0_0          2001:DB8::1     BOUND              1727 secs (00:28:47)
Router#
```

Related Commands

Command	Description
clear dhcp ipv6 client, on page 128	This command clears the DHCPv6 client binding information configured on a given interface.

show dhcp ipv6 database

To display the Dynamic Host Configuration Protocol (DHCP) for IPv6 binding database information, use the **show dhcp ipv6 database** command in XR EXEC mode.

show dhcp ipv6 database *[agent-URL]* [**location** *location*]

Syntax Description

agent-URL	(Optional) Flash, NVRAM, FTP, TFTP, or Remote Copy Protocol (RCP) uniform resource locator.
location	Displays the database information of the DHCPv6 node.
location	Name of the DHCPv6 node.

Command Default

None

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

Each permanent storage to which the binding database is saved is called the *database agent*. An agent can be configured using the **dhcp ipv6 database** command. Supported database agents include FTP and TFTP servers, RCP, Flash file system, and NVRAM.

The **show dhcp ipv6 database** command displays DHCP for IPv6 binding database agent information. If the *agent-URL* argument is specified, only the specified agent is displayed. If the *agent-URL* argument is not specified, all database agents are shown.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Examples

This is a sample output from the **show dhcp ipv6 database** command:

```
Router# show dhcp ipv6 database location 0/0/CPU0

Database:
Current file version:               1
Full file:
  write interval:                   5 minutes
  last file name:                   /disk0:/dhcp/dhcpv6_srpb_0_odd
  last write time:                  Feb-27-2013-11:45:06
  write count:                      5
  failed write count:               0
  record count:                     0
  last write error:                 -
  last write error timestamp:       -
Incremental file:
  write interval:                   2 minutes
  last file name:                   /disk0:/dhcp/dhcpv6_srpb_0_odd_inc
  last write time:                  Feb-27-2013-11:49:06
  write count:                      10
  failed write count:               0
  record count:                     0
  last write error:                 -
  last write error timestamp:       -
```

Related Commands

Command	Description
show dhcp ipv6 database full-write-interval	This command displays DHCP for IPv6 binding database information at full file write interval. The defalult interval is 10 minutes.
show dhcp ipv6 database incremental-write-interval	This command displays DHCP for IPv6 binding database information at incremental file write interval. The default interval is 1 minute.

Command	Description
show dhcp ipv6 database proxy	This command enable DHCP proxy binding database storage to file system.
show dhcp ipv6 database relay	This command enables DHCP relay binding database storage to file system.
show dhcp ipv6 database server	This command enables DHCP server binding database storage to file system.

show dhcp ipv6 proxy

To display DHCP proxy profile information with ipv6 binding, use the **show dhcp ipv6 profile** command in EXEC mode.

show dhcp ipv6 proxy{**binding** | **disconnect-history** | **interface** | **profile** | **statistics**}

Syntax Description

binding	Displays client bindings for the proxy.
disconnect-history	Displays disconect history for the proxy.
interface	Displays proxy interface information.
profile	Displays proxy profile information.
statistics	Displays proxy statistics.

Command Default

None.

Command Modes

EXEC

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Example

This is a sample output from the **show dhcp ipv4 proxy** command:

```
Router# show dhcp ipv4 proxy name foo
```

```
Profile:   foo
VRF References:
Interface References: GigabitEthernet0/2/0/0
```

show dhcp ipv6 proxy binding

To display the client bindings for Dynamic Host Configuration Protocol (DHCP) proxy, use the **show dhcp ipv6 proxy binding** command in XR EXEC mode.

show dhcp ipv6 proxy binding{**detail** | **duid** | **interface** | **interface-id** | **location** | **mac-address** | **remote-id** | **srg** | **srg-master** | **srg-slave** | **state** | **summary** | **vrf**}

Syntax Description

detail	Displays detailed bindings for proxy.
duid	Displays client bindings for DUID.
interface	Displays client bindings by Interface.
interface-id	Displays client bindings by Interface ID.
location	Specifies the node location.
mac-address	Displays detailed client binding information.
remote-id	Displays client binding by Remote ID.
srg	Displays client Bbnding by SRG group.
srg-master	Displays client Bbnding by SRG master.
srg-slave	Displays client Bbnding by SRG slave.
summary	Displays summary bindings for proxy.
vrf	Displays client bindings by VRF name.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

This is a sample output from the **show dhcp ipv6 proxy binding** command:

```
Router# show dhcp ipv6 proxy binding

Summary:
  Total number of Proxy bindings = 1
Prefix: 2001::/60 (Gi0/0/0/1)
  DUID: 00030001ca004a2d0000
  IAID: 00020001
  lifetime: 2592000
  expiration: Nov 25 2010 16:47

Router# show dhcp ipv6 proxy binding summary

Total number of clients: 2

     STATE              |              COUNT             |
                        |     IA-NA     |    IA-PD       |
-------------------------------------------------------------
  INIT                  |             0  |            0   |
  SUB VALIDATING        |             0  |            0   |
  ADDR/PREFIX ALLOCATING|             0  |            0   |
  REQUESTING            |             0  |            0   |
  SESSION RESP PENDING  |             2  |            0   |
  ROUTE UPDATING        |             0  |            0   |
  BOUND                 |             0  |            0   |
```

show dhcp ipv6 proxy interface

To display the proxy interface information for Dynamic Host Configuration Protocol (DHCP), use the **show dhcp ipv6 proxy interface** command in XR EXEC mode.

show dhcp ipv6 proxy interface {*typeinterface-path-id*} {**location***location*}

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
location	Displays the node location by Interface.
location	Displays the fully qualified location specification of an interface.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

This is a sample output from the **show dhcp ipv6 proxy interface** command:

```
Router# show dhcp ipv6 proxy interface

Tue Sep  4 19:14:54.056 UTC
Codes: Amb - Ambiguous VLAN, B - Base, R - Relay, P - Proxy,
       SR - Server, S - Snoop, C - Client, INV - Invalid
       CID - Circuit Id, RID - Remote Id, INTF - Interface

Interface             Mode Profile Name                                 Amb Lease Limit
------------------------------------------------------------------------------------------
BE1.100               P    pxy1                                         No  None
BE1.200               P    pxy1                                         No  None
BE1.250               P    pxy1                                         Yes None
BE1.400               P    pxy1                                         Yes None
```

show dhcp ipv6 server

To display DHCP server profile information with ipv6 binding, use the **show dhcp ipv6 server profile** command in EXEC mode.

show dhcp ipv6 server{ | **binding** | **disconnect-history** | **interface** | **profile** | **statistics**}

Syntax Description

binding	Displays client bindings for the server.
disconnect-history	Displays disconect history for the server.
interface	Displays server interface information.
profile	Displays server profile information.
statistics	Displays server statistics.

Command Default

None.

Command Modes

EXEC

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Example

This is a sample output from the **show dhcp ipv4 server profile** command:

```
Router# show dhcp ipv4 server profile name foo

Profile:   foo
VRF References:
Interface References: GigabitEthernet0/2/0/0
```

show dhcp vrf ipv4 server statistics

To display DHCP server statistics for the default vrf or a specific vrf, use the **show dhcp vrf ipv4 server statistics** command in XR EXEC mode.

show dhcp vrf { **default** | *vrf-name* } [**location** *node-ID*]

Syntax Description

default	Display DHCP server statistics for the default vrf.
vrf-name	Display DHCP server statistics for a specific vrf.
location *node-ID*	Displays DHCP server statistics information for a specified node.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read

Example

This is a sample output from the **show dhcp vrf default ipv4 server statistics** command:

```
Router# show dhcp vrf default ipv4 server statistics
Thu Aug  1 11:41:48.255 IST

DHCP IPv4 Proxy/Server Statistics for VRF default:

     TYPE          |    RECEIVE    |    TRANSMIT   |     DROP      |
-----------------------------------------------------------------------
 DISCOVER          |             5  |             0  |             0  |
 OFFER             |             0  |             3  |             0  |
 REQUEST           |            15  |             0  |             0  |
 DECLINE           |             0  |             0  |             0  |
 ACK               |             0  |            15  |             0  |
 NAK               |             0  |             0  |             0  |
 RELEASE           |             0  |             0  |             0  |
 INFORM            |             0  |             0  |             0  |
 LEASEQUERY        |             0  |             0  |             0  |
 LEASEUNASSIGNED   |             0  |             0  |             0  |
 LEASEUNKNOWN      |             0  |             0  |             0  |
 LEASEACTIVE       |             0  |             0  |             0  |
 BOOTP-REQUEST     |             0  |             0  |             0  |
 BOOTP-REPLY       |             0  |             0  |             0  |
RP/0/0/CPU0:server#
```

show tech support dhcp ipv4 client

To retrieve the DHCP client show tech support information, use the **show tech dhcp ipv4 client** command in XR EXEC mode.

show tech-support dhcp ipv4 client <show-tech-options>

Syntax Description

show-tech-options	Displays the DHCP IPv4 client show tech-support options.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

Use the **show tech-support dhcp ipv4 client** command to retrieve the DHCP show-tech options for the specified interface.

Task ID

Task ID	Operations
IP-Services	Execution

Examples

The following example shows how to clear the DHCP client binding statistics information:

```
Router# show tech-support dhcp ipv4 client ?
  file      Specify a valid file name (e.g. disk0:tmp.log)(cisco-support)
  terminal  Send output to terminal(cisco-support)
Router# show tech-support dhcp ipv4 client file ?
  WORD        Send to file
  bootflash:  Send to bootflash: file system(cisco-support)
  disk0:      Send to disk0: file system(cisco-support)
  disk0a:     Send to disk0a: file system(cisco-support)
  disk1:      Send to disk1: file system(cisco-support)
  disk1a:     Send to disk1a: file system(cisco-support)
  ftp:        Send to ftp: file system(cisco-support)
  nvram:      Send to nvram: file system(cisco-support)
  rcp:        Send to rcp: file system(cisco-support)
  tftp:       Send to tftp: file system(cisco-support)
Router# show tech-support dhcp ipv4 client file disk0?
WORD  disk0:  disk0a:
Router# show tech-support dhcp ipv4 client file disk0:/dhcpv4-client-showtech.tgz
Fri Jun  6 08:25:24.793 UTC
Router# dir disk0:
Fri Jun  6 08:25:47.321 UTC

Directory of disk0:

2           drwx  1024        Thu Mar 13 06:12:03 2014  .boot
…
3           -rw-  83337       Fri Jun  6 08:25:26 2014  dhcpv4-client-showtech.tgz

1911537664 bytes total (1838081024 bytes free)
Router#
```

Related Commands

show dhcp ipv4 client statistics	Displays the statistics of the DHCP client.
show tech support dhcp ipv4 server	Displays the tech support for DHCP ipv4 server profile.
show tech support dhcp ipv4 proxy	Displays the tech support for DHCP ipv4 proxy profile.
show tech support dhcp ipv4 relay	Displays the tech support for DHCP ipv4 relay profile.
show tech support dhcp ipv6 server	Displays the tech support for DHCP ipv6 server profile.
show tech support dhcp ipv6 proxy	Displays the tech support for DHCP ipv6 proxy profile.

show tech support dhcp ipv6 relay	Displays the tech support for DHCP ipv6 relay profile.

show tech-support dhcp ipv6 client

To retrieve the DHCP client show tech support information, use the **show tech dhcp ipv6 client** command in XR EXEC mode.

show tech-support dhcp ipv6 client **<show-tech-options>**

Syntax Description

show-tech-options	Displays the DHCP IPv6 client show tech-support options.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

Use the **show tech-support dhcp ipv6 client** command to retrieve the DHCP show-tech options for the specified interface.

Task ID

Task ID	Operations
IP-Services	Execution

Examples

The following example shows how to display the DHCP IPv6 client binding statistics information:

```
Router# show tech-support dhcp ipv6 client ?
  file      Specify a valid file name (e.g. disk0:tmp.log)(cisco-support)
  terminal  Send output to terminal(cisco-support)
Roiuter# show tech-support dhcp ipv6 client file ?
  WORD        Send to file
  bootflash:  Send to bootflash: file system(cisco-support)
  disk0:      Send to disk0: file system(cisco-support)
  disk0a:     Send to disk0a: file system(cisco-support)
  disk1:      Send to disk1: file system(cisco-support)
  disk1a:     Send to disk1a: file system(cisco-support)
  ftp:        Send to ftp: file system(cisco-support)
  nvram:      Send to nvram: file system(cisco-support)
  rcp:        Send to rcp: file system(cisco-support)
  tftp:       Send to tftp: file system(cisco-support)
Router# show tech-support dhcp ipv4 client file disk0?
WORD  disk0:  disk0a:
Router# show tech-support dhcp ipv6 client file disk0:/dhcpv4-client-showtech.tgz
Fri Jun  6 08:25:24.793 UTC
Router# dir disk0:
Fri Jun  6 08:25:47.321 UTC
```

```
Directory of disk0:

2           drwx  1024        Thu Mar 13 06:12:03 2014  .boot
…
3           -rw-  83337       Fri Jun  6 08:25:26 2014  dhcpv6-client-showtech.tgz

1911537664 bytes total (1838081024 bytes free)
Router#
```

Related Commands

Command	Description
show dhcp ipv4 client, on page 161	Displays DHCP IPv4 client information.
show dhcp ipv4 client statistics, on page 163	Displays the statistics of the DHCP client.

trust relay-reply

To configure a DHCP IPv6 profile to enable processing relay-replies, use the **trust relay-reply** command in DCHP IPv6 profile configuration mode. To restore the interface to the default behavior, use the **no** form of the command.

trust relay-reply
no trust relay-reply

This command has no keywords or arguments.

Command Default

By default, all interfaces are trusted.

Command Modes

DHCP IPv6 profile configuration

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ip-services	read, write

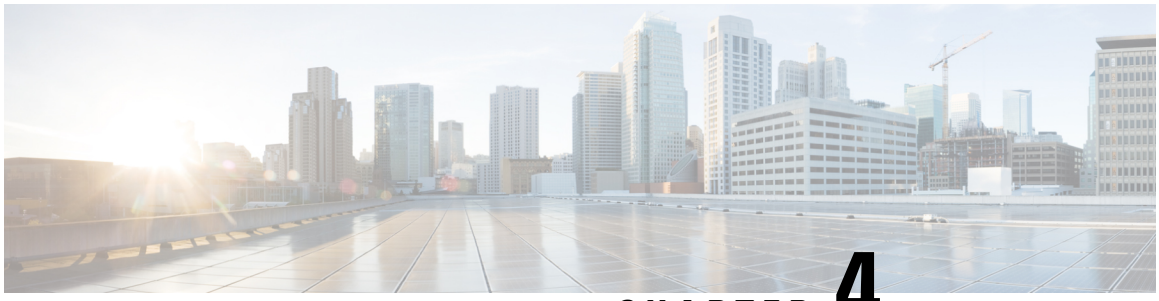
Example

```
Router# configure
Router(config)# dhcp ipv6
Router(config-dhcpv6)# profile downstream proxy
Router(config-dhcpv6-profile)# helper-address ff05::1:3
Router(config-dhcpv6-profile)# exit
Router(config-dhcpv6)# profile upstream proxy
```

```
Router(config-dhcpv6-profile)# trust relay-reply
```

Related Commands

Command	Description
helper-address (ipv6), on page 142	Configures the Dynamic Host Configuration Protocol (DHCP) IPv6 relay agent for prefix delegation.



CHAPTER 4

Cisco Express Forwarding Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This chapter describes the commands used to configure and monitor Cisco Express Forwarding (CEF) on on NCS 5000 routers.

For detailed information about CEF concepts, configuration tasks, and examples, see *Cisco IP Addresses and Services Configuration Guide*.

cef adjacency route override rib

To enable the CEF prefer Routing Information Base (RIB) prefixes over Adjacency Information Base (AIB) prefixes in the Global configuration mode. To enable the CEF prefer AIB prefixes over RIB prefixes, use the **no** form of this command.

cef adjacency route override rib

no cef adjacency route override rib

Syntax Description

route	Enables adjacency route configuration .
override	Sets override options for the adjacency routes.
rib	Sets options for adjacency routes to override the RIB routes.

Command Default

By default, CEF prefers RIB prefixes over AIB prefixes.

Command Modes

Global configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

CEF may prefer the L2 adjacency for forwarding over the RIB (routing) entry under the following conditions:

- When there is no local ARP entry (yet).

  ARP learning may result in the router creating a forwarding entry.

- A forwarding entry of /32 (or /128 for IPv6) RIB routes are overridden when there is a covering connected or attached route.

  If an interface has a larger subnet, and you want to redirect a /32 out of that subnet of a different interface via a static route.

This can be seen in scenarios of EVPN and or HSRP, or in bridge domains with a BVI and multiple EFP's.

To deviate from the behavior of preferring a L2 adjacency for forwarding over a route entry, use the **cef adjacency route override rib** command.

Task ID

Task ID	Operation
cef	read, write

Example

The following example shows how to override the CEF adjacency route:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router# cef adjacency route override rib
```

clear cef ipv4 drops

To clear Cisco Express Forwarding (CEF) IPv4 packet drop counters, use the **clear cef ipv4 drops**command in XR EXEC mode.

clear cef ipv4 drops location *node-id*

Syntax Description

location *node-id*	Clears IPv4 packet drop counters for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command will clear IPv4 CEF drop counters only for the node on which the command is issued.

Task ID

Task ID	Operations
basic-services	read, write
cef	read, write

Examples

The following example displays sample output for the IPv4 Cisco Express Forwarding (CEF) table packet drop counters, and clears IPv4 CEF drop counters for location 0/RP0/CPU0:

```
RP/0/RP0/CPU0:router# show cef ipv4 drops

CEF Drop Statistics
Node: 0/RP0/CPU0
  Unresolved drops     packets :              0
  Unsupported drops    packets :              0
  Null0 drops          packets :              0
  No route drops       packets :              0
  No Adjacency drops   packets :              0
  Checksum error drops packets :              0
  RPF drops            packets :              0
```

```
  RPF suppressed drops packets :               0
  RP destined drops    packets :               0
  Discard drops        packets :               0
  GRE lookup drops     packets :               0
  GRE processing drops packets :               0
  LISP punt drops      packets :               0
  LISP encap err drops packets :               0
  LISP decap err drops packets :               0

Node: 0/RP1/CPU0
  Unresolved drops     packets :               0
  Unsupported drops    packets :               0
  Null0 drops          packets :               0
  No route drops       packets :               0
  No Adjacency drops   packets :               0
  Checksum error drops packets :               0
  RPF drops            packets :               0
  RPF suppressed drops packets :               0
  RP destined drops    packets :               0
  Discard drops        packets :               0
  GRE lookup drops     packets :               0
  GRE processing drops packets :               0
  LISP punt drops      packets :               0
  LISP encap err drops packets :               0
  LISP decap err drops packets :               0

RP/0/RP0/CPU0:router# clear cef ipv4 drops location 0/RP0/CPU0

  Node: 0/RP0/CPU0
  Clearing CEF Drop Statistics
```

clear cef ipv4 exceptions

To clear IPv4 Cisco Express Forwarding (CEF) exception packet counters, use the **clear cef ipv4 exceptions** command in XR EXEC mode mode.

clear cef ipv4 exceptions location *node-id*

Syntax Description

location *node-id*	Clears IPv4 CEF exception packet counters for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command will clear IPv4 CEF exception packet counters for all nodes.

Task ID

Task ID	Operations
basic-services	read, write
cef	read, write

Examples

The following example displays sample output for the IPv4 Cisco Express Forwarding (CEF) exception packet counters, and clear s IPv4 CEF exception packets node 0/RP0/CPU0:

```
RP/0/RP0/CPU0:router# show cef ipv4 exceptions

CEF Exception Statistics
Node: 0/RP0/CPU0
  Slow encap  packets :               0
  Unsupported packets :               0
  Redirect    packets :               0
  Receive     packets :               0
  Broadcast   packets :               0
  IP options  packets :               0
  TTL expired packets :               0
  Fragmented  packets :               0
Node: 0/RP1/CPU0
  Slow encap  packets :               3
  Unsupported packets :               0
  Redirect    packets :               0
  Receive     packets :           12787
  Broadcast   packets :           74814
  IP options  packets :               0
  TTL expired packets :               0
  Fragmented  packets :               0

RP/0/RP0/CPU0:router# clear cef ipv4 exceptions location 0/RP0/CPU0

Node: 0/RP0/CPU0
Clearing CEF Exception Statistics
```

clear cef ipv6 drops

To clear Cisco Express Forwarding (CEF) IPv6 packet drop counters, use the **clear cef ipv6 drop** command in XR EXEC mode.

clear cef ipv6 drops location *node-id*

Syntax Description

location *node-id*	Clears IPv6 packet drop counters for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command clears IPv6 CEF drop counters for all nodes.

Task ID

Task ID	Operations
basic-services	read, write
cef	read, write

Examples

The following example displays sample output for the IPv6 Cisco Express Forwarding (CEF) table packet drop counters, and clears IPv6 CEF drop counters for location 0/RP0/CPU0:

```
RP/0/RP0/CPU0:router# show cef ipv6 drops

CEF Drop Statistics
Node: 0/RP0/CPU0
  Unresolved drops     packets :              0
  Unsupported drops    packets :              0
  Null0 drops          packets :              0
  No route drops       packets :              1
  No Adjacency drops   packets :              0
  Checksum error drops packets :              0
  RPF drops            packets :              0
  RPF suppressed drops packets :              0
  RP destined drops    packets :              0
  Discard drops        packets :              0
  GRE lookup drops     packets :              0
  GRE processing drops packets :              0
  LISP punt drops      packets :              0
  LISP encap err drops packets :              0
  LISP decap err drops packets :              0

Node: 0/RP1/CPU0
  Unresolved drops     packets :              0
  Unsupported drops    packets :              0
  Null0 drops          packets :              0
  No route drops       packets :              1
  No Adjacency drops   packets :              0
  Checksum error drops packets :              0
  RPF drops            packets :              0
  RPF suppressed drops packets :              0
  RP destined drops    packets :              0
  Discard drops        packets :              0
  GRE lookup drops     packets :              0
  GRE processing drops packets :              0
  LISP punt drops      packets :              0
  LISP encap err drops packets :              0
  LISP decap err drops packets :              0

RP/0/RP0/CPU0:router# clear cef ipv6 drop
```

```
Node: 0/RP0/CPU0
Clearing CEF Drop Statistics
```

clear cef ipv6 exceptions

To clear IPv6 Cisco Express Forwarding (CEF) exception packet counters, use the **clear cef ipv6 exceptions** command in XR EXEC mode .

clear cef ipv6 exceptions location *node-id*

Syntax Description

location *node-id*	Clears IPv6 CEF exception packet counters for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command clears IPv6 CEF exception packet counters for all nodes.

Task ID

Task ID	Operations
basic-services	read, write
cef	read, write

Examples

The following example displays sample output for the IPv6 Cisco Express Forwarding (CEF) exception packet counters, and clears the IPv6 CEF exception packets for location:

```
RP/0/RP0/CPU0:router# show cef ipv6 exceptions

CEF Exception Statistics
Node: 0/RP0/CPU0
  Slow encap  packets :              0
  Unsupported packets :              0
  Redirect    packets :              0
  Receive     packets :              1
  Broadcast   packets :              0
  IP options  packets :              0
  TTL expired packets :              0
  Fragmented  packets :              0
```

```
Node: 0/RP1/CPU0
  Slow encap  packets :               0
  Unsupported packets :               0
  Redirect    packets :               0
  Receive     packets :               7
  Broadcast   packets :               0
  IP options  packets :               0
  TTL expired packets :               0
  Fragmented  packets :               0

RP/0/RP0/CPU0:router# clear cef ipv6 exceptions location 0/RP0/CPU0

Node: 0/RP0/CPU0
Clearing CEF Exception Statistics
```

hw-module fib bgppa stats-mode

To enable the BGP policy accounting on the main interface or on the sub interface, run the **hw-module fib bgppa stats-mode** command with the **main-intf** or the **sub-intf** keywords respectively.

hw-module fib bgppa stats-mode {main-intf | sub-intf}

Syntax Description

bgppa	BGP policy accounting
stats-mode	Stats accounting mode
main-intf	Account the BGP policy accounting stats for the main interface.
sub-intf	Account the BGP policy accounting stats for the sub interface.

Command Default

None

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.9.1	This command was introduced.

Usage Guidelines

- The BGP policy accounting feature is applicable for the following address families:
  - IPv4
  - IPv6
- After configuring the command, you must reload the router for the BGP policy accounting feature to take effect.

Task ID

Task ID	Operation
bgp	read, write

The following example shows the configuration of the main interface and the sub interface. You must reload the router after configuring the following commands to take effect.

For main interface:

```
Router# config
Router(config)# hw-module fib bgppa stats-mode main-intf

Router(config)# commit
```

For sub interface:

```
Router# config
Router(config)# hw-module fib bgppa stats-mode sub-intf
Router(config)# commit
```

hw-module profile load-balance algorithm

To modify the hashing algorithm that is used for ECMP and bundle member selection, use the **hw-module profile load-balance algorithm** command in XR Config mode.

hw-module profile load-balance algorithm { **L3-only** | **PPPoE** | **gtp** | **gtp-mpls** | **inner-l2-field** | **ip-tunnel** | **layer2** | **mpls-lsr-ler** | **mpls-lsr-ler-optimized** | **mpls-safe-speculative-parsing** }

Syntax Description

ip-tunnel	Allows the hashing algorithm to use the outer IPv4 GRE header even while doing an IP tunnel decapsulation.
layer2	Allows the hashing algorithm to use the inner IP header information while doing layer 2 forwarding with inner payload as MPLS.
gtp	Allows hashing based on the tunnel id in GTP-U packets.
gtp-mpls	Allows hashing based on the tunnel id in GTP-U packets intead of Layer 4 packets when underlay network is MPLS.
mpls-safe-speculative-parsing	Allows hashing based on the first nibble of the MAC DA address.
pppoe	Allows hashing based on inner IPv4 or IPv6 headers for PPPoE packets. We recommend enabling this hashing on head and tail nodes.
L3-Only	Allows hashing for L3 header only. We recommend enabling this hashing when majority of traffic is fragmented.

mpls-lsr-ler	Allows hashing in Label Edge Router (LER) and Label Switched Routers (LSRs) with MPLS traffic. This profile is recommended to be used when the following traffic flows are prominent: • IPv4 pop and lookup flows (EthoMPLS2/3oIPv4oL4) with L4 as TCP or UDP • IPv6 pop and lookup flows (EthoMPLS2/3oIPv6oXX) with L4 as TCP or UDP
mpls-lsr-ler-optimized	Allows optimized hashing in LER and LSR with MPLS IPv6 traffic. This profile is recommended to be used when the following traffic flows are prominent: • 4 Label IPv6 flows (EthoMPLS4/6oIPv6) • IPv6 pop and lookup flows (EthoMPLS2/3oIPv6oXX) with L4 as non-TCP/UDP (for example, no next header, GRE)
inner-L2-field	Allows the hashing algorithm to use the inner ethernet fields of the source MAC and destination MAC addresses.

Command Default

No load-balancing profile is configured.

Command Modes

XR Config mode

Command History

Release	Modification
7.10.1	The **mpls-lsr-ler-optimized** keyword was introduced.
7.7.2	The **inner-l2-field** keyword was introduced.
6.5.1	This command was modified.
6.3.2	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Without control-word, L2VPN traffic is considered to be IPv4 or IPv6 traffic depending on the presence of nibble 4 or nibble 6 in the payload after the last label in the traffic. The matching offset fields are considered for load-balancing hash calculation. This may cause hashing of a single flow to different links resulting in decrease of end user throughput.

Note

- Only one of the load-balancing profiles should be enabled at a time. The last configured CLI takes precedence.
- While adding or removing the **hw-module profile load-balance algorithm mpls-lsr-ler** and **hw-module profile load-balance algorithm mpls-lsr-ler-optimized**commands, there is no need to reload the router.
- While adding or removing the **hw-module profile load-balance algorithm ip-tunnel** and **hw-module profile load-balance algorithm PPPoE**commands, you must reload the router.
- The **hw-module profile segment-routing srv6** is mutually exclusive with **hw-module profile load-balance algorithm PPPoE** and **hw-module profile load-balance algorithm ip-tunnel** commands.

Task ID

Task ID	Operation
bundle	read, write

This example shows how to configure the **hw-module profile load-balance algorithm** command to use the outer IPv4 GRE header for hashing even while doing an IP tunnel decapsulation.

```
RP/0/RP0/CPU0:Router(config)# hw-module profile load-balance algorithm ip-tunnel
```

This example shows how to configure the **hw-module profile load-balance algorithm** command to use the tunnel id in GTP-U packets for hashing.

```
RP/0/RP0/CPU0:Router(config)# hw-module profile load-balance algorithm gtp
```

This example shows how to configure the **hw-module profile load-balance algorithm** command to hash the L2VPN traffic to the right egress link.

```
RP/0/RP0/CPU0:Router(config)# hw-module profile load-balance algorithm
mpls-safe-speculative-parsing
```

This example shows how to configure the **hw-module profile load-balance algorithm** command to hash the IPv6 traffic with four MPLS labels to ensure optimized load-balancing.

```
RP/0/RP0/CPU0:ios(config)#hw-module profile load-balance algorithm mpls-lsr-ler-optimized
```

pppoe payload

To enable load balancing based on PPPoE payload IPV4/IPV6 header when PPPoE header is on ETH, use the **hw-module profile load-balance algorithm pppoe** command in XR Config mode. To restore the default values, use the **no** form of this command.

hw-module profile load-balance algorithm pppoe [**ip-tunnel** | **layer2** | **gtp** | **mpls-safe-speculative-parsing**]

Syntax Description

ip-tunnel	Allows the hashing algorithm to use the outer IPv4 GRE header even while doing an IP tunnel decapsulation.
layer2	Allows the hashing algorithm to use the inner IP header information while doing layer 2 forwarding with inner payload as MPLS.
gtp	Allows hashing based on the tunnel id in GTP-U packets.
mpls-safe-speculative-parsing	Allows hashing based on the first nibble of the MAC DA address.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.4.1	This command was introduced.

Usage Guidelines

Without control-word, L2VPN traffic is considered to be IPv4 or IPv6 traffic depending on the presence of nibble 4 or nibble 6 in the payload after the last label in the traffic. The matching offset fields are considered for load-balancing hash calculation. This may cause hashing of a single flow to different links resulting in decrease of end user throughput.

Task ID

Task ID	Operations
bundle	read, write

Examples

This example shows how to configure the **hw-module profile load-balance algorithm** command to use the outer IPv4 GRE header for hashing even while doing an IP tunnel decapsulation.

:

```
Router(config)#hw-module profile load-balance algorithm ip-tunnel
Fri Jul 23 08:44:28.724 UTC
reload of all chassis/all line cards is required only for PPPoE option configuration/removal
Router(config)#
Router(config)#
Router(config)#
Router(config)#commit
Fri Jul 23 08:44:36.701 UTC
Router(config)#Router(config)#no hw-module p
port-range profile
Router(config)#no hw-module profile load-balance algorithm ip-tunnel
Fri Jul 23 08:44:50.292 UTC
reload of all chassis/all line cards is required only for PPPoE option configuration/removal
Router(config)#commit
Fri Jul 23 08:44:53.504 UTC
Router(config)#
```

This example shows how to configure the **hw-module profile load-balance algorithm** command to use the tunnel id in GTP-U packets for hashing.

```
Router(config)#hw-module profile load-balance algorithm gtp
Fri Jul 23 08:45:00.823 UTC
reload of all chassis/all line cards is required only for PPPoE option configuration/removal
Router(config)#
Router(config)#commit
Fri Jul 23 08:45:03.651 UTC
Router(config)#
Router(config)#
Router(config)#no hw-module profile load-balance algorithm gtp
Fri Jul 23 08:45:14.485 UTC
reload of all chassis/all line cards is required only for PPPoE option configuration/removal
Router(config)#commit
Fri Jul 23 08:45:17.172 UTC
```

This example shows how to configure the **hw-module profile load-balance algorithm** command to hash the L2VPN traffic to the right egress link .

```
Router(config)#hw-module profile load-balance algorithm ?
L3-only L3 Header only Hash.
PPPoE PPPoE session based optimized hash. Reload is required for this option
gtp GTP optimized.
gtp-mpls GTP over MPLS optimized hash.
ip-tunnel IP tunnel optimized.
layer2 Layer 2 optimized.
mpls-safe-speculative-parsing MPLS safe Speculative parsing.Router(config)#
```

show adjacency

To display Cisco Express Forwarding (CEF) adjacency table information, use the **show adjacency** command in XR EXEC mode.

show adjacency [{**ipv4** [**nexthop** *ipv4-address*] | **mpls** | **ipv6**}] [*interface type interface-instance*] [**remote**] [**detail**] [**location** *node-id*]

Syntax Description

ipv4	(Optional) Displays only IPv4 adjacencies.
nexthop *ipv4-address*	(Optional) Displays adjacencies that are destined to the specified IPv4 nexthop.
mpls	(Optional) Displays only MPLS adjacencies.
ipv6	(Optional) Displays only IPv6 adjacencies.
interface-type	(Optional) Interface type. For more information, use the question mark (?) online help function.

interface-instance	Either a physical interface instance or a virtual interface instance: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash mark between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
remote	(Optional) Displays only remote adjacencies. A remote adjacency is an internal adjacency used to forward packets between line cards.
detail	(Optional) Displays detailed adjacency information, including Layer 2 information.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

This command is used to verify that an adjacency exists for a connected device, that the adjacency is valid, and that the MAC header rewrite string is correct.

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays the CEF adjacency table for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from **show adjacency** command with the **location** keyword specified:

```
RP/0/RP0/CPU0:router# show adjacency location 0/RP1/CPU0

Interface      Address Version Refcount Protocol
Mg0/RP1/CPU0/0 1.73.57.180 49 2( 0)       ipv4
```

```
Mg0/RP1/CPU0/0 1.73.57.181 55 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.57.250 14 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.57.91  48 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.57.92  60 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.52.5   21 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.52.52 17723 2( 0)     ipv4
Mg0/RP1/CPU0/0 1.73.46.4   80 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.46.1   86 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.46.2   88 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.46.10  84 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.46.250 23 2( 0)       ipv4
Te0/5/0/11/3   110.0.0.2    3 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.0.3    20 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.0.2     7 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.0.1    15 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.44.250  8 2( 0)       ipv4
```

```
RP/0/RP0/CPU0:router# show adjacency location 0/RP1/CPU0

Interface      Address Version Refcount Protocol
Mg0/RP1/CPU0/0 1.73.57.180 49 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.57.181 55 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.57.250 14 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.57.91  48 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.57.92  60 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.52.5   21 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.52.52 17723 2( 0)     ipv4
Mg0/RP1/CPU0/0 1.73.46.4   80 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.46.1   86 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.46.2   88 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.46.10  84 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.46.250 23 2( 0)       ipv4
Te0/5/0/11/3   110.0.0.2    3 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.0.3    20 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.0.2     7 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.0.1    15 2( 0)       ipv4
Mg0/RP1/CPU0/0 1.73.44.250  8 2( 0)       ipv4
```

This table describes the significant fields shown in the display.

Table 13: show adjacency Command Field Descriptions

Field	Description
Interface	Outgoing interface associated with the adjacency.
Address	Address can represent one of these addresses: • Next hop IPv4 or IPv6 address • Point-to-Point address Information in parentheses indicates different types of adjacency.
Version	Version number of the adjacency. Updated whenever the adjacency is updated.
Refcount	Number of references to this adjacency.
Protocol	Protocol for which the adjacency is associated.

Field	Description
0f000800 and 000c86f33d330800453a21c10800	Layer 2 encapsulation string.
mtu	Value of the maximum transmission unit (MTU).
flags	Internal field.
packets	Number of packets going through the adjacency.
bytes	Number of bytes going through the adjacency.

show cef

To display information about packets forwarded by Cisco Express Forwarding (CEF), use the **show cef** command in XR EXEC mode.

show cef [*prefix* [*mask*]] [{**hardware** {**egress**} | **detail**}] [**location** {*node-id* | **all**}]

Syntax Description

prefix	(Optional) Longest matching CEF entry for the specified IPv4 destination prefix.
mask	(Optional) Exact CEF entry for the specified IPv4 prefix and mask.
hardware	(Optional) Displays detailed information about hardware.
egress	Displays information from the egress packet switch exchange (PSE) file.
detail	(Optional) Displays full details.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
all	(Optional) Displays all locations.

Command Default

When the prefix is not explicitly specified, this command displays all the IPv4 prefixes that are present in CEF. When not specified, the location defaults to the active Route Processor (RP) node.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output shows the load information flag from the **show cef** command for both **hardware** and **ingress** keywords.

```
Router# show cef 1.81.0.0/16 hardware ingress location 0/RP0/CPU0

1.81.0.0/16, version 10, internal 0x1000001 0x0 (ptr 0x8d793370) [1], 0x0 (0x0), 0x0 (0x0)
Updated Nov 24 03:56:15.876
local adjacency 1.73.0.1
Prefix Len 16, traffic index 0, precedence n/a, priority 3
via 1.73.0.1/32, 2 dependencies, recursive [flags 0x0]
path-idx 0 NHID 0x0 [0x8d7934f0 0x0]
next hop 1.73.0.1/32 via 1.73.0.1/32
RP/0/RP1/CPU0:ncs5508#show cef 1.81.0.0/16 hardware ingress loc 0/5/cpu0
1.81.0.0/16, version 10, internal 0x1000001 0x0 (ptr 0x8853a698) [1], 0x0 (0x0), 0x0 (0x0)
Updated Nov 24 03:56:15.880
Prefix Len 16, traffic index 0, precedence n/a, priority 3
via 1.73.0.1/32, 2 dependencies, recursive [flags 0x0]
path-idx 0 NHID 0x0 [0x8853a4e8 0x0]
next hop 1.73.0.1/32 via 1.73.0.1/32



LEAF - HAL pd context :
sub-type : IPV4, ecd_marked:0, has_collapsed_ldi:0
collapse_bwalk_required:0, ecdv2_marked:0
HW Walk:
LEAF:
Handle: 0x8893c7d8 type: 0 FEC handle: 0x887557a8

REC-SHLDI HAL PD context :
ecd_marked:0, collapse_bwalk_required:0, load_shared_lb:0

RSHLDI:
PI:0x0x883e8908 PD:0x0x883e8984 rev:0 p-rev:0 flag:0x1
FEC hdl: 0x887557a8 fec index: 0x2000101e(4126) num paths: 1
Path:0 fec index: 0x2000101e(4126) DSP:0x16033036
```

show cef bgp-attribute

To display Border Gateway Protocol (BGP) attributes for Cisco Express Forwarding (CEF), use the **show cef bgp-attribute** command in XR EXEC mode.

show cef bgp-attribute [**attribute-id index-id**] [**local-attribute-id index-id**] [**location** *node-id*]

Syntax Description

attribute-id	*index-id*	(Optional) Displays FIB attribute index.
local-attribute-id	*index-id*	(Optional) Displays FIB local attribute index.

location *node-id*	(Optional) Displays BGP information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

The default location is active RP.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

This command has no keywords or arguments.

Task ID

Task ID	Operations
cef	read

Examples

The following example shows how to use the **show cef bgp-attribute** command:

```
RP/0/RP0/CPU0:router# show cef bgp-attribute

Total number of entries: 75742
BGP Attribute ID: 0x2058a, Local Attribute ID: 0x1
    Origin AS:    195, Next Hop AS:        195
BGP Attribute ID: 0x20583, Local Attribute ID: 0x2
    Origin AS:    22, Next Hop AS:        22
BGP Attribute ID: 0x20582, Local Attribute ID: 0x3
    Origin AS:    21, Next Hop AS:        21
BGP Attribute ID: 0x20585, Local Attribute ID: 0x4
    Origin AS:    28, Next Hop AS:        28
BGP Attribute ID: 0x20584, Local Attribute ID: 0x5
    Origin AS:    27, Next Hop AS:        27
BGP Attribute ID: 0x2057f, Local Attribute ID: 0x6
    Origin AS:    86, Next Hop AS:        86
BGP Attribute ID: 0x2058b, Local Attribute ID: 0x7
    Origin AS:    196, Next Hop AS:        196
BGP Attribute ID: 0x20589, Local Attribute ID: 0x8
    Origin AS:    194, Next Hop AS:        194
```

This table describes the significant fields shown in the display.

Table 14: show cef bgp-attribute Command Field Descriptions

Field	Description
BGP Attribute ID	Displays the id assigned by BGP.
Local Attribute ID	Displays the id assigned by FIB.
Origin AS	Displays the origin AS of the prefix that carries this attribute id.
Next Hop AS	Displays the AS that contains the BGP nexthop for this prefix.

show cef summary

To display summary information for the Cisco Express Forwarding (CEF) table, use the **show cef summary** command in XR EXEC mode.

show cef summary [**location** {*node-id* | **all**}]

Syntax Description

location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
all	(Optional) Displays all locations.

Command Default

The **show cef summary** command assumes the IPv4 CEF table and the active RP node as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef summary** command.

```
RP/0/RP0/CPU0:router# show cef summary location 0/RP0/CPU0

Router ID is 10.1.1.1

IP CEF with switching (Table Version 0) for node0_1_CPU0

  Load balancing: L3
  Tableid 0xe0000000, Vrfid 0x60000000, Vrid 0x20000000, Flags 0x301
  Vrfname default, Refcount 318
  170 routes, 0 reresolve, 0 unresolved (0 old, 0 new), 12240 bytes
  183 load sharing elements, 57292 bytes, 184 references
  19 shared load sharing elements, 7036 bytes
  164 exclusive load sharing elements, 50256 bytes
  0 CEF route update drops, 10 revisions of existing leaves
  Resolution Timer: 15s
  0 prefixes modified in place
  0 deleted stale prefixes
  21 prefixes with label imposition, 60 prefixes with label information
Adjacency Table has 49 adjacencies
  25 incomplete adjacencies
```

This table describes the significant fields shown in the display.

Table 15: show cef summary Command Field Descriptions

Field	Description
Load balancing	Current load-balancing mode. The default value is L3.
Table Version	Version of the CEF table.
tableid	Table identification number.
vrfname	VRF name.
flags	Option value for the table
routes	Total number of routes.
reresolve	Total number of routes being reresolved.
unresolved (*x* old, *x* new)	Number of routes not yet resolved.
load sharing elements	Total number of internal load-sharing data structures.
bytes	Total memory used by internal load sharing data structures.
references	Total reference count of all internal load sharing data structures.
CEF resets	Number of CEF table resets.
revisions of existing leaves	Number of updates to existing prefixes.
Exponential (currently *x*s, peak *x*s)	Currently not used.
prefixes modified in place	Prefixes modified in place.
Adjacency Table has *x* adjacencies	Total number of adjacencies.
x incomplete adjacency	Total number of incomplete adjacencies.

show cef ipv4

To display the IPv4 Cisco Express Forwarding (CEF) table, use the **show cef ipv4** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv4** [{*prefix* [*mask*] | *interface-type interface-instance*}] [**detail**] [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
prefix	(Optional) Longest matching CEF entry for the specified IPv4 destination prefix.

mask	(Optional) Exact CEF entry for the specified IPv4 prefix and mask.
interface-type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-instance	Either a physical interface instance or a virtual interface instance: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash mark between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0 /CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
detail	(Optional) Displays full CEF entry information.
location *node-id*	(Optional) Displays the IPv4 CEF table for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If the location is not specified, the command defaults to the active RP node.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays the CEF table on the node in which the command is issued. Otherwise, the command is effective on the node specified by the **location** *node-id* keyword and argument.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef ipv4** command:

```
RP/0/RP0/CPU0:router/CPU0:router# show cef ipv4
Prefix              Next Hop            Interface
------------------- ------------------- ------------------
0.0.0.0/0           drop                default handler
0.0.0.0/32          broadcast
1.75.55.1/32        1.76.0.1/32         <recursive>
1.76.0.0/16         attached            MgmtEth0/RP0/CPU0/0
1.76.0.0/32         broadcast           MgmtEth0/RP0/CPU0/0
1.76.0.1/32         1.76.0.1/32         MgmtEth0/RP0/CPU0/0
1.76.0.2/32         1.76.0.2/32         MgmtEth0/RP0/CPU0/0
1.76.0.3/32         1.76.0.3/32         MgmtEth0/RP0/CPU0/0
1.76.11.2/32        1.76.11.2/32        MgmtEth0/RP0/CPU0/0

RP/0/RP0/CPU0:router/CPU0:router# show cef ipv4
Prefix              Next Hop            Interface
------------------- ------------------- ------------------
0.0.0.0/0           drop                default handler
0.0.0.0/32          broadcast
1.75.55.1/32        1.76.0.1/32         <recursive>
1.76.0.0/16         attached            MgmtEth0/RP0/CPU0/0
1.76.0.0/32         broadcast           MgmtEth0/RP0/CPU0/0
1.76.0.1/32         1.76.0.1/32         MgmtEth0/RP0/CPU0/0
1.76.0.2/32         1.76.0.2/32         MgmtEth0/RP0/CPU0/0
1.76.0.3/32         1.76.0.3/32         MgmtEth0/RP0/CPU0/0
1.76.11.2/32        1.76.11.2/32        MgmtEth0/RP0/CPU0/0
```

This table describes the significant fields shown in the display.

Table 16: show cef ipv4 Command Field Descriptions

Field	Description
Prefix	Prefix in the IPv4 CEF table.
Next Hop	Next hop of the prefix.
Interface	Interface associated with the prefix.

show cef ipv4 adjacency

To display Cisco Express Forwarding (CEF) IPv4 adjacency status and configuration information, use the **show cef ipv4 adjacency** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv4 adjacency** [*interface-type interface-path-id*] [**location** *node-id*] [**detail**] [**discard**] [**glean**] [**null**] [**punt**] [**remote**] [**protected**]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
interface-type	(Optional) Interface type. For more information, use the question mark (?) online help function.

interface- path-id	(Optional) Either a physical interface instance or a virtual interface instance: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash mark between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
detail	(Optional) Displays the detailed adjacency information.
discard	(Optional) Filters out and displays only the discarded adjacency information.
glean	(Optional) Filters out and displays only the glean adjacency information.
null	(Optional) Filters out and displays only the adjacency information.
punt	(Optional) Filters out and displays only the punt adjacency information.
remote	(Optional) Filters out and displays only the remote adjacency information.
protected	(Optional) Filters out and displays only the IP-Fast Reroute (FRR) protected adjacency information.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, the **show cef ipv4 adjacency** command displays the CEF adjacency table for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from **show cef ipv4 adjacency** command :

```
RP/0/RP0/CPU0:router# show cef ipv4 adjacency

Display protocol is ipv4
Interface    Address                                          Type    Refcount

Hu0/6/0/16                                                    special 2
             Interface: Hu0/6/0/16 Type:  glean
             Interface Type: 0x0, Base Flags: 0x220 (0x8ceb3f98)
             Nhinfo PT: 0x8ceb3f98, Idb PT: 0x8cb35a20,
             If Handle: 0x30001e0 no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec  7 11:20:35.145


Hu0/6/0/16  Prefix: 10.0.22.2/32                            local   9
            Adjacency: PT:0x8d5752b8 10.0.22.2/32
            Interface: Hu0/6/0/16
            NHID: 0x0
            MAC: e6.07.2b.8d.33.f0.e6.48.5c.10.b3.a0.08.00
            Interface Type: 0x0, Base Flags: 0x1 (0x8d001fa0)
            Nhinfo PT: 0x8d001fa0, Idb PT: 0x8cb35a20,
            If Handle: 0x30001e0 no dependent adj
            Ancestor If Handle: 0x0
Update time Dec  7 11:20:45.022


Hu0/6/0/18                                                    special 2
             Interface: Hu0/6/0/18 Type:  glean
             Interface Type: 0x0, Base Flags: 0x220 (0x8ceb44c0)
             Nhinfo PT: 0x8ceb44c0, Idb PT: 0x8cb35920,
             If Handle: 0x30001f0 no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec  7 11:20:33.449


Hu0/6/0/18   Prefix: 10.0.62.2/32                           local   10
             Adjacency: PT:0x8d5794a0 10.0.62.2/32
             Interface: Hu0/6/0/18
             NHID: 0x0
             MAC: e6.07.2b.8d.34.48.e6.48.5c.10.b3.a8.08.00
             Interface Type: 0x0, Base Flags: 0x1 (0x8d002aa0)
             Nhinfo PT: 0x8d002aa0, Idb PT: 0x8cb35920
             If Handle: 0x30001f0 no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec  7 11:20:45.019
```

This table describes the significant fields shown in the display.

Table 17: show cef ipv4 adjacency Command Field Descriptions

Field	Description
Interface	Interface associated with the prefix.
Address	Prefix address information.
Type	Type of adjacency, can be either local or remote.
Refcount	Number of times the adjacency is referenced by other routers.

show cef ipv4 adjacency hardware

To display Cisco Express Forwarding (CEF) IPv4 adjacency hardware status and configuration information, use the **show cef ipv4 adjacency hardware** command in XR EXEC mode.

show cef[**vrf** *vrf-name*] **ipv4 adjacency hardware** {**egress**} [{**detail** | **discard** | **drop** | **glean** | **location** *node-id* | **null** | **punt** | **protected** | **remote**}]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
egress	Displays information from the egress packet switch exchange (PSE) file.
detail	(Optional) Displays full details.
discard	(Optional) Displays the discard adjacency information.
drop	(Optional) Displays the drop adjacency information.
glean	(Optional) Displays the glean adjacency information.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
null	(Optional) Displays the null adjacency information.
punt	(Optional) Displays the punt adjacency information.
protected	(Optional) Filters out and displays only the IP-Fast Reroute (FRR) protected adjacency information.
remote	(Optional) Displays the remote adjacency information.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output shows the load information flag from the **show cef ipv4 adjacency hardware** command for the **egress** keyword:

```
RP/0/RP0/CPU0:router# show cef ipv4 adjacency hardware egress detail location 0/2/CPU0

Display protocol is ipv4
Interface    Address                                          Type    Refcount

Hu0/6/0/16                                                    special 2
             Interface: Hu0/6/0/16 Type:  glean
             Interface Type: 0x0, Base Flags: 0x220 (0x87874298)
             Nhinfo PT: 0x87874298, Idb PT: 0x874f4a20, If Handle: 0x30001e0
             no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec  7 11:20:35.155


        SP-NHINFO:
            Trap Port: 0x16033036, Trap handle: (nil), npu_mask: 3f



Hu0/6/0/16   Prefix: 10.0.22.2/32                             local   9
             Adjacency: PT:0x8661b378 10.0.22.2/32
             Interface: Hu0/6/0/16
             NHID: 0x0
             MAC: e6.07.2b.8d.33.f0.e6.48.5c.10.b3.a0.08.00
             Interface Type: 0x0, Base Flags: 0x1 (0x88074420)
             Nhinfo PT: 0x88074420, Idb PT: 0x874f4a20, If Handle: 0x30001e0
             no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec  7 11:20:45.623


        TX-NHINFO:
            Encap hdl: 0x8a975b58 Encap id: 0x4003f004 Remote: 64
            L3 int: 0 npu_mask: 0
```

This table describes the significant fields shown in the display.

Table 18: show cef ipv4 adjacency hardware Command Field Descriptions

Field	Description
Interface	Interface associated with the prefix.
Address	Prefix address information.
Type	Type of adjacency, can be either local or remote.
Refcount	Number of times the adjacency is referenced by other routers.

show cef ipv4 drops

To display IPv4 Cisco Express Forwarding (CEF) table packet drop counters, use the **show cef ipv4 drops** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv4 drops** [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
location *node-id*	(Optional) Displays IPv4 CEF table packet drop counters for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

A packet might be dropped from the IPv4 CEF table because of unresolved CEF entries, unsupported features, absence of route information, absence of adjacency information, or an IP checksum error.

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays IPv4 CEF packet drop counters for all nodes.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show cef ipv4 drops** for location command:

```
RP/0/RP0/CPU0:router# show cef ipv4 drops

CEF Drop Statistics
Node: 0/RP0/CPU0
  Unresolved drops     packets :              0
  Unsupported drops    packets :              0
  Null0 drops          packets :              0
  No route drops       packets :              0
  No Adjacency drops   packets :              0
  Checksum error drops packets :              0
  RPF drops            packets :              0
  RPF suppressed drops packets :              0
  RP destined drops    packets :              0
  Discard drops        packets :              0
  GRE lookup drops     packets :              0
  GRE processing drops packets :              0
  LISP punt drops      packets :              0
  LISP encap err drops packets :              0
  LISP decap err drops packets :              0
```

```
Node: 0/RP1/CPU0
  Unresolved drops     packets :               0
  Unsupported drops    packets :               0
  Null0 drops          packets :               0
  No route drops       packets :               0
  No Adjacency drops   packets :               0
  Checksum error drops packets :               0
  RPF drops            packets :               0
  RPF suppressed drops packets :               0
  RP destined drops    packets :               0
  Discard drops        packets :               0
  GRE lookup drops     packets :               0
  GRE processing drops packets :               0
  LISP punt drops      packets :               0
  LISP encap err drops packets :               0
  LISP decap err drops packets :               0
```

Table 19: show cef ipv4 drop Command Field Descriptions

Field	Description
Unresolved drops	Drops due to unresolved routes.
Unsupported drops	Drops due to an unsupported feature.
Null0 drops	Drops to the Null0 interface.
No route drops	Number of packets dropped because there were no routes to the destination.
No Adjacency drops	Number of packets dropped because there were no adjacencies established.
Checksum error drops	Drops due to IPv4 checksum error.
RPF drops	Drops due to IPv4 unicast RPF[1].
RPF suppressed drops	Drops suppressed due to IPv4 unicast RPF.
RP destined drops	Drops destined for the router.
Discard drops	Drops those were discarded.
GRE lookup drops	GRE packets dropped during GRE Lookup.
GRE processing drops	GRE packets dropped during GRE Processing.
LISP punt drops	LISP packets dropped during software processing of the packets.
LISP encap err drops	LISP encap packets dropped due to errors.
LISP decap err drops	LISP Decap packets dropped due to errors.

[1] RPF = Reverse Path Forwarding

show cef ipv4 exact-route

To display an IPv4 Cisco Express Forwarding (CEF) exact route, use the **show cef ipv4 exact-route** command in XR EXEC mode.

show cef [**vrf** *vrf-name*]**ipv4 exact-route**{*source-address destination-address*} [**protocol***protocol-name*] [**source-port***source-port*] [**destination-port***destination-port*] [*type interface-path-id*] [*policy-class-value*] [**detail | location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
source-address	The IPv4 source address in x.x.x.x format.
destination-address	The IPv4 destination address in x.x.x.x format.
protocol *protocol name*	(Optional) Displays the specified protocol for the route.
source-port *source-port*	(Optional) Sets the UDP source port. The range is from 0 to 65535.
destination-port *destination-port*	(Optional) Sets the UDP destination port. The range is from 0 to 65535.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
detail	(Optional) Displays full CEF entry information.
location *node-id*	(Optional) Displays the IPv4 CEF table for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If the Layer 4 information is enabled, the source-port, destination-port, and protocol fields are required. Otherwise, the output of the **show cef ipv4 exact-route** command is not correct.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef ipv4 exact-route** command:

```
RP/0/RP0/CPU0:router# show cef ipv4 exact-route 159.0.0.0 189.0.0.0

189.0.0.0/24, version 1952527, internal 0x1000001 0x83 (ptr 0x9019ebd0) [1], 0x0 (0x91a814b8),
 0xa20 (0x8dcc6700)
 Updated Dec  9 17:15:37.521
 local adjacency 10.0.94.2
 Prefix Len 24, traffic index 0, precedence n/a, priority 2
   via TenGigE0/4/0/30/0
   via 10.0.94.2/32, TenGigE0/4/0/30/0, 7 dependencies, weight 0, class 0 [flags 0x0]
    path-idx 0 NHID 0x0 [0x8cffee20 0x8cffec20]
    next hop 10.0.94.2/32
    local adjacency
     local label 75001      labels imposed {ImplNull}
```

This table describes the significant fields shown in the display.

Table 20: show cef ipv4 exact-route Command Field Descriptions

Field	Description
Prefix	Prefix in the IPv4 CEF table .
Next Hop	Next hop of the prefix
Interface	Interface associated with the prefix

show cef ipv4 exceptions

To display IPv4 Cisco Express Forwarding (CEF) exception packet counters, use the **show cef ipv4 exceptions** command in .

show cef [**vrf** *vrf-name*] **ipv4 exceptions** [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
location *node-id*	(Optional) Displays CEF exception packet counters for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

CEF exception packets are those packets that have been sent from the hardware to the software because they require additional handling. The types of IPv4 CEF exception packets are displayed in the command's output and are defined.

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays IPv4 CEF exception packet counters on all nodes.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show cef ipv4 exceptions** command:

```
RP/0/# show cef ipv4 exceptions

CEF Exception Statistics
Node: 0/RP0/CPU0
  Slow encap  packets :               0
  Unsupported packets :               0
  Redirect    packets :               0
  Receive     packets :               0
  Broadcast   packets :               0
  IP options  packets :               0
  TTL expired packets :               0
  Fragmented  packets :               0
Node: 0/RP1/CPU0
  Slow encap  packets :               3
  Unsupported packets :               0
  Redirect    packets :               0
  Receive     packets :           12787
  Broadcast   packets :           74814
  IP options  packets :               0
  TTL expired packets :               0
  Fragmented  packets :               0
```

This table describes the significant fields shown in the display.

Table 21: show cef ipv4 exceptions Command Field Descriptions

Field	Description
Slow encap	Number of packets requiring special processing during encapsulation.
Redirect	Number of ICMP[2] redirect messages sent.
Receive	Number of packets destined to the router.
Broadcast	Number of broadcasts received.

Field	Description
IP options	Number of IP option packets.
TTL expired	Number of packets with expired TTLs[3].
Fragmented	Number of packets that have been fragmented.

[2] ICMP = internet control message protocol
[3] TTL = time to live

show cef ipv4 hardware

To display Cisco Express Forwarding (CEF) IPv4 hardware status and configuration information, use the **show cef ipv4 hardware** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv4 hardware** {**egress** | [{**detail** | **location** *node-id*}]}

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
egress	Displays information from the egress packet switch exchange (PSE) file.
detail	(Optional) Displays full details.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef ipv4 hardware** command:

```
RP/0/RP0/CPU0:router# sh cef ipv4 hardware egress detail location 0/6/CPU0

0.0.0.0/0, version 0, proxy default, default route handler, drop adjacency,
 internal 0x1001011 0x0 (ptr 0x887e40a8) [1], 0x0 (0x88772098), 0x0 (0x0)
 Updated Dec 20 22:22:08.311
 Prefix Len 0, traffic index 0, precedence n/a, priority 15
  gateway array (0x88534098) reference count 1, flags 0x200, source default (12), 0 backups

                [2 type 3 flags 0xa401 (0x885db098) ext 0x0 (0x0)]
  LW-LDI[type=3, refc=1, ptr=0x88772098, sh-ldi=0x885db098]
  gateway array update type-time 1 Dec 20 22:22:08.311
 LDI Update time Dec 20 22:22:08.327
 LW-LDI-TS Dec 20 22:22:08.337
   via 0.0.0.0/32, 3 dependencies, weight 0, class 0 [flags 0x0]
    path-idx 0 NHID 0x0 [0x8778d3c8 0x0]
    next hop 0.0.0.0/32
     drop adjacency


 LEAF - HAL pd context :
 sub-type : IPV4, ecd_marked:0, has_collapsed_ldi:0
 collapse_bwalk_required:0, ecdv2_marked:0
HW Walk:
LEAF:
    Handle: 0x88c40098 type: 0 FEC handle: 0x8894d098

    LWLDI:
        PI:0x88772098 PD:0x887720d8 rev:1 p-rev:0 ldi type:3
        FEC hdl: 0x8894d098 fec index: 0x0(0) num paths:1, bkup: 0

        SHLDI:
            PI:0x885db098 PD:0x885db118 rev:0 p-rev:0 flag:0x0
            FEC hdl: 0x8894d098 fec index: 0x20001001(4097) num paths: 1 bkup paths: 0
            Path:0 fec index: 0x20001001(4097) DSP:0x16033037

        SP-NHINFO:
            PD: 0x8778d438, Trap Port: 0x16033037, Trap handle: (nil), npu_mask: 3f



    Load distribution: 0 (refcount 2)

    Hash  OK  Interface                Address
    0     Y   Unknown                  drop
0.0.0.0/32, version 0, broadcast
  Updated Dec 20 22:22:08.365
  Prefix Len 32


 LEAF - HAL pd context :
 sub-type : IPV4, ecd_marked:0, has_collapsed_ldi:0
 collapse_bwalk_required:0, ecdv2_marked:0
HW Walk:
LEAF:
    Handle: 0x88c404d8 type: 0 FEC handle: 0x88957fe8

    LWLDI:
        PI:0x887723e8 PD:0x88772428 rev:11 p-rev:8 ldi type:3
        FEC hdl: 0x88957fe8 fec index: 0x0(0) num paths:1, bkup: 0

        SHLDI:
            PI:0x885dc478 PD:0x885dc4f8 rev:8 p-rev:0 flag:0x0
            FEC hdl: 0x88957fe8 fec index: 0x20001004(4100) num paths: 1 bkup paths: 0
```

```
            Path:0 fec index: 0x20001004(4100) DSP:0x16033037

        SP-NHINFO:
            PD: 0x8778d548, Trap Port: 0x16033037, Trap handle: (nil), npu_mask: 3f

1.75.55.1/32, version 11, internal 0x1000001 0x0 (ptr 0x887e4d50) [1], 0x0 (0x0), 0x0 (0x0)

 Updated Dec 20 22:22:24.596
 Prefix Len 32, traffic index 0, precedence n/a, priority 3
  gateway array (0x88534de0) reference count 3, flags 0x4010, source rib (7), 0 backups
                [1 type 3 flags 0x48501 (0x885e45a8) ext 0x0 (0x0)]
  LW-LDI[type=0, refc=0, ptr=0x0, sh-ldi=0x0]
  gateway array update type-time 1 Dec 20 22:22:24.594
 LDI Update time Dec 20 22:22:24.727
   via 1.76.0.1/32, 2 dependencies, recursive [flags 0x0]
    path-idx 0 NHID 0x0 [0x887e4c78 0x0]
    next hop 1.76.0.1/32 via 1.76.0.1/32


 LEAF - HAL pd context :
 sub-type : IPV4, ecd_marked:0, has_collapsed_ldi:0
 collapse_bwalk_required:0, ecdv2_marked:0
HW Walk:
LEAF:
    Handle: 0x88c42078 type: 0 FEC handle: 0x88999bc8

 REC-SHLDI HAL PD context :
ecd_marked:0, collapse_bwalk_required:0, load_shared_lb:0

    RSHLDI:
        PI:0x0x885e45a8 PD:0x0x885e4624 rev:0 p-rev:0 flag:0x1
        FEC hdl: 0x88999bc8 fec index: 0x20001012(4114) num paths: 1
        Path:0 fec index: 0x20001012(4114) DSP:0x16033036
                MPLS Encap Handle: (nil) LL Encap Handle: (nil)

        TX-NHINFO: INCOMPLETE
            Trap Port: 0x16033036 npu_mask: 0



    Load distribution: 0 (refcount 1)

    Hash  OK  Interface                 Address
    0     Y   MgmtEth0/RP0/CPU0/0       1.76.0.1
1.76.0.0/16, version 8, attached, connected, glean adjacency,
 internal 0x3000061 0x0 (ptr 0x887e49f0) [1], 0x0 (0x88773cc0), 0x0 (0x0)
 Updated Dec 20 22:22:23.985
 Prefix Len 16, traffic index 0, precedence n/a, priority 0
  gateway array (0x88534b88) reference count 1, flags 0x0, source rib (7), 0 backups
                [2 type 3 flags 0x8401 (0x885e1de8) ext 0x0 (0x0)]
  LW-LDI[type=3, refc=1, ptr=0x88773cc0, sh-ldi=0x885e1de8]
  gateway array update type-time 1 Dec 20 22:22:23.986
 LDI Update time Dec 20 22:22:23.986
 LW-LDI-TS Dec 20 22:22:24.179
   via MgmtEth0/RP0/CPU0/0, 2 dependencies, weight 0, class 0 [flags 0x8]
    path-idx 0 NHID 0x0 [0x8778e3b8 0x0]
     glean adjacency


 LEAF - HAL pd context :
 sub-type : IPV4, ecd_marked:0, has_collapsed_ldi:0
 collapse_bwalk_required:0, ecdv2_marked:0
HW Walk:
LEAF:
```

```
    Handle: 0x88c417f8 type: 0 FEC handle: 0x88983d28

    LWLDI:
        PI:0x88773cc0 PD:0x88773d00 rev:61 p-rev:60 ldi type:3
        FEC hdl: 0x88983d28 fec index: 0x0(0) num paths:1, bkup: 0

        SHLDI:
            PI:0x885e1de8 PD:0x885e1e68 rev:60 p-rev:0 flag:0x0
            FEC hdl: 0x88983d28 fec index: 0x2000100e(4110) num paths: 1 bkup paths: 0
            Path:0 fec index: 0x2000100e(4110) DSP:0x16033036

        SP-NHINFO:
            PD: 0x8778e428, Trap Port: 0x16033036, Trap handle: (nil), npu_mask: 3f



    Load distribution: 0 (refcount 2)

    Hash  OK  Interface                Address
    0     Y   MgmtEth0/RP0/CPU0/0      glean
1.76.0.0/32, version 0, broadcast
  Updated Dec 20 22:22:24.459
  Prefix Len 32


 LEAF - HAL pd context :
 sub-type : IPV4, ecd_marked:0, has_collapsed_ldi:0
 collapse_bwalk_required:0, ecdv2_marked:0
HW Walk:
LEAF:
    Handle: 0x88c41c38 type: 0 FEC handle: 0x8898ec78

    LWLDI:
        PI:0x88774010 PD:0x88774050 rev:65 p-rev:64 ldi type:3
        FEC hdl: 0x8898ec78 fec index: 0x0(0) num paths:1, bkup: 0

        SHLDI:
            PI:0x885e31c8 PD:0x885e3248 rev:64 p-rev:0 flag:0x0
            FEC hdl: 0x8898ec78 fec index: 0x20001010(4112) num paths: 1 bkup paths: 0
            Path:0 fec index: 0x20001010(4112) DSP:0x16033037

        SP-NHINFO:
            PD: 0x8778d548, Trap Port: 0x16033037, Trap handle: (nil), npu_mask: 3f

1.76.0.1/32, version 0, internal 0x1020001 0x0 (ptr 0x887e4c78) [2], 0x0 (0x887741b8), 0x0
 (0x0)
 Updated Dec 20 22:22:24.593
 Prefix Len 32, traffic index 0, Adjacency-prefix, precedence n/a, priority 15
  gateway array (0x88534ea8) reference count 1, flags 0x0, source internal (11), 0 backups
                [2 type 3 flags 0x8401 (0x885e3bb8) ext 0x0 (0x0)]
  LW-LDI[type=3, refc=1, ptr=0x887741b8, sh-ldi=0x885e3bb8]
  gateway array update type-time 1 Dec 20 22:22:24.594
 LDI Update time Dec 20 22:22:24.594
 LW-LDI-TS Dec 20 22:22:24.657
   via 1.76.0.1/32, MgmtEth0/RP0/CPU0/0, 3 dependencies, weight 0, class 0 [flags 0x0]
    path-idx 0 NHID 0x0 [0x87ee71b8 0x0]
    next hop 1.76.0.1/32
    local adjacency


 LEAF - HAL pd context :
 sub-type : IPV4, ecd_marked:0, has_collapsed_ldi:0
 collapse_bwalk_required:0, ecdv2_marked:0
HW Walk:
```

show cef ipv4 interface

To display IPv4 Cisco Express Forwarding (CEF)-related information for an interface, use the **show cef ipv4 interface** command in XR EXEC mode.

show cef[**vrf** *vrf-name*] **ipv4 interface** *type interface-path-id* [**detail**] [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
type	Interface type. For more information, use the question mark (?) online help function.
in terface-path-id	Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface HundredGigE 0/RSP0 /CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
detail	(Optional) Displays detailed CEF information for all the interfaces on the node in which the command is issued.
location *node-id*	(Optional) Displays IPv4 CEF-related information for an interface. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, the **show cef ipv4 interface rpf-statistics** command displays the CEF-related information for the interface on the route processor.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show cef ipv4 interface** command:

```
RP/0/RP0/CPU0:router# show cef ipv4 interface  hundredGigE 0/4/0/0

HundredGigE0/4/0/0 is up if_handle 0x02000148 if_type IFT_HUNDREDGE(0x49)
     idb info 0x87674320 flags 0x8001 ext 0x89a1c648 flags 0x50
     Vrf Local Info (0x899dd790)
  Interface last modified Dec  7, 2015 08:07:58, create
  Reference count 1       Next-Hop Count 2
  Forwarding is enabled
  ICMP redirects are never sent
  ICMP unreachables are enabled
  Protocol MTU 8986, TableId 0xe0000000(0x87aff378)
  Protocol Reference count 2
  Primary IPV4 local address 10.0.1.0/32
```

This table describes the significant fields shown in the display.

Table 22: show cef ipv4 interface Command Field Descriptions

Field	Description
HundredGigE 0/RSP0/CPU0/0 is up	Status of the interface.
if_handle	Internal interface handle.
Forwarding is enabled	Indicates that Cisco Express Forwarding (CEF) is enabled.
ICMP redirects are always sent or never sent	Indicates whether ICMP[4] redirect messages should be sent. By default, ICMP redirect messages are always sent.
IP MTU	Value of the IPv4 MTU[5] size set on the interface.
Reference count	Internal reference counter.

[4] ICMP = internet control message protocol
[5] MTU = maximum transmission unit

show cef ipv4 resource

To display the IPv4 nonrecursive prefix entries in the IPv4 Cisco Express Forwarding (CEF) table, use the **show cef ipv4 resource** command in XR EXEC mode.

show cef ipv4 resource [**detail**] [**location** *node-id*]

Syntax Description

detail	(Optional) Displays detailed information resources listed in the IPv4 CEF table.
location *node-id*	(Optional) Displays the IPv4 resource entries in the IPv4 CEF table for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, the output displays the IPv4 CEF nonrecursive routes for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show cef ipv4 resource** command:

```
RP/0/RP0/CPU0:router# show cef ipv4 resource detail

CEF resource availability summary state: GREEN
  ipv4 shared memory resource:
        CurrMode GREEN, CurrUtil 0%
        CurrAvail 1874526208 bytes, MaxAvail 1875693568 bytes
  ipv6 shared memory resource:
        CurrMode GREEN, CurrUtil 0%
        CurrAvail 1874591744 bytes, MaxAvail 1875365888 bytes
  mpls shared memory resource:
        CurrMode GREEN, CurrUtil 0%
        CurrAvail 1874407424 bytes, MaxAvail 1875038208 bytes
  common shared memory resource:
        CurrMode GREEN, CurrUtil 0%
        CurrAvail 1873215488 bytes, MaxAvail 1874972672 bytes
  TABLE hardware resource: GREEN
  LEAF hardware resource: GREEN
  LOADINFO hardware resource: GREEN
  NHINFO hardware resource: GREEN
  LABEL_INFO hardware resource: GREEN
  IDB hardware resource: GREEN
  FRR_NHINFO hardware resource: GREEN
  LDSH_ARRAY hardware resource: GREEN
  RSRC_MON hardware resource: GREEN
```

show cef ipv4 summary

To display a summary of the IPv4 Cisco Express Forwarding (CEF) table, use the **show cef ipv4 summary** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv4 summary** [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
location *node-id*	(Optional) Displays a summary of the IPv4 CEF table for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays a summary of the IPv4 CEF table for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef ipv4 summary** command:

```
RP/0/RP0/CPU0:router# show cef ipv4 summary
Router ID is
10
0
.0.0.0

IP CEF with switching (Table Version 0)

  Load balancing: L3
  Tableid 0xe0000000, Vrfid 0x60000000, Vrid 0x20000000, Flags 0x301
  Vrfname default, Refcount 367
  193 routes, 0 reresolve, 0 unresolved (0 old, 0 new), 13896 bytes
  204 load sharing elements, 51904 bytes, 154 references
  17 shared load sharing elements, 5536 bytes
  187 exclusive load sharing elements, 46368 bytes
  0 CEF route update drops, 175 revisions of existing leaves
  Resolution Timer: 15s
  0 prefixes modified in place
```

```
  0 deleted stale prefixes
  16 prefixes with label imposition, 51 prefixes with label information
Adjacency Table has 44 adjacencies
  1 incomplete adjacency
```

This table describes the significant fields shown in the display.

Table 23: show cef ipv4 summary Command Field Descriptions

Field	Description
Load balancing	Current load-balancing mode. The default value is L3.
Table Version	Version of the CEF table.
tableid	Table identification number.
vrfid	VPN routing and forwarding (VRF) identification (vrfid) number.
vrfname	VRF name.
vrid	Virtual router identification (vrid) number.
flags	Option value for the table
routes	Total number of routes.
reresolve	Total number of routes being reresolved.
unresolved (*x* old, *x* new)	Number of routes not yet resolved.
load sharing elements	Total number of internal load-sharing data structures.
bytes	Total memory used by internal load sharing data structures.
references	Total reference count of all internal load sharing data structures.
CEF resets	Number of CEF table resets.
revisions of existing leaves	Number of updates to existing prefixes.
Exponential (currently *x*s, peak *x*s)	Currently not used.
prefixes modified in place	Prefixes modified in place.
Adjacency Table has *x* adjacencies	Total number of adjacencies.
x incomplete adjacency	Total number of incomplete adjacencies.

show cef ipv4 unresolved

To display unresolved routes in the IPv4 Cisco Express Forwarding (CEF) table, use the **show cef ipv4 unresolved** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv4 unresolved** [**detail**] [**hardware** {**egress**}] [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
detail	(Optional) Displays detailed information unresolved routes listed in the IPv4 CEF table.
hardware	(Optional) Displays detailed information about hardware.
egress	(Optional) Displays egress packet switch exchange (PSE).
location *node-id*	(Optional) Displays the unresolved routes in the IPv4 CEF table for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, the output displays the unresolved routes for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show cef ipv4 unresolved** command when an unresolved route is detected:

```
RP/0/RP0/CPU0:router# show cef ipv4 unresolved

Prefix              Next Hop            Interface
10.3.3.3              102.2.2.2               ?
```

This table describes the significant fields shown in the display.

Table 24: show cef ipv4 unresolved Command Field Descriptions

Field	Description
Prefix	Prefix of the unresolved CEF.
Next Hop	Next hop of the unresolved CEF.

Field	Description
Interface	Next hop interface. A question mark (?) indicates that the interface has not been resolved.

show cef ipv6

To display the IPv6 Cisco Express Forwarding (CEF) table, use the **show cef ipv6** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv6** [*interface-type interface-number* | *ipv6-prefix/ prefix-length*] [**detail**] [**location***node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
interface-type interface-number	(Optional) IPv6 prefixes going through the specified next hop interface.
ipv6-prefix/prefix-length	(Optional) Longest prefix entry in the CEF table matching the specified IPv6 prefix and prefix length.
detail	(Optional) Displays detailed IPv6 CEF table information.
location *node-id*	(Optional) Displays the IPv6 CEF table for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays the IPv6 CEF table for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef ipv6** command:

```
RP/0/RP0/CPU0:router# show cef ipv6
```

```
::/0
drop default handler
fe80::/10
receive
ff02::/16
receive
ff02::2/128
receive
ff02::1:ff00:0/104
receive
ff05::/16
receive
ff12::/16
receive
```

This table describes the significant fields shown in the display.

Table 25: show cef ipv6 Command Field Descriptions

Field	Description
drop	Indicates that packets sent to the destination prefix are dropped.
loopback	Indicates that the prefix points to a loopback address. Packets sent to loopback addresses are dropped.
receive	Indicates that the prefix is configured on one of the router interfaces. Packets sent to those prefixes are received by the router.
connected	Indicates that the prefix points to a directly connected next-hop interface.
recursive	Indicates that the prefix is not directly connected but is reachable through the next-hop prefix displayed.

The following sample output is from the **show cef ipv6** with the **detail** keyword:

```
RP/0/RP0/CPU0:router# show cef ipv6 detail


::/0, version 0, proxy default, default route handler, drop adjacency, internal 0x1001011
0x0 (ptr 0x8d7d52dc) [1], 0x0 (0x8db46098), 0x0 (0x0)
Updated Nov 22 22:57:58.580
Prefix Len 0, traffic index 0, precedence n/a, priority 15
via ::/128, 3 dependencies, weight 0, class 0 [flags 0x0]
path-idx 0 NHID 0x0 [0x8cf1c218 0x0]
next hop ::/128
drop adjacency
::ffff:90.0.0.1/128, version 14, attached, receive
Updated Nov 25 15:28:03.320
Prefix Len 128
internal 0x1004141 (ptr 0x8d7d48b4) [1], 0x0 (0x8db462c8), 0x0 (0x0)
fe80::/10, version 0, receive
Updated Nov 22 22:57:58.611
Prefix Len 10
internal 0x1004001 (ptr 0x8d7d4cc4) [1], 0x0 (0x8db461e8), 0x0 (0x0)
ff02::/16, version 0, receive
Updated Nov 22 22:57:58.611
Prefix Len 16
internal 0x1004001 (ptr 0x8d7d4f14) [1], 0x0 (0x8db46140), 0x0 (0x0)
```

```
ff02::2/128, version 0, receive
Updated Nov 22 22:57:58.611
Prefix Len 128
internal 0x1004001 (ptr 0x8d7d4fe4) [1], 0x0 (0x8db46108), 0x0 (0x0)
ff02::1:ff00:0/104, version 0, receive
Updated Nov 22 22:57:58.601
Prefix Len 104
internal 0x1004001 (ptr 0x8d7d520c) [1], 0x0 (0x8db460d0), 0x0 (0x0)
ff05::/16, version 0, receive
Updated Nov 22 22:57:58.607
Prefix Len 16
internal 0x1004001 (ptr 0x8d7d513c) [1], 0x0 (0x8db461b0), 0x0 (0x0)
ff12::/16, version 0, receive
Updated Nov 22 22:57:58.607
Prefix Len 16
internal 0x1004001 (ptr 0x8d7d4d94) [1], 0x0 (0x8db46178), 0x0 (0x0)
```

This table describes the significant output fields shown in the display.

Table 26: show cef ipv6 detail Command Field Descriptions

Field	Description
flags:	Properties of the indicated prefix.
Loadinfo owner:	Owner of the Loadinfo used by the prefix for forwarding. The Loadinfo owner is the prefix that owns the array of pointers to adjacencies.
fast adj:	Cached adjacency used for forwarding.
path 1:	The following three items are displayed below path 1: • flags–Properties of the path. • next hop–Next-hop prefix if the packet is being forwarded. • interface–Next-hop interface if the packet is being forwarded.

show cef ipv6 adjacency

To display Cisco Express Forwarding (CEF) IPv6 adjacency status and configuration information, use the **show cef ipv6 adjacency** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv6 adjacency** [*interface-type interface-path-id*] [**location** *node-id*] [**detail**] [**discard**] [**glean**] [**null**] [**punt**] [**remote**]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
interface-type	(Optional) Interface type. For more information, use the question mark (?) online help function.

interface- path-id	(Optional) Either a physical interface instance or a virtual interface instance: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash mark between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0 /CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
detail	(Optional) Displays the detailed adjacency information.
discard	(Optional) Filters out and displays only the discarded adjacency information.
glean	(Optional) Filters out and displays only the glean adjacency information.
null	(Optional) Filters out and displays only the null adjacency information.
punt	(Optional) Filters out and displays only the punt adjacency information.
remote	(Optional) Filters out and displays only the remote adjacency information.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays the CEF adjacency table for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef ipv6 adjacency** command:

```
RP/0/RP0/CPU0:router# show cef ipv6 adjacency

Hu0/4/0/6                                                    special 2
             Interface: Hu0/4/0/6 Type:  glean
             Interface Type: 0x0, Base Flags: 0x220 (0x8cf24d98)
             Nhinfo PT: 0x8cf24d98, Idb PT: 0x8cb39da0, If Handle: 0x2000198
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 20 22:29:18.442


Hu0/4/0/6    Prefix: 10:0:18::2/128                          local   6
             no next-hop adj
             Interface: NULLIFHNDL
             NHID: 0x0
             Mac-length is 0
             incomplete
             Interface Type: 0x0, Base Flags: 0x8 (0x8d318778)
             Nhinfo PT: 0x8d318778, Idb PT: 0x8cb39da0, If Handle: 0x2000198
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 20 22:29:18.446


Hu0/4/0/25                                                   special 2
             Interface: Hu0/4/0/25 Type:  glean
             Interface Type: 0x0, Base Flags: 0x220 (0x8cf24d18)
             Nhinfo PT: 0x8cf24d18, Idb PT: 0x8cb39420, If Handle: 0x2000230
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 20 22:29:09.986


Hu0/4/0/25   Prefix: fe80::e407:2bff:fe8d:3418/128           local   3
             Adjacency: PT:0x8d568048 fe80::e407:2bff:fe8d:3418/128
             Interface: Hu0/4/0/25
             NHID: 0x0
             MAC: e6.07.2b.8d.34.18.e6.48.5c.10.b2.a4.86.dd
             Interface Type: 0x0, Base Flags: 0x1 (0x8d318558)
             Nhinfo PT: 0x8d318558, Idb PT: 0x8cb39420, If Handle: 0x2000230
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 20 22:29:15.089
```

This is a sample output from the **show cef ipv6 adjacency remote detail** command:

```
RP/0/RP0/CPU0:router# show cef ipv6 adjacency remote detail location 0/RP0/CPU0

Display protocol is ipv6
Interface    Address                                         Type    Refcount

Te0/2/0/3    Ifhandle: 0x8000240                             remote  2
```

```
                Adjacency: PT:0xa1bed9e4
                Interface: Te0/2/0/3
                Interface Type: 0x0, Base Flags: 0x0 (0xa55f3114)
                Nhinfo PT: 0xa55f3114, Idb PT: 0xa2d850d8, If Handle: 0x8000240
                Ancestor If Handle: 0x0


tt103           Ifhandle: 0x120                                 remote  1
                no next-hop adj
                Interface: NULLIFHNDL
                tunnel adjacency
                Interface Type: 0x24, Base Flags: 0x200 (0xa61ddc30)
                Nhinfo PT: 0xa61ddc30, Idb PT: 0xa2d851d8, If Handle: 0x120
                Ancestor If Handle: 0x0


tt2993          Ifhandle: 0xf9a0                                remote  1
                no next-hop adj
                Interface: NULLIFHNDL
                tunnel adjacency
                Interface Type: 0x24, Base Flags: 0x200 (0xa65634f0)
                Nhinfo PT: 0xa65634f0, Idb PT: 0xa2d94a58, If Handle: 0xf9a0
                Ancestor If Handle: 0x0


tt2994          Ifhandle: 0xf9e0                                remote  1
                no next-hop adj
                Interface: NULLIFHNDL
                tunnel adjacency
                Interface Type: 0x24, Base Flags: 0x200 (0xa65641e0)
                Nhinfo PT: 0xa65641e0, Idb PT: 0xa2d94a98, If Handle: 0xf9e0
                Ancestor If Handle: 0x0


tt2995          Ifhandle: 0xfa20                                remote  1
                no next-hop adj
                Interface: NULLIFHNDL
                tunnel adjacency
                Interface Type: 0x24, Base Flags: 0x200 (0xa6564350)
                Nhinfo PT: 0xa6564350, Idb PT: 0xa2d94ad8, If Handle: 0xfa20
                Ancestor If Handle: 0x0
```

show cef ipv6 adjacency hardware

To display Cisco Express Forwarding (CEF) IPv6 adjacency hardware status and configuration information, use the **show cef ipv6 adjacency hardware** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv6 adjacency hardware** {**egress**} [{**detail** | **discard** | **drop** | **glean** | **location** *node-id* | **null** | **punt** | **remote**}]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
egress	Displays information from the egress packet switch exchange (PSE) file.
detail	(Optional) Displays full details.

discard	(Optional) Displays the discard adjacency information.
drop	(Optional) Displays the drop adjacency information.
glean	(Optional) Displays the glean adjacency information.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
null	(Optional) Displays the null adjacency information.
punt	(Optional) Displays the punt adjacency information.
remote	(Optional) Displays the remote adjacency information.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef ipv6 adjacency hardware** command:

```
RP/0/RP0/CPU0:router#  sh cef ipv6 adjacency hardware egress location 0/6/CPU

Display protocol is ipv6
Interface    Address                                          Type    Refcount

Te0/2/0/24/0                                                  special 2
             Interface: Te0/2/0/24/0 Type:  glean
             Interface Type: 0x0, Base Flags: 0x220 (0x877c4280)
             Nhinfo PT: 0x877c4280, Idb PT: 0x87414620, If Handle: 0x10002c0
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 20 22:29:31.635


        SP-NHINFO:
            PD: 0x877c42f8, Trap Port: 0x16033036, Trap handle: (nil), npu_mask: 3f



Te0/2/0/24/0 Prefix: 10:0:8::2/128                            local   3
             Adjacency: PT:0x86ca5ba0 10:0:8::2/128
```

```
             Interface: Te0/2/0/24/0
             NHID: 0x0
             MAC: 10.f3.11.4c.71.9c.e6.48.5c.10.b1.80.86.dd
             Interface Type: 0x0, Base Flags: 0x1 (0x8adc4920)
             Nhinfo PT: 0x8adc4920, Idb PT: 0x87414620, If Handle: 0x10002c0
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 20 22:29:45.496


        TX-NHINFO:
            PD: 0x8adc4998 Encap hdl: 0x8ae01008 Encap id: 0x4003f008 Remote: 64
            L3 int: 0 npu_mask: 0



Te0/2/0/24/0 Prefix: fe80::12f3:11ff:fe4c:719c/128           local   5
             Adjacency: PT:0x86ca64e0 fe80::12f3:11ff:fe4c:719c/128
             Interface: Te0/2/0/24/0
             NHID: 0x0
             MAC: 10.f3.11.4c.71.9c.e6.48.5c.10.b1.80.86.dd
             Interface Type: 0x0, Base Flags: 0x1 (0x8adc4c80)
             Nhinfo PT: 0x8adc4c80, Idb PT: 0x87414620, If Handle: 0x10002c0
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 20 22:29:49.590

RP/0/RP0/CPU0:fretta-54#sh cef ipv4 hardware
                           ^
% Invalid input detected at '^' marker.
RP/0/RP0/CPU0:fretta-54#sh cef ipv4 hardware egress ?
  detail    Display full information
  flags     Interpret any flags in the output(cisco-support)
  internal  internal information
  location  specify a node name
  |         Output Modifiers
```

show cef ipv6 drops

To display IPv6 Cisco Express Forwarding (CEF) table packet drop counters, use the **show cef ipv6 drops** command in XR EXEC mode.

show cef [**vrf** *vrf-name*]**ipv6 drops** [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
location *node-id*	(Optional) Displays IPv6 CEF table packet drop counters for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

A packet might be dropped by the IPv6 CEF table because of unresolved CEF entries, unsupported features, absence of route information, absence of adjacency information, or an IP checksum error.

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays the packet drops for all nodes.

Note Because no hardware forwarding occurs on the route processor (RP), no packet drop information is displayed for that node.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show cef ipv6 drops** command:

```
RP/0/RP0/CPU0:router# show cef ipv6 drops location 0/RP0/CPU0

CEF Drop Statistics
Node: 0/RP0/CPU0
  Unresolved drops     packets :              0
  Unsupported drops    packets :              0
  Null0 drops          packets :              0
  No route drops       packets :              1
  No Adjacency drops   packets :              0
  Checksum error drops packets :              0
  RPF drops            packets :              0
  RPF suppressed drops packets :              0
  RP destined drops    packets :              0
  Discard drops        packets :              0
  GRE lookup drops     packets :              0
  GRE processing drops packets :              0
  LISP punt drops      packets :              0
  LISP encap err drops packets :              0
  LISP decap err drops packets :              0
```

Table 27: show cef ipv6 drops Command Field Descriptions

Field	Description
Unresolved drops	Drops due to unresolved routes.
Unsupported drops	Drops due to an unsupported feature.
Null0 drops	Drops to the Null0 interface.
No route drops	Number of packets dropped because there were no routes to the destination.

Field	Description
No Adjacency drops	Number of packets dropped because there were no adjacencies established.
Checksum error drops	Drops due to IPv6 checksum error.
RPF drops	Drops due to IPv6 unicast RPF[6].
RPF suppressed drops	Drops suppressed due to IPv6 unicast RPF.
RP destined drops	Drops destined for the router.
Discard drops	Drops those were discarded
GRE lookup drops	GRE packets dropped during GRE Lookup.
GRE processing drops	GRE packets dropped during GRE Processing.
LISP punt drops	LISP packets dropped during software processing of the packets.
LISP encap err drops	LISP encap packets dropped due to errors.
LISP decap err drops	LISP Decap packets dropped due to errors.

[6] RPF = Reverse Path Forwarding

show cef ipv6 exact-route

To display the path an IPv6 flow comprising a source and destination address would take, use the **show cef ipv6 exact-route** command in XR EXEC mode.

show cef [**vrf** *vrf-name*]**ipv6 exact-route**{*source-address destination-address* } [**protocol***protocol name*] [**source-port***source-port*] [**destination-port***destination-port*] [**ingress-interface***type interface-path-id*] [**policy-class** *value*] [**detail | location** *node-id]*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
source-address	The IPv6 source address in x:x::x format.
destination-address	The IPv6 destination address in x:x::x format.
protocol *protocol name*	(Optional) Displays the specified protocol for the route.
source-port *source-port*	(Optional) Sets the UDP source port. The range is from 0 to 65535.

destination-port *destination-port*	(Optional) Sets the UDP destination port. The range is from 0 to 65535.
ingress-interface	(Optional) Sets the ingress interface.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
policy-class *value*	(Optional) Displays the class for the policy-based tunnel selection. The range for the tunnel policy class value is from 1 to 7.
detail	(Optional) Displays full CEF entry information.
location *node-id*	(Optional) Displays the IPv6 CEF table for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If the Layer 4 information is enabled, the source-port, destination-port, protocol, and ingress-interface fields are required. Otherwise, the output of the **show cef ipv6 exact-route** command is not correct.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef ipv6 exact-route** command:

```
RP/0/RP0/CPU0:router# show cef ipv6 exact-route 222::2 9999::6751 location

0/RP0/CPU0 source address: 222::2 destination address: 9999::6751
interface : HundredGigE 0/3/0/3 non local interface
```

show cef ipv6 exceptions

To display IPv6 Cisco Express Forwarding (CEF) exception packet counters, use the **show cef ipv6 exceptions** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv6 exceptions** [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
location *node-id*	(Optional) Displays IPv6 CEF exception packet counters for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

CEF exception packets are those packets that have been sent from the hardware to the software because they require additional handling. The types of IPv6 CEF exception packets are displayed in the output of **show cef ipv6 exceptions**.

If you do not specify a node with **location** keyword and *node-id* argument, this command displays IPv6 CEF exception packet counters for all nodes.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show cef ipv6 exceptions** command:

```
RP/0/RP0/CPU0:router# show cef ipv6 exceptions location 0/RP0/CPU0

CEF Exception Statistics
Node: 0/RP0/CPU0
  Slow encap  packets :              0
  Unsupported packets :              0
  Redirect    packets :              0
  Receive     packets :              1
  Broadcast   packets :              0
  IP options  packets :              0
  TTL expired packets :              0
  Fragmented  packets :              0
```

This table describes the significant fields shown in the display.

Table 28: show cef ipv6 exceptions Command Field Descriptions

Field	Description
TTL err	Packets sent to software for processing because the packet header of the IPv6 prefix had a TTL[7] error.
Link-local dst addr	Packets sent to the software for processing because the destination address of the IPv6 prefix is link local.
Hop-by-Hop header	Packets sent to the software for processing because the IPv6 packet has a hop-by-hop header.
PLU entry set to punt	Packets sent to software for processing because the IPv6 prefix is set to punt.
Packet too big	Packets sent to the software for processing because the packet size exceeded the MTU[8].
Med priority punt	Field used internally for troubleshooting.

[7] TTL = time to live
[8] MTU = maximum transmission unit

show cef ipv6 hardware

To display Cisco Express Forwarding (CEF) IPv6 hardware status and configuration information, use the **show cef ipv6 hardware** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv6 hardware** {**egress** | [{**detail** | **location** *node-id*}]}

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
egress	Displays information from the egress packet switch exchange (PSE) file.
detail	(Optional) Displays full details.

location	*node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output displays the full details from the **show cef ipv6 hardware** command:

```
RP/0/RP0/CPU0:router# show cef ipv6 hardware egress detail

::/0, version 0, proxy default, default route handler, drop adjacency, internal 0x1001011
0x0 (ptr 0x8d7d52dc) [1], 0x0 (0x8db46098), 0x0 (0x0)
Updated Nov 22 22:57:58.578
Prefix Len 0, traffic index 0, precedence n/a, priority 15
gateway array (0x8d87a098) reference count 1, flags 0x200, source default (12), 0 backups
[2 type 3 flags 0xa401 (0x8d9cf098) ext 0x0 (0x0)]
LW-LDI[type=3, refc=1, ptr=0x8db46098, sh-ldi=0x8d9cf098]
gateway array update type-time 1 Nov 22 22:57:58.578
LDI Update time Nov 22 22:57:58.595
LW-LDI-TS Nov 22 22:57:58.595
via ::/128, 3 dependencies, weight 0, class 0 [flags 0x0]
path-idx 0 NHID 0x0 [0x8cf1c218 0x0]
next hop ::/128
drop adjacency


Load distribution: 0 (refcount 2)

Hash OK Interface Address
0 Y Unknown drop
::ffff:90.0.0.1/128, version 14, attached, receive
Updated Nov 25 15:28:03.318
Prefix Len 128
internal 0x1004141 (ptr 0x8d7d48b4) [1], 0x0 (0x8db462c8), 0x0 (0x0)
fe80::/10, version 0, receive
Updated Nov 22 22:57:58.608
Prefix Len 10
internal 0x1004001 (ptr 0x8d7d4cc4) [1], 0x0 (0x8db461e8), 0x0 (0x0)
ff02::/16, version 0, receive
Updated Nov 22 22:57:58.609
Prefix Len 16
```

```
internal 0x1004001 (ptr 0x8d7d4f14) [1], 0x0 (0x8db46140), 0x0 (0x0)
```

show cef ipv6 interface

To display IPv6 Cisco Express Forwarding (CEF)-related information for an interface, use the **show cef ipv6 interface** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv6 interface** *type interface-path-id* [**detail**] [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
detail	(Optional) Displays detailed CEF information for all the interfaces on the node in which the command is issued.
location *node-id*	(Optional) Displays IPv4 CEF-related information for an interface. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, the **show cef ipv6 interface** command displays the CEF-related information for the interface on the route processor.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef ipv6 interface** command:

```
RP/0/RP0/CPU0:router# show cef ipv6 interface

fib_show_interface
created item name: 1000/protocol/1/vrf/default/interface-info/1/
HundredGigE0/4/0/1 is down if_handle 0x02000170 if_type UNKNOWN caps 0(0x0)
     idb info 0x8cb3a020 flags 0x8001 ext 0x0
     Vrf Local Info (0x0)
  Interface last modified Dec 20, 2015 22:28:52, create
  Reference count 1       Next-Hop Count 0
  Protocol Reference count 0
  Protocol ipv6 not configured or enabled on this card
  Primary IPV6 local address NOT PRESENT
HundredGigE0/4/0/2 is down if_handle 0x02000178 if_type UNKNOWN caps 0(0x0)
     idb info 0x8cb39fa0 flags 0x8001 ext 0x0
     Vrf Local Info (0x0)
  Interface last modified Dec 20, 2015 22:28:52, create
  Reference count 1       Next-Hop Count 0
  Protocol Reference count 0
  Protocol ipv6 not configured or enabled on this card
  Primary IPV6 local address NOT PRESENT
HundredGigE0/4/0/3 is down if_handle 0x02000180 if_type UNKNOWN caps 0(0x0)
     idb info 0x8cb39f20 flags 0x8001 ext 0x0
     Vrf Local Info (0x0)
  Interface last modified Dec 20, 2015 22:28:52, create
  Reference count 1       Next-Hop Count 0
  Protocol Reference count 0
  Protocol ipv6 not configured or enabled on this card
  Primary IPV6 local address NOT PRESENT
HundredGigE0/4/0/4 is down if_handle 0x02000188 if_type UNKNOWN caps 0(0x0)
     idb info 0x8cb39ea0 flags 0x8001 ext 0x0
     Vrf Local Info (0x0)
  Interface last modified Dec 20, 2015 22:28:52, create
  Reference count 1       Next-Hop Count 0
  Protocol Reference count 0
  Protocol ipv6 not configured or enabled on this card
  Primary IPV6 local address NOT PRESENT
HundredGigE0/4/0/5 is down if_handle 0x02000190 if_type UNKNOWN caps 0(0x0)
     idb info 0x8cb39e20 flags 0x8001 ext 0x0
     Vrf Local Info (0x0)
  Interface last modified Dec 20, 2015 22:28:52, create
  Reference count 1       Next-Hop Count 0
  Protocol Reference count 0
  Protocol ipv6 not configured or enabled on this card
  Primary IPV6 local address NOT PRESENT
HundredGigE0/4/0/6 is up if_handle 0x02000198 if_type UNKNOWN caps 0(0x0)
     idb info 0x8cb39da0 flags 0x8001 ext 0x8de7fd98 flags 0x0
     Vrf Local Info (0x8df2e100)
  Interface last modified Dec 20, 2015 22:28:52, create
  Reference count 1       Next-Hop Count 2
  Protocol Reference count 1
  Protocol ipv6 not configured or enabled on this card
  Primary IPV6 local address 10:0:18::1/128
```

show cef ipv6 resource

To display the IPv6 nonrecursive prefix entries in the IPv6 Cisco Express Forwarding (CEF) table, use the **show cef ipv6 resource** command in XR EXEC mode.

show cef ipv6 resource [**detail**] [**location** *node-id*]

Syntax Description

detail	(Optional) Displays detailed information resources listed in the IPv6 CEF table.
location *node-id*	(Optional) Displays the IPv6 resource entries in the IPv6 CEF table for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, the output displays the IPv6 CEF nonrecursive routes for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show cef ipv6 resource** command:

```
RP/0/RP0/CPU0:router# show cef ipv6 resource

CEF resource availability summary state: GREEN
  ipv4 shared memory resource: GREEN
  ipv6 shared memory resource: GREEN
  mpls shared memory resource: GREEN
  common shared memory resource: GREEN
  TABLE hardware resource: GREEN
  LEAF hardware resource: GREEN
  LOADINFO hardware resource: GREEN
  NHINFO hardware resource: GREEN
  LABEL_INFO hardware resource: GREEN
  IDB hardware resource: GREEN
  FRR_NHINFO hardware resource: GREEN
  LDSH_ARRAY hardware resource: GREEN
  RSRC_MON hardware resource: GREEN
```

show cef ipv6 summary

To display a summary of the IPv6 Cisco Express Forwarding (CEF) table, use the **show cef ipv6 summary** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv6 summary** [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
location *node-id*	(Optional) Displays a summary of the IPv6 CEF table for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays a summary of the IPv6 CEF table for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

The following is sample output from the **show cef ipv6 summary** command:

```
RP/0/RP0/CPU0:router# show cef ipv6 summary

IP CEF with switching (Table Version 0)

  Load balancing: L3
  Tableid 0xe0800000, Vrfid 0x60000000, Vrid 0x20000000, Flags 0x301
  Vrfname default, Refcount 12
  4 routes, 0 reresolve, 0 unresolved (0 old, 0 new), 288 bytes
  0 load sharing elements, 0 bytes, 0 references
  0 shared load sharing elements, 0 bytes
  0 exclusive load sharing elements, 0 bytes
  0 CEF route update drops, 0 revisions of existing leaves
  Resolution Timer: 15s
  0 prefixes modified in place
  0 deleted stale prefixes
  0 prefixes with label imposition, 0 prefixes with label information
Adjacency Table has 44 adjacencies
  1 incomplete adjacency
```

This table describes the significant fields shown in the display.

Table 29: show cef ipv6 summary Command Field Descriptions

Field	Description
Load balancing	Current load-balancing mode. The default value is L3.
Table Version	Version of the CEF table.

Field	Description
routes	Total number of routes.
unresolved (*x* old, *x* new)	Number of routes not yet resolved.
load sharing elements	Total number of internal load-sharing data structures.
bytes	Total memory used by internal load sharing data structures.
references	Total reference count of all internal load sharing data structures.
CEF resets	Number of CEF table resets.
revisions of existing leaves	Number of updates to existing prefixes.
Exponential (currently *x*s, peak *x*s)	Currently not used.
prefixes modified in place	Prefixes modified in place.
Router ID	Router identification.
Adjacency Table has *x* adjacencies	Total number of adjacencies.
x incomplete adjacency	Total number of incomplete adjacencies.

show cef ipv6 unresolved

To display the unresolved routes in the IPv6 Cisco Express Forwarding (CEF) table, use the **show cef ipv6 unresolved** command in XR EXEC mode.

show cef [**vrf** *vrf-name*] **ipv6 unresolved** [**detail**] [**hardware** {**egress**}] [**location** *node-id*]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
detail	(Optional) Displays full details.
hardware	(Optional) Displays Cisco Express Forwarding (CEF) IPv6 hardware status and configuration information.
egress	Displays information from the egress packet switch exchange (PSE) file.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, this command displays the unresolved routes for the node on which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

This following is sample output from **show cef ipv6 unresolved** command when an unresolved route is detected:

```
RP/0/RP0/CPU0:router# show cef ipv6 unresolved

9999::/64
  unresolved
```

This table describes the significant fields shown in the display.

Table 30: show cef ipv6 unresolved Command Field Descriptions

Field	Description
xxxx::/*xx*	Detected unresolved route.

show cef mpls adjacency

To display the Multiprotocol Label Switching (MPLS) adjacency table, use the **show cef mpls adjacency** command in XR EXEC mode.

show cef mpls adjacency [*interface-type interface-path-id*] [{**detail** | **discard** | **drop** | **glean** | **null** | **punt** | **remote**}] [**location** *node-id*]

Syntax Description

interface-type	(Optional) Interface type. For more information, use the question mark (?) online help function.

interface- path-id	(Optional) Either a physical interface instance or a virtual interface instance: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash mark between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0 /CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
detail	(Optional) Displays full details.
discard	(Optional) Displays the discard adjacency information.
drop	(Optional) Displays the drop adjacency information.
glean	(Optional) Displays the glean adjacency information.
null	(Optional) Displays the null adjacency information.
punt	(Optional) Displays the punt adjacency information.
remote	(Optional) Displays the remote adjacency information.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, the **show cef mpls adjacency** command displays the MPLS adjacency table for the node in which the command is issued.

Task ID

Task ID	Operations
cef	read

Examples

This following is sample output from **show cef mpls adjacency** command:

```
RP/0/RP0/CPU0:router# sh cef mpls adjacency inter

Display protocol is mpls
Interface    Address                                        Type   Refcount

BE1906       Prefix: 10.0.86.1/32                           local   7
             Adjacency: PT:0x8cba28d0 10.0.86.1/32
             Interface: BE1906
             NHID: 0x0
             MAC: e6.48.5c.10.b4.8e.e6.07.2b.8d.34.88.88.47
             Interface Type: 0x1c, Base Flags: 0x1 (0x8d10f620)
             Nhinfo PT: 0x8d10f620, Idb PT: 0x8ca57320, If Handle:
0x8000174
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 21 03:56:49.977


BE1904       Prefix: 10.0.85.1/32                           local   7
             Adjacency: PT:0x8cba3c78 10.0.85.1/32
             Interface: BE1904
             NHID: 0x0
             MAC: e6.48.5c.10.b4.86.e6.07.2b.8d.34.89.88.47
             Interface Type: 0x1c, Base Flags: 0x1 (0x8d10f1a0)
             Nhinfo PT: 0x8d10f1a0, Idb PT: 0x8ca572a0, If Handle:
0x800016c
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 21 03:57:25.360
```

show cef mpls adjacency hardware

To display the Multiprotocol Label Switching (MPLS) adjacency hardware status and configuration information, use the **show cef mpls adjacency hardware** command in XR EXEC mode.

show cef mpls adjacency hardware {**egress**} [{**detail** | **discard** | **drop** | **glean** | **location** *node-id* | **null** | **punt** | **remote**}]

Syntax Description

egress	Displays information from the egress packet switch exchange (PSE) file.
detail	(Optional) Displays full details.
discard	(Optional) Displays the discard adjacency information.
drop	(Optional) Displays the drop adjacency information.

glean	(Optional) Displays the glean adjacency information.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
null	(Optional) Displays the null adjacency information.
punt	(Optional) Displays the punt adjacency information.
remote	(Optional) Displays the remote adjacency information.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
cef	read

Examples

This following is sample output from **show cef mpls adjacency hardware** command:

```
RP/0/RP0/CPU0:router# sh cef mpls adjacency inter

Display protocol is mpls
Interface    Address                                          Type   Refcount

BE1906       Prefix: 10.0.86.1/32                             local   7
             Adjacency: PT:0x8cba28d0 10.0.86.1/32
             Interface: BE1906
             NHID: 0x0
             MAC: e6.48.5c.10.b4.8e.e6.07.2b.8d.34.88.88.47
             Interface Type: 0x1c, Base Flags: 0x1 (0x8d10f620)
             Nhinfo PT: 0x8d10f620, Idb PT: 0x8ca57320, If Handle:
0x8000174
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 21 03:56:49.977


BE1904       Prefix: 10.0.85.1/32                             local   7
             Adjacency: PT:0x8cba3c78 10.0.85.1/32
             Interface: BE1904
             NHID: 0x0
             MAC: e6.48.5c.10.b4.86.e6.07.2b.8d.34.89.88.47
             Interface Type: 0x1c, Base Flags: 0x1 (0x8d10f1a0)
             Nhinfo PT: 0x8d10f1a0, Idb PT: 0x8ca572a0, If Handle:
0x800016c
```

```
no dependent adj
             Ancestor If Handle: 0x0
 Update time Dec 21 03:57:25.360
```

show cef mpls drops

To display Multiprotocol Label Switching (MPLS) drop counters for packets that belong to a segment routing (SR) network, use the **show cef mpls drops** command in XR EXEC mode.

show cef mpls drops [**location** {*node-id* | **all**}]

Syntax Description

location *node-id*	(Optional) Displays detailed Cisco Express Forwarding (CEF) information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
all	(Optional) Displays all locations.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.5.1	This command was introduced.

Usage Guidelines

Use this command to display the SR MPLS drop counters.

The incoming top MPLS label is inspected. If the label belongs to the Segment Routing Local Block (SRLB) or the Segment Routing Global Block (SRGB), an MPLS SR drop counter is incremented for unknown label value.

Note The NCS 5500 routerNCS 540 router does not support the TTL expiry counter. The `SR MPLS TTL expired packets` counter is always 0.

Note The drop counters will increment for manually allocated adjacency SIDs and prefix SIDs only. They will not increment for dynamically allocated adjacency SIDs.

Task ID

Task ID	Operation
cef	read

Example

This following is sample output from **show cef mpls drops** command:

```
RP/0/RP0/CPU0:router# show cef mpls drops location 0/0/CPU0
Sat Jun  9 03:49:27.100 IST
CEF Drop Statistics
Node: 0/0/CPU0
  SR MPLS unreachable packets :              100
  SR MPLS TTL expired packets :              0
```

show cef mpls interface

To display the Multiprotocol Label Switching (MPLS) Cisco Express Forwarding (CEF)-related information for an interface, use the **show cef mpls interface** command in XR EXEC mode.

show cef mpls interface *type interface-path-id* [**detail**] [**location** *node-id*]

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
in terface-path-id	Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/ RSP0 • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
detail	(Optional) Displays detailed CEF information for all the interfaces on the node in which the command is issued.
location *node-id*	(Optional) Displays IPv4 CEF-related information for an interface. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If you do not specify a node with the **location** keyword and *node-id* argument, the **show cef mpls interface** command displays the CEF-related information for the interface on the route processor.

Task ID

Task ID	Operations
cef	read

Examples

The following sample output is from the **show cef mpls interface** command:

```
RP/0/RP0/CPU0:router#  sh cef mpls interface hundredGigE 0/0/0/0

fib_show_interface
mpls_v6_item_name: 0/protocol/2/vrf/default/interface-info/1/130
HundredGigE0/0/0/0 is up if_handle 0x00000130 if_type IFT_HUNDREDGE(0x49)
     idb info 0x894d5c20 flags 0x8001 ext 0x89c545b8 flags 0x50
     Vrf Local Info (0x0)
  Interface last modified Dec 20, 2015 12:00:36, create
  Reference count 1       Next-Hop Count 2
  Forwarding is enabled
  Protocol MTU 1500, TableId 0(0x882b5098)
  Protocol Reference count 2
```

show cef mpls unresolved

To display the Multiprotocol Label Switching (MPLS) unresolved routes, use the **show cef mpls unresolved** command in XR EXEC mode.

show cef mpls unresolved [**detail**] [**location** *node-id*]

Syntax Description

detail	(Optional) Displays detailed adjacency information, including Layer 2 information.
location *node-id*	(Optional) Displays detailed CEF information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
cef	read

Examples

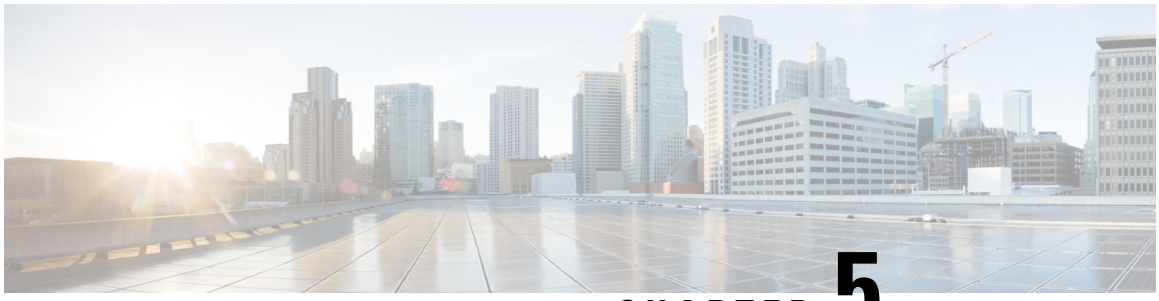
The following sample output is from the **show cef mpls unresolved** command:

```
RP/0/RP0/CPU0:router# show cef mpls unresolved

Label/EOS           Next Hop            Interface
20001/0
20001/1
```

This table describes the significant fields shown in the display.

Table 31: show cef mpls unresolved Command Field Descriptions

Field	Description
Label/EOS	MPLS forwarding label/End of Stack (EOS) bit.
Next Hop	Next hop of the prefix.
Interface	Interface associated with the prefix.



CHAPTER 5

Host Services and Applications Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This chapter describes the commands used to configure and monitor host services and applications, such as Domain Name System (DNS), Telnet, File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP), and Remote Copy Protocol (RCP).

For detailed information about host services and applications concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

cinetd rate-limit

To configure the rate limit at which service requests are accepted by Cisco inetd (Cinetd), use the **cinetd rate-limit** command in XR Config mode. To restore the default, use the **no** form of this command.

cinetd rate-limit *value*
no cinetd rate-limit *value*

Syntax Description

value	Number of service requests that are accepted per second. Range is 1 to 100. Default is 1.

Command Default One service request per second is accepted.

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines Any service request that exceeds the rate limit is rejected. The rate limit is applied to individual applications.

Task ID

Task ID	Operations
ip-services	read, write

Examples The following example shows the **cinetd rate-limit** being set to 10:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# cinetd rate-limit 10
```

clear host

To delete temporary entries from the hostname-to-address cache, use the **clear host** command in XR EXEC mode.

clear host {*host-name* | *****}

Syntax Description

host-name	Name of host to be deleted.
*	Specifies that all entries in the local cache be deleted.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines The dynamic host entries in the cache are cleared.

The temporary entries in the cache are cleared; the permanent entries that were entered with the domain ipv4 host, on page 262 or the domain ipv6 host, on page 263 command are not cleared.

By default, no static mapping is configured.

Task ID

Task ID	Operations
ip-services	execute

Examples

The following example shows how to clear all temporary entries from the hostname-and-address cache:

```
RP/0/RP0/CPU0:router# clear host *
```

domain ipv4 host

To define a static hostname-to-address mapping in the host cache using IPv4, use the **domain ipv4 host** command in XR Config mode. To remove the **domain ipv4 host** command from the configuration file and restore the system to its default condition, use the **no** form of this command.

domain ipv4 host *host-name v4address2.....v4address8*
no domain ipv4 host *host-name v4address1*

Syntax Description

host-name	Name of the host. The first character can be either a letter or a number.
v4address1	Associated IP address.
v4address2...v4address8	(Optional) Additional associated IP address. You can bind up to eight addresses to a hostname.

Command Default

No static mapping is configured.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The first character can be either a letter or a number. If you use a number, the operations you can perform (such as **ping**) are limited.

Task ID

Task ID	Operations
ip-services	read, write
basic-services	read, write

Examples

The following example shows how to define two IPv4 static mappings:

```
RP/0/RP0/CPU0:router(config)# domain ipv4 host host1 192.168.7.18
RP/0/RP0/CPU0:router(config)# domain ipv4 host bost2 10.2.0.2 192.168.7.33
```

domain ipv6 host

To define a static hostname-to-address mapping in the host cache using IPv6, use the **domain ipv6 host** command in XR Config mode. To remove the **domain ipv6 host** command from the configuration file and restore the system to its default condition, use the **no** form of this command.

domain ipv6 host *host-name v6address1 [v6address2 .....v6address4]*
no domain ipv6 host *host-name v6address1*

Syntax Description

host-name	Name of the host. The first character can be either a letter or a number.
v6address1	Associated IP address.
v6address2...v6address4	(Optional) Additional associated IP address. You can bind up to four addresses to a hostname.

Command Default

No static mapping is configured. IPv6 address prefixes are not enabled.

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The first character can be either a letter or a number. If you use a number, the operations you can perform (such as **ping**) are limited.

Task ID

Task ID	Operations
ip services	read, write

Examples

The following example shows how to define two IPv6 static mappings:

```
RP/0/RP0/CPU0:router(config)# domain ipv6 host host1 ff02::2
RP/0/RP0/CPU0:router(config)# domain ipv6 host host2 ff02::1
```

domain list

To define a list of default domain names to complete unqualified hostnames, use the **domain list** command in XR Config mode. To delete a name from a list, use the **no** form of this command.

domain list *domain-name*
no domain list *domain-name*

Syntax Description

domain-name	Domain name. Do not include the initial period that separates an unqualified name from the domain name.

Command Default

No domain names are defined.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If there is no domain list, the domain name that you specified with the domain name (IPAddr), on page 265 command is used to complete unqualified hostnames. If there is a domain list, the default domain name is not used. The **domain list** command is similar to the domain name (IPAddr), on page 265 command, except that you can use the **domain list** command to define a list of domains, each to be tried in turn.

Task ID

Task ID	Operations
ip-service	read, write

Examples

The following example shows how to add several domain names to a list:

```
RP/0/RP0/CPU0:router(config)# domain list domain1.com
RP/0/RP0/CPU0:router(config)# domain list domain2.edu
```

The following example shows how to add a name to and then delete a name from the list:

```
RP/0/RP0/CPU0:router(config)# domain list domain3.edu
RP/0/RP0/CPU0:router(config)# no domain list domain2.edu
```

domain lookup disable

To disable the IP Domain Name System (DNS)-based hostname-to-address translation, use the **domain lookup disable** command in XR Config mode. To remove the specified command from the configuration file and restore the system to its default condition, use the **no** form of this command.

domain lookup disable
no domain lookup disable

Syntax Description

This command has no keywords or arguments.

Command Default

The IP DNS-based host-to-address translation is enabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Using the **no** command removes the specified command from the configuration file and restores the system to its default condition. The **no** form of this command is not stored in the configuration file.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to enable the IP DNS-based hostname-to-address translation:

```
RP/0/RP0/CPU0:router(config)# domain lookup disable
```

domain name (IPAddr)

To define a default domain name that the software uses to complete unqualified hostnames, use the **domain name** command in the appropriate mode. To remove the name, use the **no** form of this command.

domain name *domain-name*
no domain name *domain-name*

Syntax Description

domain-name	Default domain name used to complete unqualified hostnames. Do not include the initial period that separates an unqualified name from the domain name.

Command Default

There is no default domain name.

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines If a hostname does not contain a domain name, then a dot and the domain name configured by the **domain name** command are appended to the hostname before it is added to the host table.

If no domain name is configured by the **domain name** command and the user provides only the hostname, then the request is not looked up.

Task ID

Task ID	Operations
ip-services	read, write

domain name-server

To specify the address of one or more name servers to use for name and address resolution, use the **domain name-server** command in XR Config mode. To remove the address specified, use the **no** form of this command.

domain name-server *server-address*
no domain name-server *server-address*

Syntax Description

server-address	IP address of a name server.

Command Default If no name server address is specified, the default name server is 255.255.255.255. IPv4 and IPv6 address prefixes are not enabled.

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines You can enter up to six addresses, but only one for each command.

If no name server address is specified, the default name server is 255.255.255.255 so that the DNS lookup can be broadcast to the local network segment. If a DNS server is in the local network, it replies. If not, there might be a server that knows how to forward the DNS request to the correct DNS server.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to specify host 192.168.1.111 as the primary name server and host 192.168.1.2 as the secondary server:

```
RP/0/RP0/CPU0:router(config)# domain name-server 192.168.1.111
RP/0/RP0/CPU0:router(config)# domain name-server 192.168.1.2
```

ftp client anonymous-password

To assign a password for anonymous users, use the **ftp client anonymous-password** command in XR Config mode. To remove the **ftp client anonymous-password** command from the configuration file and restore the system to its default condition, use the **no** form of this command.

ftp client anonymous-password *password*
no ftp client anonymous-password

Syntax Description

password	Password for the anonymous user.

Command Default

No default behavior or values

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **ftp client anonymous-password** command is File Transfer Protocol (FTP) server dependent.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to set the anonymous password to *xxxx*:

```
RP/0/RP0/CPU0:router(config)# ftp client anonymous-password xxxx
```

ftp client passive

To configure the software to use only passive File Transfer Protocol (FTP) connections, use the **ftp client passive** command in XR Config mode. To remove the **ftp client passive** command from the configuration file and restore the system to its default condition, use the **no** form of this command.

ftp client passive
no ftp client passive

Syntax Description This command has no keywords or arguments.

Command Default FTP data connections are active.

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines Using the **ftp client passive** command allows you to make only passive-mode FTP connections. To specify the source IP address for FTP connections, use the **ftp client source-interface** command.

Task ID

Task ID	Operations
ip-services	read, write

Examples The following example shows how to configure the networking device to use only passive FTP connections:

```
RP/0/RP0/CPU0:router(config)# ftp client passive

1d:3h:54:47: ftp_fs[16437]: FTP: verifying tuple passive (SET).
1d:3h:54:47: ftp_fs[16437]: FTP: applying tuple passive (SET).
1d:3h:54:47: ftp_fs[16437]: FTP: passive mode has been enabled.
```

ftp client password

To specify the password for the File Transfer Protocol (FTP) connections, use the **ftp client password** command in XR Config mode. To disable this feature, use the **no** form of this command.

ftp client password {*clear-text-password* | **clear** *clear-text password* | **encrypted** *encrypted-text password*}
no ftp client password {*clear-text-password* | **clear** *clear-text password* | **encrypted** *encrypted-text password*}

Syntax Description

clear-text-password	Specifies an unencrypted (cleartext) user password
clear *clear-text password*	Specifies an unencrypted (cleartext) shared password.
encrypted *encrypted-text password*	Specifies an encrypted shared password.

Command Default No default behavior or values

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ip-services	read, write

Examples The following example shows how to specify the password for the File Transfer Protocol (FTP) connections:

```
RP/0/RP0/CPU0:router(config)# ftp client password lab
```

ftp client source-interface

To specify the source IP address for File Transfer Protocol (FTP) connections, use the **ftp client source-interface** command in XR Config mode . To remove the **ftp client source-interface** command from the configuration file and restore the system to its default condition, use the **no** form of this command.

ftp client source-interface *type interface-path-id*
no ftp client source-interface *type interface-path-id*

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default The FTP source address is the IP address of the interface used by the FTP packets to leave the networking device.

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use this command to set the same source address for all FTP connections. To configure the software to use only passive FTP connections, use the **ftp client passive** command.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to configure the IP address associated with HundredGigEinterface 0/1/2/1 as the source address on all FTP packets, regardless of which interface is actually used to send the packet:

```
RP/0/RP0/CPU0:router(config)# ftp client source-interface HundredGigE0/1/2/1
```

ftp client username

To specify the username for File Transfer Protocol (FTP) connections, use the **ftp client username** command in XR Config mode. To disable this feature, use the **no** form of this command.

ftp client username *username*
no ftp client username *username*

Syntax Description

username	Name for FTP user.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to specify the username for FTP connections:

```
Router(config)# ftp client username fox
```

logging source-interface vrf

To configure the logging source interface in order to identify the syslog traffic that originates in a VRF from a particular router, as coming from a single device, use the **logging source-interface vrf** command in XR Config mode. To remove the source-interface logging configuration for the given VRF, use the **no** form of this command.

logging source-interface *interface* **vrf** *vrf-name*
no logging source-interface *interface* **vrf** *vrf-name*

Syntax Description

interface	Interface number of the source
vrf-name	Name that identifies the VRF

Command Default

If *vrf-name* is not specified, the source interface is configured for the default VRF.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Normally, a syslog message contains the IPv4 or IPv6 address of the interface used to exit the router. The **logging source-interface** command configures the syslog packets to contain the IPv4 or IPv6 address of a particular interface for a VRF, regardless of which interface the packet uses to exit the router.

Task ID

Task ID	Operation
logging	read, write

Example

This example shows how to configure interface loopback 0 to be the logging source interface for VRF vrf1.

```
RP/0/RP0/CPU0:router#logging source-interface loopback 0 vrf vrf1
RP/0/RP0/CPU0:router#logging source-interface loopback 1 vrf default
```

This sample output shows a logging source interface that is correctly configured for the VRF.

```
RP/0/RP0/CPU0:router#show running configuration logging
```

```
logging trap debugging
logging 223.255.254.249 vrf vrf1
logging 223.255.254.248 vrf default
logging source-interface Loopback0 vrf vrf1
logging source-interface Loopback1
```

ping (network)

To check host reachability and network connectivity on IP networks, use the **ping** command in XR EXEC mode.

ping [{**ipv4** | **ipv6**}] [{*host-nameip-address*}] [**count** *number*] [**size** *number*] [**source** {*ip-addressinterface-name* | **type** *number*}] [**timeout** *seconds*] [**pattern** *number*] [**type** *number*] [**priority** *number*][**verbose**] [**donnotfrag**] [**validate**] [**sweep**]

Syntax Description

ipv4	(Optional) Specifies IPv4 address prefixes.
A.B.C.D	Target end address of the pseudowire.
host-name	(Optional) Hostname of the system to ping.
ip-address	(Optional) IP address of the system to ping.
count *number*	(Optional) Sets the repeat count. Range is 0 to 2147483647.
size *number*	(Optional) Sets the datagram size. Range is 36 to 18024
source	(Optional) Identifies the source address or source interface.
type *number*	(Optional) Sets the type of service. Range is 0 to 255. Available when the **ipv4** keyword is specified.
timeout *seconds*	(Optional) Sets the timeout in seconds. Range is 0 to 3600.
priority *number*	(Optional) Sets the packet priority. Range is 0 to 15. Available when the **ipv6** keyword is specified.
pattern *number*	(Optional) Sets the data pattern. Range is 0 to 65535.
verbose	(Optional) Sets verbose output.
donnotfrag	(Optional) Sets the Don’t Fragment (DF) bit in the IP header.
validate	(Optional) Validates the return packet.
sweep	(Optional) Sets the sweep ping.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The default value for the **ping** command refers only to the target IP address. No default value is available for the target IP address.

The ping program sends an echo request packet to an address and then waits for a reply. Ping output can help you evaluate path-to-host reliability, delays over the path, and whether the host can be reached or is functioning.

Note The **ping** (EXEC) command is supported only on IP networks.

If you enter the command without specifying either a hostname or an IP address, the system prompts you to specify the target IP address and several other command parameters. After specifying the target IP address, you can specify alternate values for the remaining parameters or accept the displayed default for each parameter.

If the system cannot map an address for a hostname, it returns an "%Unrecognized host or address, or protocol not running" error message.

To abnormally terminate a ping session, enter the escape sequence, which is, by default, Ctrl-C. Simultaneously press and release the Ctrl and C keys.

This table describes the test characters sent by the ping facility.

Table 32: ping Test Characters

Character	Description
!	Each exclamation point indicates receipt of a reply.
.	Each period indicates that the network server timed out while waiting for a reply.
?	Unknown packet type.
U	A "destination unreachable" error protocol data unit (PDU) was received.
C	A "congestion experienced" packet was received.
M	Fragmentation is needed, but the "don't fragment" bit in the IP header is set. When this bit is set, the IP layer does not fragment the packet and returns an Internet Control Message Protocol (ICMP) error message to the source if the packet size is larger than the maximum transmission size. When this bit is not set, the IP layer fragments the packet to forward it to the next hop.
Q	A source quench packet was received.

Task ID

Task ID	Operations
basic-services	read, write, execute

Examples

Although the precise dialog varies somewhat between IPv4 and IPv6, all are similar to the ping session, using default values shown in the following output:

```
RP/0/RP0/CPU0:router# ping

Protocol [ipv4]:
Target IP address: 10.0.0.1
Repeat count [5]:
Datagram size [100]:
Timeout in seconds [2]:
Extended commands? [no]: yes
Source address or interface: 10.0.0.2
Type of service [0]:
Set DF bit in IP header? [no]:
Validate reply data? [no]: yes
Data pattern [0xABCD]:
Loose, Strict, Record, Timestamp, Verbose[none]:
Sweep range of sizes? [no]:
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.25.58.21, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/11/49 ms
```

If you enter a hostname or an address on the same line as the **ping** command, the command performs the default actions appropriate for the protocol type of that hostname or address, as shown in the following output:

```
RP/0/RP0/CPU0:router# ping server01

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.7.27, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/8/9 ms
```

ping bulk (network)

To check reachability and network connectivity to multiple hosts on IP networks, use the **ping bulk** command in XR EXEC mode.

ping bulk ipv4 [**input cli** [{**batch** | **inline**}]]
[**vrf** *vrf-name*] [{**ip-address** | **domain-name**}]

Syntax Description

ipv4	Specifies IPv4 address prefixes.
input	Specifies input mode.
cli	Specifies input via CLI.
batch	Pings after all destinations are input.
inline	Pings after each destination is input.

vrf *vrf-name ip-address domain-name*	(Optional) Specifies a particular VRF. IP address of the system to ping. (Optional) Domain name of the system to ping. **Note** You must hit the Enter button and then specify one destination address per line.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

You must hit the Enter button and then specify one destination address per line.

Maximum number of destinations you can specify in the cli or batch mode is 2000.

Task ID

Task ID	Operation
basic-services	read, write, execute

Example

The following example shows how to ping many hosts by the input via CLI method:

```
RP/0/RP0/CPU0:router# ping bulk ipv4 input cli batch

Please enter input via CLI with one destination per line and when done Ctrl-D/(exit)
to initiate pings:
1: vrf myvrf1 10.2.1.16
2:
Starting pings...
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.2.1.16, vrf is myvrf1, timeout is 2
seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 5/7/9 ms



RP/0/RP0/CPU0:router# ping bulk ipv4 input cli

Please enter input via CLI with one destination per line:
vrf myvrf1 1.1.1.1
vrf myvrf2 2.2.2.2
vrf myvrf1 myvrf1.cisco.com
vrf myvrf2 myvrf2.cisco.com

Starting pings...
Type escape sequence to abort.
```

```
Sending 1, 100-byte ICMP Echos to 1.1.1.1, vrf is myvrf1:
!
Success rate is 100 percent (1/1), round-trip min/avg/max = 1/1/1 ms
Sending 2, 100-byte ICMP Echos to 2.2.2.2, vrf is myvrf2:
!!
Success rate is 100 percent (2/2), round-trip min/avg/max = 1/1/1 ms
Sending 1, 100-byte ICMP Echos to 1.1.1.1, vrf is myvrf1:
!
Success rate is 100 percent (1/1), round-trip min/avg/max = 1/4/1 ms
Sending 2, 100-byte ICMP Echos to 2.2.2.2, vrf is myvrf2:
!!
Success rate is 100 percent (2/2), round-trip min/avg/max = 1/3/1 ms
```

scp

To securely transfer a file from a local directory to a remote directory or from a remote directory to a local directory, use the **scp** command in XR EXEC mode.

scp {*local-directory username@location/directory*} */filename* {*username@location/directory local-directory* } */filename*

Syntax Description

local-directory	Specifies the local directory on the device.
username@location/directory	Specifies the remote directory where *location* is the IP address of the remote device.
filename	Specifies the file name to be transferred.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Secure Copy Protocol (SCP) is a file transfer protocol which provides a secure and authenticated method for transferring files. SCP relies on SSHv2 to transfer files from a remote location to a local location or from local location to a remote location.

Use the **scp** command to copy a file from the local device to a destination device or from a destination device to the local device.

Using SCP, you can only transfer individual files. You cannot transfer a file from a remote device to another remote device.

SSH server process must be running on the remote device.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to copy a file using the **scp** command from a local directory to a remote directory:

```
RP/0/RP0/CPU0:router# scp /usr/file1.txt root@209.165.200.1:/root/file3.txt

Connecting to 209.165.200.1...
Password:
  Transferred 553065 Bytes
  553065 bytes copied in 0 sec (7576232)bytes/sec
```

The following example shows how to copy a file using the **scp** command from a remote directory to a local directory:

```
RP/0/RP0/CPU0:router# scp root@209.165.200.1:/root/file4.txt /usr/file.txt

Connecting to 209.165.200.1...
Password:
  Transferred 553065 Bytes
  553065 bytes copied in 0 sec (7576232)bytes/sec
```

show cinetd services

To display the services whose processes are spawned by Cinetd when a request is received, use the **show cinetd services** command in XR EXEC mode.

show cinetd services

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ip-services	read

Examples

The following is sample is output from the **show cinetd services** command:

```
RP/0/RP0/CPU0:router# show cinetd services

Vrf Name          Family Service Proto Port ACL max_cnt curr_cnt wait Program Client Option

context-management v4    telnet   tcp   23       100       0    nowait telnetd sysdb
default            v4    telnet   tcp   23       100       2    nowait telnetd sysdb
```

This table describes the significant fields shown in the display.

Table 33: show cinetd services Command Field Descriptions

Field	Description
Family	Version of the network layer (IPv4 or IPv6).
Service	Network service (for example, FTP, Telnet, and so on).
Proto	Transport protocol used by the service (tcp or udp).
Port	Port number used by the service.
ACL	Access list used to limit the service from some hosts.
max_cnt	Maximum number of concurrent servers allowed for a service.
curr_cnt	Current number of concurrent servers for a service.
wait	Status of whether Cinetd has to wait for a service to finish before serving the next request.
Program	Name of the program for a service.
Option	Service-specific options.

show hosts

To display the default domain name, the style of name lookup service, a list of name server hosts, and the cached list of hostnames and addresses, use the **show hosts** command in XR EXEC mode.

show hosts [*host-name*]

Syntax Description

host-name	(Optional) Name of the host about which to display information. If omitted, all entries in the local cache are displayed.

Command Default

Unicast address prefixes are the default when IPv4 address prefixes are configured.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ip-services	read

Examples

The following is sample output from the **show hosts** command:

```
RP/0/RP0/CPU0:router# show hosts

Default domain is cisco.com
Name/address lookup uses domain service
Name servers are 255.255.255.255
Host              Flags        Age(hr)   Type       Address(es)
host1.cisco.com   (temp, OK)    1         IP          192.168.4.10
abc              (perm, OK)    0         IP         10.0.0.0 10.0.0.2 10.0.0.3
```

This table describes the significant fields shown in the display.

Table 34: show hosts Command Field Descriptions

Field	Description
Default domain	Default domain used to complete the unqualified hostnames.
Name/address lookup	Lookup is disabled or uses domain services.
Name servers	List of configured name servers.
Host	Hostname.
Flags	Indicates the status of an entry. • temp—Temporary entry entered by a name server; the software removes the entry after 72 hours of inactivity. • perm—Permanent entry entered by a configuration command; does not time out. • OK—Entry is believed to be valid. • ??—Entry is considered suspect and subject to revalidation. • EX—Entry has expired.
Age(hr)	Number of hours since the software most recently referred to the cache entry.
Type	Type of address (IPv4 or IPv6).
Address(es)	Address of the host. One host may have up to eight addresses.

telnet

To log in to a host that supports Telnet, use the **telnet** command in XR EXEC mode.

telnet [**vrf** {*vrf-name* | **default**}] {*ip-addresshost-name*} [*options*]

Syntax Description

vrf	(Optional) Specifies a VPN routing and forwarding (VRF) instance
vrf-name	VRF name of the system to ping.
default	Specifies the default VRF instance.

ip-address	IP address of a specific host on a network. • IPv4 address format—Must be entered in the (*x.x.x.x*) format. • IPv6 address format— Must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
host-name	Name of a specific host on a network.
options	(Optional) Telnet connection options. See Table 35: Telnet Connection Options, on page 280for a list of supported options.

Command Default

Telnet client is in Telnet connection options nostream mode.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If the Telnet server is enabled, you should be able to start a Telnet session as long as you have a valid username and password.

This table lists the supported Telnet connection options.

Table 35: Telnet Connection Options

Option	Description
/stream	Turns on stream processing, which enables a raw TCP stream with no Telnet control sequences. A stream connection does not process Telnet options and can be appropriate for connections to ports running UNIX-to-UNIX copy program (UUCP) and other non-Telnet protocols.
/nostream	Turns off stream processing.
port number	Port number. Range is 0 to 65535.
/source-interface	Specifies source interface.

To display a list of the available hosts, use the **show hosts** command. To display the status of all TCP connections, use the **show tcp** command.

The software assigns a logical name to each connection, and several commands use these names to identify connections. The logical name is the same as the hostname, unless that name is already in use or you change the connection name with the **name-connection** EXEC command. If the name is already in use, the software assigns a null name to the connection.

The Telnet software supports special Telnet commands in the form of Telnet sequences that map generic terminal control functions to operating system-specific functions. To issue a special Telnet command, enter the escape sequence and then a command character. The default escape sequence is Ctrl-^ (press and hold the Control and Shift keys and the 6 key). You can enter the command character as you hold down Ctrl or with Ctrl released; you can use either uppercase or lowercase letters. Table 36: Special Telnet Escape Sequences, on page 281 lists the special Telnet escape sequences.

Table 36: Special Telnet Escape Sequences

Escape Sequence[9]	Purpose
Ctrl-^ c	Interrupt Process (IP).
Ctrl-^ o	Terminate Output (AO).
Ctrl-^ u	Erase Line (EL).

[9] The caret (^) symbol refers to Shift-6 on your keyboard.

At any time during an active Telnet session, you can list the Telnet commands by pressing the escape sequence keys followed by a question mark at the system prompt:

ctrl-^?

A sample of this list follows. In this sample output, the first caret (^) symbol represents the Control key, and the second caret represents Shift-6 on your keyboard:

```
RP/0/RP0/CPU0:router# ^^?

[Special telnet escape help]
^^B  sends telnet BREAK
^^C  sends telnet IP
^^H  sends telnet EC
^^O  sends telnet AO
^^T  sends telnet AYT
^^U  sends telnet EL
```

You can have several concurrent Telnet sessions open and switch among them. To open a subsequent session, first suspend the current connection by pressing the escape sequence (Ctrl-Shift-6 and then x [Ctrl^x] by default) to return to the system command prompt. Then open a new connection with the **telnet** command.

To terminate an active Telnet session, issue any of the following commands at the prompt of the device to which you are connecting:

- close
- disconnect
- exit
- logout
- quit

Task ID

Task ID	Operations
basic-services	read, write, execute

Examples

The following example shows how to establish a Telnet session to a remote host named host1:

```
RP/0/RP0/CPU0:router# telnet host1
```

telnet client source-interface

To specify the source IP address for a Telnet connection, use the **telnet client source-interface** command in XR Config mode. To remove the **telnet client source-interface** command from the configuration file and restore the system to its default condition, use the **no** form of this command.

telnet {**ipv4** | **ipv6**} **client source-interface** *type interface-path-id*
no telnet client source-interface *type interface-path-id*

Syntax Description

ipv4	Specifies IPv4 address prefixes.
ipv6	Specifies IPv6 address prefixes.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

The IP address of the best route to the destination is used as the source IP address.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **telnet client source-interface** command to set the IP address of an interface as the source for all Telnet connections.

Task ID

Task ID	Operations
ipv4	read, write

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to set the IP address for HundredGigE interface 1/0/2/1 as the source address for Telnet connections:

```
RP/0/RP0/CPU0:router(config)# telnet ipv4 client source-interface hundredgige1/0/2/1
```

telnet dscp

To define the differentiated services code point (DSCP) value and IPv4 precedence to specifically set the quality-of-service (QoS) marking for Telnet traffic on a networking device, use the **telnet dscp** command in XR Config mode. To disable DSCP, use the **no** form of this command.

telnet [**vrf** {*vrf-name* | **default**}] **ipv4 dscp** *dscp-value*
no telnet [**vrf** {*vrf-name* | **default**}] **ipv4 dscp** *dscp-value*

Syntax Description

vrf	(Optional) Specifies a VPN routing and forwarding (VRF) instance.
vrf-name	(Optional) VRF name of the system to ping.
default	(Optional) Specifies the default VRF instance.
ipv4	Specifies IPv4 address prefixes.
dscp-value	Value for DSCP. The range is from 0 to 63. The default value is 0.

Command Default

If DSCP is disabled or not configured, the following default values are listed:

- The default value for the server 16.
- The default value for the client is 0.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

IPv4 is the supported protocol for defining a DSCP value for locally originated Telnet traffic.

DSCP can impact both server and client behavior of the specific VRF.

Task ID

Task ID	Operations
ipv4	read, write
ip-services	read, write

Examples

The following example shows how to define the DSCP value and IPv4 precedence:

```
RP/0/RP0/CPU0:router(config)# telnet vrf default ipv4 dscp 40
RP/0/RP0/CPU0:router(config)# telnet vrf default ipv4 dscp 10
```

telnet server

To enable Telnet services on a networking device, use the **telnet server** command in XR Config mode. To disable Telnet services, use the **no** form of this command.

telnet [**vrf** {*vrf-name* | **default**}] {**ipv4** | **ipv6**} **server max-servers** {**no-limit***limit*} [**access-list** *list-name*]
no telnet [**vrf** {*vrf-name* | **default**}] {**ipv4** | **ipv6**} **server max-servers** {**no-limit***limit*} [**access-list** *list-name*]

Syntax Description

vrf	(Optional) Specifies VPN routing and forwarding (VRF) instance.
vrf-name	(Optional) VRF name of the system to ping.
default	(Optional) Specifies the default VRF instance.
ipv4	Specifies IPv4 address prefixes.
ipv6	Specifies IPv6 address prefixes.
max-servers	Sets the number of allowable Telnet servers.
no-limit	Specifies that there is no maximum number of allowable Telnet servers.
limit	Specifies the maximum number of allowable Telnet servers. Range is 1 to 200.
access-list	(Optional) Specifies an access list.
list-name	(Optional) Access list name.

Command Default

Telnet services are disabled.

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Disable Telnet services to prevent inbound Telnet connections from being accepted into a networking device using the **telnet** command. After Telnet services are disabled, no new inbound connections are accepted, and the Cisco Internet services daemon (Cinetd) stops listening on the Telnet port.

Enable Telnet services by setting the **max-servers** keyword to a value of one or greater. This allows inbound Telnet connections into a networking device.

This command affects only inbound Telnet connections to a networking device. Outgoing Telnet connections can be made regardless of whether Telnet services are enabled.

Using the **no** form of the command disables the Telnet connection and restores the system to its default condition.

Note Before establishing communications with the router through a Telnet session, configure the telnet server and vty-pool functions (see the *Cisco ASR 9000 Series Aggregation Services Router* System Management Command *Reference* , the *Cisco ASR 9000 Series Aggregation Services Router* System Management Configuration Guide, and *Cisco ASR 9000 Series Aggregation Services Router* IP Addresses and Services Configuration Guide).

Task ID

Task ID	Operations
ipv4	read, write
ip-services	read, write

Examples

The following example shows how to enable Telnet services for one server:

```
RP/0/RP0/CPU0:router(config)# telnet ipv4 server max-servers 1
```

telnet transparent

To send a Carriage Return (CR) as a CR-NULL rather than a Carriage Return-Line Feed (CR-LF) for virtual terminal sessions, use the **telnet transparent** command in line template submode. To remove the **telnet transparent** command from the configuration file and restore the system to its default condition, use the **no** form of this command.

telnet transparent
no telnet transparent

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes Line console

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **telnet transparent** command is useful for coping with different interpretations of end-of-line handling in the Telnet protocol specification.

Task ID

Task ID	Operations
tty-access	read, write

Examples

The following example shows how to configure the vty line to operate in Telnet transparent mode so that when the carriage return key is pressed the system sends the signal as a CR-NULL key combination rather than a CR-LF key combination:

```
RP/0/RP0/CPU0:router(config)# line console
RP/0/RP0/CPU0:router(config-line)# telnet transparent
```

tftp client source-interface

To specify the source IP address for a TFTP connection, use the **tftp client source-interface** command in XR Config mode. To remove the **tftp client source-interface** command from the configuration file and restore the system to its default condition, use the **no** form of this command.

tftp client source-interface *type interface-path-id*
no tftp client source-interface *type interface-path-id*

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

The IP address of the best route to the destination is used as the source IP address.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **tftp client source-interface** command to set the IP address of an interface as the source for all TFTP connections.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to set the IP address for HundredGigE interface 1/0/2/1 as the source address for TFTP connections:

```
RP/0/RP0/CPU0:router(config)# tftp client source-interface hundredgige1/0/2/1
```

tftp server

To enable or disable the TFTP server or a feature running on the TFTP server, use the **tftp server** command in XR Config mode. To restore the system to its default condition, use the **no** form of this command.

tftp {**ipv4** | **ipv6**} **server homedir** *tftp-home-directory* [**max-servers** [{*number* | **no-limit**}]] [**access-list** *name*]
no tftp {**ipv4** | **ipv6**} **server homedir** *tftp-home-directory* [**max-servers** [{*number* | **no-limit**}]] [**access-list** *name*]

Syntax Description

ipv4	Specifies IPv4 address prefixes.
ipv6	Specifies IPv6 address prefixes.
homedir *tftp-home-directory*	Specifies the home directory.
max-servers *number*	(Optional) Sets the maximum number of concurrent TFTP servers. The range is from 1 to 2147483647.
max-servers no-limit	(Optional) Sets no limit to process a number of allowable TFTP server.
access-list *name*	(Optional) Specifies the name of the access list associated with the TFTP server.

Command Default

The TFTP server is disabled by default. When not specified, the default value for the **max-servers** keyword is unlimited.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Using the **no** form of the **tftp server** command removes the specified command from the configuration file and restores the system to its default condition. The **no** form of the command is not stored in the configuration file.

Task ID

Task ID	Operations
ipv4	read, write
ip-services	read, write

Examples

The following example shows that the TFTP server is enabled for the access list named test:

```
RP/0/RP0/CPU0:router(config)# tftp ipv4 server homedir disk0 access-list test
```

traceroute

To discover the routes that packets actually take when traveling to their destination across an IP network, use the **traceroute** command in XR EXEC mode.

traceroute [{**ipv4** | **ipv6**}] [{*host-nameip-address*}] [{**source***ip-address-nameinterface-name*}] [**numeric**] [**timeout** *seconds*] [**probe** *count*] [**minttl** *seconds*] [**maxttl** *seconds*] [**port** *number*] [**priority** *number*] [**verbose**]

Syntax Description

ipv4	(Optional) Specifies IPv4 address prefixes.
ipv6	(Optional) Specifies IPv6 address prefixes.
host-name	(Optional) Hostname of system to use as the destination of the trace attempt.
ip-address	(Optional) Address of system to use as the destination of the trace attempt.
source	(Optional) Source address.
ip-address-name	(Optional) IP address A.B.C.D or hostname.
numeric	(Optional) Numeric display only.
timeout *seconds*	(Optional) Timeout value. Range is 0 to 3600.
probe *count*	(Optional) Probe count. Range is 0 to 65535.
minttl *seconds*	(Optional) Minimum time to live. Range is 0 to 255.
maxttl *seconds*	(Optional) Maximum time to live. Range is 0 to 255.
port *number*	(Optional) Port number. Range is 0 to 65535.

priority *number*	(Optional) Packet priority. Range is 0 to 15. Available when the **ipv6** keyword is specified.
verbose	(Optional) Verbose output.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The default value for the **traceroute** command refers only to the destination. No default value is available for the destination address.

The **traceroute** command works by taking advantage of the error messages generated by networking devices when a datagram exceeds its time-to-live (TTL) value.

The **traceroute** command starts by sending probe datagrams with a TTL value of 1, which causes the first networking device to discard the probe datagram and send back an error message. The **traceroute** command sends several probes at each TTL level and displays the round-trip time for each.

The **traceroute** command sends out one probe at a time. Each outgoing packet may result in one or two error messages. A "time-exceeded" error message indicates that an intermediate networking device has seen and discarded the probe. A "destination-unreachable" error message indicates that the destination node has received the probe and discarded it because it could not deliver the packet. If the timer goes off before a response comes in, the **traceroute** command prints an asterisk (*).

The **traceroute** command terminates when the destination responds, when the maximum TTL is exceeded, or when the user interrupts the trace with the escape sequence, which is, by default, Ctrl-C. Simultaneously press and release the Ctrl and C keys.

To use nondefault parameters and invoke an extended **traceroute** test, enter the command without a *host-name* or *ip- address* argument. You are stepped through a dialog to select the desired parameter values for the **traceroute** test.

Because of how IP is implemented on various networking devices, the IP **traceroute** command may behave in unexpected ways.

Not all destinations respond correctly to a probe message by sending back an "ICMP port unreachable" message. A long sequence of TTL levels with only asterisks, terminating only when the maximum TTL has been reached, may indicate this problem.

There is a known problem with the way some hosts handle an "ICMP TTL exceeded" message. Some hosts generate an "ICMP" message, but they reuse the TTL of the incoming packet. Because this value is zero, the ICMP packets do not succeed in returning. When you trace the path to such a host, you may see a set of TTL values with asterisks (*). Eventually the TTL is raised high enough that the "ICMP" message can get back. For example, if the host is six hops away, the **traceroute** command times out on responses 6 through 11.

Task ID

Task ID	Operations
basic-services	read, write, execute

Examples

The following output shows a sample **traceroute** session when a destination hostname has been specified:

```
RP/0/RP0/CPU0:router# traceroute host8-sun

Type escape sequence to abort.
Tracing the route to 192.168.0.73
 1 192.168.1.6 (192.168.1.6) 10 msec 0 msec 10 msec
 2 gateway01-gw.gateway.cisco.com (192.168.16.2) 0 msec 10 msec 0 msec
 3 host8-sun.cisco.com (192.168.0.73) 10 msec * 0 msec
```

The following display shows a sample extended **traceroute** session when a destination hostname is not specified:

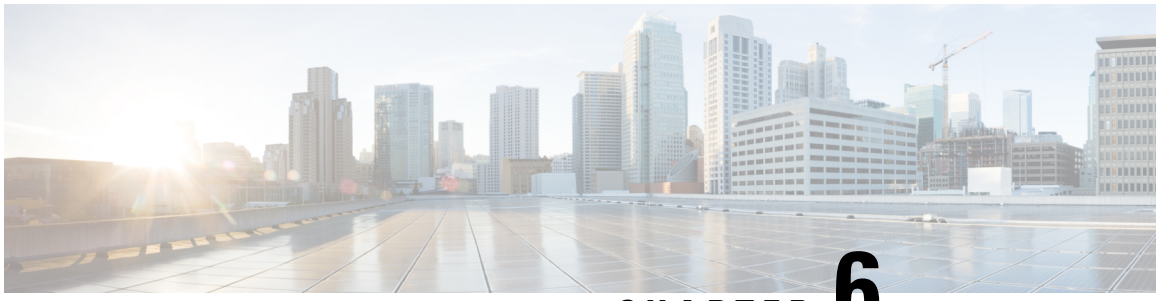
```
traceroute# traceroute

Protocol [ipv4]:
Target IP address: ena-view3
Source address: 10.0.58.29
Numeric display? [no]:
Timeout in seconds [3]:
Probe count [3]:
Minimum Time to Live [1]:
Maximum Time to Live [30]:
Port Number [33434]:
Loose, Strict, Record, Timestamp, Verbose[none]:

Type escape sequence to abort.
Tracing the route to 171.71.164.199
 1  sjc-jpxlnock-vpn.cisco.com (10.25.0.1) 30 msec  4 msec  4 msec
 2  15lab-vlan725-gx1.cisco.com (173.19.72.2) 7 msec  5 msec  5 msec
 3  stc15-00lab-gw1.cisco.com (173.24.114.33) 5 msec  6 msec  6 msec
 4  stc5-lab4-gw1.cisco.com (173.24.114.89) 5 msec  5 msec  5 msec
 5  stc5-sbb4-gw1.cisco.com (172.71.241.162) 5 msec  6 msec  6 msec
 6  stc5-dc5-gw1.cisco.com (172.71.241.10) 6 msec  6 msec  5 msec
 7  stc5-dc1-gw1.cisco.com (172.71.243.2) 7 msec  8 msec  8 msec
 8  ena-view3.cisco.com (172.71.164.199) 6 msec  *  8 msec
```

This table describes the characters that can appear in traceroute output.

Table 37: traceroute Text Characters

Character	Description
xx msec	For each node, the round-trip time in milliseconds for the specified number of probes.
*	Probe time out.
?	Unknown packet type.
A	Administratively unreachable. This output usually indicates that an access list is blocking traffic.
H	Host unreachable.
N	Network unreachable.
P	Protocol unreachable.
Q	Source quench.

Character	Description
U	Port unreachable.



CHAPTER 6

HSRP commands

HSRP sessions are not up by default. You can configure upto 255 (IPv4 and IPv6 combined) HSRP sessions per router with the help of the command, `hw-module vrrpscale enable`. For more information about the command, see *VRRP Commands* in the *IP Addresses and Services Command Reference for Cisco NCS 5500 Series and NCS 540 and NCS 560 Series Routers*.

HSRP group configuration is configured on a specified interface and the subordinate groups configured inherits the state of the specified interface on which the HSRP group configuration is configured.

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This chapter describes the Cisco IOS XR software commands used to configure and monitor the Hot Standby Router Protocol (HSRP).

For detailed information about HSRP concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

address (hsrp)

To enable hot standby protocol for IP, use the **address (hsrp)** command in the HSRP group submode. To disable hot standby protocol for IP, use the **no** form of this command.

address { **learn** *address* }
no address { **learn** *address* }

Syntax Description

learn	Learns virtual IP address from peer.
address	Hot standby IP address.

Command Default

None

Command Modes

HSRP Group Submode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read, write

Example

This example shows how to enable a group to learn the primary virtual IPv4 address from received HSRP control packets:

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE hundredgige 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp 1 version 2
Router(config-hsrp-gp)# address learn
Router(config-hsrp-gp)#
```

Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

Related Commands

Command	Description
address secondary (hsrp), on page 300	Configures the secondary virtual IPv4 address for a virtual router.

address global (HSRP)

To configure the global virtual IPv6 address for the HSRP group, use the **address global** command in the virtual router submode. To deconfigure the global virtual IPv6 address for the HSRP group, use the **no** form of this command.

address global *ipv6-address*

no address global *ipv6-address*

Syntax Description

ipv6-address	Global HSRP IPv6 address.

Command Default None

Command Modes HSRP Group Submode, under the IPv6 address-family

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read,write

Example

This example shows how to add a global virtual IPv6 address for the HSRP group:

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv6
Router(config-hsrp-address-family)# hsrp 3
Router(config-hsrp-virtual-router)# address global 4000::1000
Router(config-hsrp-virtual-router)#
```

Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

address global subordinate (HSRP)

To configure the global virtual IPv6 address for the subordinate group, use the **address global** command in the HSRP slave submode. To deconfigure the global virtual IPv6 address for the subordinate group, use the **no** form of this command.

address global *ipv6-address*

no address global *ipv6-address*

Syntax Description		
	ipv6-address	Global VRRP IPv6 address.

Command Default None

Command Modes HSRP Slave Submode, under the IPv6 address-family

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read,write

Example

This example shows how to add a global virtual IPv6 address for the subordinate group:

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv6
Router(config-hsrp-address-family)# hsrp 3 slave
Router(config-hsrp-virtual-router)# address global 4000::1000
Router(config-hsrp-virtual-router)#
```

Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

address linklocal(HSRP)

To either configure the virtual link-local IPv6 address for the HSRP group or to specify that the virtual link-local IPv6 address should be enabled and calculated automatically from the virtual router virtual Media

Access Control (MAC) address, use the **address linklocal** command in the HSRP group submode, under the IPv6 address-family. To deconfigure the virtual link-local IPv6 address forthe HSRP group, use the **no** form of this command.

address linklocal
ipv6-address | **autoconfig**

no address linklocal
ipv6-address | **autoconfig**

Syntax Description

ipv6-address	HSRP IPv6 link-local address.
autoconfig	Autoconfigures the HSRP IPv6 link-local address.

Command Default

None

Command Modes

HSRP Group Submode, under the IPv6 address-family

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

When you configure HSRP for IPv6, you must also configure the linklocal IPv6 address using either the *ipv6-address* argument or the **autoconfig** keyword. If you configure only the global IPv6 address and commit the changes using the **commit** keyword, the router does not accept the configuration and displays an error message.

Task ID

Task ID	Operation
hsrp	read, write

Example

This example shows how to autoconfigure the HSRP IPv6 link-local address:

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv6
Router(config-hsrp-address-family)# hsrp 3 version 2
Router(config-hsrp-virtual-router)# address linklocal autoconfig
Router(config-hsrp-virtual-router)#
```

This example shows how to configure the virtual link-local IPv6 address for the HSRP group:

```
Router# configure
Router(config)# router hsrp
```

```
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv6
Router(config-hsrp-address-family)# hsrp 3
Router(config-hsrp-virtual-router)# address linklocal FE80::260:3EFF:FE11:6770
Router(config-hsrp-virtual-router)#
```

Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

address secondary (hsrp)

To configure the secondary virtual IPv4 address for a virtual router, use the **address secondary** command in the Hot Standby Router Protocol (HSRP) virtual router submode. To deconfigure the secondary virtual IPv4 address for a virtual router, use the **no** form of this command.

address *address* **secondary**
no address *address* **secondary**

Syntax Description

secondary	Sets the secondary HSRP IP address.
address	HSRP IPv4 address.

Command Default

None

Command Modes

HSRP virtual router

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read, write

Example

This example shows how to set the secondary virtual IPv4 address for the virtual router:

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp 3 version 2
Router(config-hsrp-gp)# address 10.20.30.1 secondary
Router(config-hsrp-gp)#
```

Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

authentication (hsrp)

To configure an authentication string for the Hot Standby Router Protocol (HSRP), use the **hsrp authentication** command in HSRP group submode. To delete an authentication string, use the **no** form of this command.

authentication *string*
no authentication [*string*]

Syntax Description

string	Authentication string. It can be up to eight characters long. The default is 'cisco'.

Command Default

The default authentication string is cisco.

Command Modes

HSRP Group Submode

Command History

Release	Modification
Release 7.1.1	This command was introduced. This command replaces the **hsrp authentication** command.

Usage Guidelines

The authentication string is sent unencrypted in all HSRP messages. The same authentication string must be configured on all routers and access servers on a LAN to ensure interoperation. Authentication mismatch

prevents a device from learning the designated Hot Standby IP address and the Hot Standby timer values from other routers configured with HSRP.

The **hsrp authentication** command is available for version 1 groups only

Task ID

Task ID	Operations
hsrp	read, write

Examples

This example shows how to configure "company1" as the authentication string required to allow Hot Standby routers in group 1 on tengige hundredgige interface 0/4/0/4 to interoperate:

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp 1 version 1
Router(config-hsrp-gp)# authentication company1
Router(config-hsrp-gp)#
```

Note The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.

Related Commands

Command	Description
show hsrp, on page 315	Displays HSRP information.

bfd fast-detect (hsrp)

To enable bidirectional forwarding(BFD) fast-detection on a HSRP interface, use the **hsrp bfd fast-detect** command in HSRP group submode. This creates a BFD session between the HSRP router and its peer, and if the session goes down while HSRP is in backup state, this will initiate a HSRP failover. To disable BFD fast-detection, use the **no** form of this command.

hsrp group number bfd fast-detect

Syntax Description

group number *group number*	(Optional) HSRP group number. Range is 0 to 255.

Command Default BFD is disabled.

Command Modes HSRP interface configuration

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
hsrp	read, write

Examples

This example shows how to enable bfd fast-detect:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router hsrp
RP/0/RP0/CPU0:router(config-hsrp)# interface gig 0/1/1/0
RP/0/RP0/CPU0:router(config-hsrp-if)# hsrp 1 bfd fast-detect
```

clear hsrp statistics

To reset the Hot Standby Routing Protocol Statistics (HSRP) statistics to zero, use the **clear hsrp statistics** command in XR EXEC mode.

clear hsrp statistics [**interface** *interface-type interface-path-id group*]

Syntax Description

interface *interface-path-id*	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
group	(Optional) Group number.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read, write

Example

This sample output is from the **clear hsrp statistics** command:

```
Router# clear hsrp statistics
```

Related Commands

Command	Description
show hsrp, on page 315	Displays HSRP information.

hsrp bfd minimum-interval

To configure the BFD minimum interval to be used for all VRRP BFD sessions on a given interface, use the **bfd minimum-interval** command in the interface configuration mode. To remove the configured minimum-interval period and set the minimum-interval period to the default period, use the **no** form of this command.

hsrp bfd minimum-interval *interval*

Syntax Description

interval	Specify the minimum-interval in milliseconds. Range is 15 to 30000.

Command Default Default minimum interval is 50 ms.

Command Modes HSRP interface configuration

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines Minimum interval determines the frequency of sending BFD packets to BFD peers. It is the time between successive BFD packets sent for the session. Minimum interval is defined in milliseconds. The configured minimum interval applies to all BFD sessions on the interface.

Task ID

Task ID	Operations
hsrp	read, write

Examples

The following example shows how to configure a minimum interval of 100 milliseconds:

```
RP/0/RP0/CPU0:router(config)# router hsrp
RP/0/RP0/CPU0:router(config-hsrp)# interface gig 0/1/1/0
RP/0/RP0/CPU0:router(config-hsrp-if)# hsrp bfd minimum-interval 100
```

hsrp bfd multiplier

To set the BFD multiplier value, use the **bfd multiplier** command in the interface configuration mode. To remove the configured multiplier value and set the multiplier to the default value, use the **no** form of this command.

hsrp bfd multiplier *multiplier*

Syntax Description

multiplier	Specifies the BFD multiplier value. Range is 2 to 50.

Command Default

Default value is 3.

Command Modes

HSRP interface configuration

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

The multiplier value specifies the number of consecutive BFD packets that, if not received as expected, cause a BFD session to go down. The BFD multiplier applies to all configured BFD sessions on the interface.

Task ID

Task ID	Operations
hsrp	read, write

Examples

The following example shows how to configure a BFD multiplier with multiplier value of 10:

```
RP/0/RP0/CPU0:router(config)# router hsrp
RP/0/RP0/CPU0:router(config-hsrp)# interface gig 0/1/1/0
RP/0/RP0/CPU0:router(config-hsrp-if)# hsrp bfd multiplier 10
```

hsrp delay

To configure the activation delay for the Hot Standby Router Protocol (HSRP), use the **hsrp delay** command in HSRP interface configuration mode. To delete the activation delay, use the **no** form of this command.

hsrp delay minimum *value* **reload** *value*
no hsrp delay

Syntax Description

minimum *value*	Sets the minimum delay in seconds for every interface up event. Range is 0 to 10000.
reload *value*	Sets the reload delay in seconds for first interface up event. Range is 0 to 10000.

Command Default

minimum *value* : 1

reload *value* : 5

Command Modes

HSRP interface configuration

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

The **hsrp delay** command delays the start of the HSRP finite state machine (FSM) on an interface up event to ensure that the interface is ready to pass traffic. This ensures that there are no mistaken state changes due to loss of hello packets. The minimum delay is applied on all interface up events and the reload delay is applied on the first interface event.

The values of zero must be explicitly configured to turn this feature off.

Task ID

Task ID	Operations
hsrp	read, write

Examples

The following example shows how to configure a minimum delay of 10 seconds with a reload delay of 100 seconds:

```
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/RP0/CPU0/0
Router(config-hsrp-if)# hsrp delay minimum 10 reload 100
```

Related Commands

Command	Description
show hsrp, on page 315	Displays HSRP information.

hsrp ipv4

To activate the Hot Standby Router Protocol (HSRP), use the **hsrp ipv4** command in HSRP interface configuration mode. To disable HSRP, use the **no** form of this command.

hsrp ipv4 [*ip-address* [**secondary**]]
no hsrp *group-number* **ipv4** [*ip-address* [**secondary**]]

Syntax Description

group-number	(Optional) Group number on the interface for which HSRP is being activated. Range is 0 to 255. Default is 0.
ip-address	(Optional) IP address of the Hot Standby router interface.
secondary	(Optional) Indicates that the IP address is a secondary Hot Standby router interface. Useful on interfaces with primary and secondary addresses; you can configure primary and secondary HSRP addresses.

Command Default

group-number : 0

HSRP is disabled by default.

Command Modes

HSRP interface configuration

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

The **hsrp ipv4** command activates HSRP on the configured interface. If an IP address is specified, that address is used as the designated address for the Hot Standby group. If no IP address is specified, the virtual address is learned from the active router. For HSRP to elect a designated router, at least one router in the Hot Standby group must have been configured with, or must have learned, the designated address. Configuring the designated address on the active router always overrides a designated address that is currently in use.

When the **hsrp ipv4** command is enabled on an interface, the handling of proxy Address Resolution Protocol (ARP) requests is changed (unless proxy ARP was disabled). If the Hot Standby state group has been configured with or has learned the designated address, the proxy ARP requests are answered using the MAC address of the Hot Standby group. Otherwise, proxy ARP responses are suppressed.

Configuring secondary Hot Standby router IP addresses is necessary when the interface has secondary IP addresses configured and redundancy must be provided for the networks of these addresses also.

A primary address must be configured before a secondary address. Likewise, a secondary address must be unconfigured before unconfiguring a primary address. All IP addresses can be unconfigured using the **no hsrp ipv4** command.

Task ID

Task ID	Operations
hsrp	read, write

Examples

The following example shows how to activate HSRP for group 1 on tengige interface 0/2/0/1. The IP address used by the Hot Standby group is learned using HSRP.

```
Router(config)# router hsrp
Routerrouter(config-hsrp)# interface tenGigE 0/2/0/1
Router(config-hsrp-if)# hsrp 1 ipv4
```

Related Commands

Command	Description
hsrp redirects, on page 308	Configures ICMP redirect messages to be sent when the HSRP is configured on an interface.
show hsrp, on page 315	Displays HSRP information.

hsrp redirects

To configure Internet Control Message Protocol (ICMP) redirect messages to be sent when the Hot Standby Router Protocol (HSRP) is configured on an interface, use the **hsrp redirects** command in HSRP interface configuration mode. To revert to the default, which is that ICMP messages are enabled, use the **no** form of this command.

hsrp redirects disable
no hsrp redirects disable

Syntax Description

disable	Disables the filtering of ICMP redirect messages on interfaces configured with HSRP.

Command Default

HSRP ICMP redirects are enabled by default.

Command Modes

HSRP interface configuration

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

The **hsrp redirects** command can be configured on a per-interface basis. When HSRP is first configured on an interface, the setting for that interface inherits the global value. With the **hsrp redirects** command is enabled, ICMP redirects messages are filtered by replacing the real IP address in the next-hop address of the redirect packet with a virtual IP address if it is known to HSRP.

Task ID

Task ID	Operations
hsrp	read, write

Examples

The following example shows how to allow HSRP to filter redirect messages on tengige interface 0/2/0/1:

```
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/2/0/1
Router(config-hsrp-if)# hsrp 1 ipv4 192.168.18.1
Router(config-hsrp-if)# hsrp redirects disable
```

Related Commands

Command	Description
show hsrp, on page 315	Displays HSRP information.

interface (HSRP)

To enable Hot Standby Router Protocol (HSRP) interface configuration command mode, use the **interface** command in router configuration mode. To terminate interface mode, use the **no** form of this command.

interface *type* *interface-path-id*
no **interface** *type* *interface-path-id*

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

HSRP is disabled.

Command Modes

Router HSRP configuration

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

All the commands used to configure HSRP are used in HSRP interface configuration mode.

Task ID

Task ID	Operations
hsrp	read, write

Examples

The following example show how to enable HSRP interface configuration mode on tengige 0/2/0/1:

```
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/2/0/1
Router(config-hsrp-if)#
```

Related Commands

Command	Description
router hsrp, on page 313	Enables HSRP.

preempt (hsrp)

To configure Hot Standby Router Protocol (HSRP) preemption and preemption delay, use the **hsrp preempt** command in HSRP interface configuration mode. To restore the default values, use the **no** form of this command.

hsrp [*group-number*] **preempt** [**delay** *seconds*]
no hsrp [*group-number*] **preempt** [**delay** *seconds*]

Syntax Description

group-number	(Optional) Group number on the interface to which the other arguments in this command apply. Default is 0.
delay *seconds*	(Optional) Time in seconds. The *seconds* argument causes the local router to postpone taking over the active role for the specified preempt delay *seconds* value. Range is 0 to 3600 seconds (1 hour). Default is 0 seconds (no delay).

Command Default

group-number: 0

seconds: 0 seconds (if the router wants to preempt, it does immediately)

Command Modes

HSRP interface configuration

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

When the **hsrp preempt** command is configured, the local router should attempt to assume control as the active router if it has a hot standby priority higher than the current active router. If the hsrp preempt command is not configured, the local router assumes control as the active router only if no other router is currently in the active state.

When a router first comes up, it does not have a complete routing table. If HSRP is configured to preempt, the local HSRP group may become the active router, yet it is unable to provide adequate routing services. This problem can be solved by configuring a delay before the preempting router actually preempts the currently active router.

The preempt delay *seconds* value does not apply if there is no router currently in the active state. In this case, the local router becomes active after the appropriate timeouts (see the **hsrp timers** command), regardless of the preempt *delay seconds* value.

Task ID

Task ID	Operations
hsrp	read, write

Examples

In the following example, the router waits for 300 seconds (5 minutes) after having determined that it should preempt before attempting to preempt the active router. The router might become the active router in a shorter span of time despite the configured delay if no active router is present. Only preempting the active router is delayed.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# router hsrpi
RP/0/RSP0/CPU0:router(config-hsrp)# interface tenGigE 0/4/0/4
RP/0/RSP0/CPU0:router(config-hsrp-if)# address-family ipv4
RP/0/RSP0/CPU0:router(config-hsrp-ipv4)# hsrp 1 version 2
RP/0/RSP0/CPU0:router(config-hsrp-gp)# preempt delay 300
RP/0/RSP0/CPU0:router(config-hsrp-gp)#
```

Related Commands

Command	Description
priority (hsrp), on page 311	Configures HSRP priority.
track(object), on page 328	Configures an interface so that the Hot Standby priority changes based on the availability of other interfaces.
show hsrp, on page 315	Displays HSRP information.

priority (hsrp)

To configure Hot Standby Router Protocol (HSRP) priority, use the **priority** command in HSRP group submode. To restore the default values, use the **no** form of this command.

priority *priority*
no priority *priority*

Syntax Description

priority	Priority value that prioritizes a potential Hot Standby router. Range is from 1 to 255. Default is 100.

Command Default

The default priority is 100.

Command Modes

HSRP interface configuration

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

The assigned priority is used to help select the active and standby routers. Assuming that preemption is enabled, the router with the highest priority becomes the designated active router. In case of ties, the interface IP addresses are compared, and the interface with the higher IP address has priority.

The priority of the device can change dynamically if an interface is configured with the **hsrp track** command and another interface on the device goes down.

If preemption is not enabled, the router may not become active even though it might have a higher priority than other HSRP routers.

Task ID

Task ID	Operations
hsrp	read, write

Examples

In this example, the router has a priority of 120:

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tengige 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp 1 version 2
Router(config-hsrp-gp)# priority 120
Router(config-hsrp-gp)#
```

Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

Related Commands

Command	Description
preempt (hsrp), on page 310	Configures HSRP preemption and preemption delay.
track(object), on page 328	Configures an interface so that the Hot Standby priority changes based on the availability of other interfaces.
show hsrp, on page 315	Displays HSRP information.

router hsrp

To enable the Hot Standby Router Protocol (HSRP), use the **router hsrp** command in XR Config mode. To disable HSRP, use the **no** form of this command.

router hsrp
no router hsrp

Syntax Description

This command has no keywords or arguments.

Command Default

HSRP is disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

HSRP configuration commands must be configured in the HSRP interface configuration mode.

Task ID

Task ID	Operations
hsrp	read, write

Examples

The following example shows how to configure an HSRP redundancy process that contains a virtual router group 1 on tengige 0/2/0/1:

```
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/2/0/1
Router(config-hsrp-if)# hsrp 1 priority 254
```

session name

To configure an HSRP session name, use the **session name** command in the HSRP group submode. To deconfigure an HSRP session name, use the **no** form of this command.

name *name*

Syntax Description

name	MGO session name

Command Default

None

Command Modes

HSRP Group Submode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read

Example

This example shows how to configure an HSRP session name.

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp 1 version 2
Router(config-hsrp-gp)# name s1
Router(config-hsrp-gp)#
```

Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

show hsrp

To display Hot Standby Router Protocol (HSRP) information, use the **show hsrp** command in XR EXEC mode mode.

show hsrp [**interface** *interface-type* *interface-path-id*] [*group-number*] [{ **brief** | **detail** }]

Syntax Description

interface*interface-type*	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
group-number	(Optional) Group number on the interface for which output is displayed.
brief	(Optional) A single line of output summarizes each standby group. The **brief** keyword is the default if **detail** is not specified.
detail	(Optional) This keyword has the same effect as not specifying **brief**; more output is provided.
	(Optional) After this vertical bar (|), specify one of these output modifiers and a keyword from the output: • **begin** —Begins the output from the word that you specify. • **exclude** —Excludes lines that match the word that you specify. • **include** —Includes lines that match the word that you specify.

Command Default

By default, a single line of output summarizing each standby group is displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

Use the **show hsrp** command to display HSRP information.

If you want to specify a value for the *group-number* argument, you must also specify an interface *type* and *number*.

Task ID

Task ID	Operations
hsrp	read

Examples

This is sample output from the **show hsrp detail** command:

```
Router# show hsrp detail

tengige 0/4/0/0 - Group 1
  Local state is Active, priority 100
  Hellotime 3 sec holdtime 10 sec
  Next hello sent in 0.539
  Minimum delay 1 sec, reload delay 5 sec
BFD enabled: state none, interval 15 ms multiplier 3
  Hot standby IP address is 4.0.0.100 configured
  Active router is local
  Standby router is unknown expired
  Standby virtual mac address is 0000.0c07.ac01
  2 state changes, last state change 00:05:20
```

This table describes the significant fields shown in the display.

Table 38: show hsrp Command Field Descriptions

Field	Description
tengige E0/2/0/4	Interface type and number and Hot Standby group number for the interface.
Local state is	State of local networking device; can be one of the following: • Active—Current Hot Standby router. • Standby—Router next in line to be the Hot Standby router. • Speak—Router is sending packets to claim the active or standby role. • Listen—Router is neither active nor standby, but if no messages are received from the active or standby router, it will start to "speak." • Learn—Router is neither active nor standby, nor does it have enough information to attempt to claim the active or standby roles. • Init—Router is not yet ready to participate in HSRP, possibly because the associated interface is not up.
Hellotime	Current time (in seconds) between sending of hello packets, learned dynamically from the hello packets received from the active Hot Standby router.
holdtime	Current time (in seconds) before other routers declare the active or standby router to be down, learned dynamically from the hello packets received from the active Hot Standby router.

Field	Description
Next hello sent in	Time in which the software will send the next hello packet (in hours:minutes:seconds).
BFD enabled	Displays BFD related information (with multiplier and minimum interval details)
Hot standby IP address is configured	IP address of the current Hot Standby router. The word "configured" indicates that this address is known through the **hsrp ip** command. Otherwise, the address was learned dynamically through HSRP hello packets from other routers that do have the HSRP IP address configured.
Active router is	Value can be "local" or an IP address. Address of the current active Hot Standby router.
Standby router is	Value can be "local" or an IP address of the standby router (the router that is next in line to be the Hot Standby router).
Standby virtual mac address is	MAC address associated with the standby group address.
state changes	Number of times the router changed the standby state.
last state change	Time (in hours:minutes:seconds) expired since the last state change.
Tracking interface states for	List of interfaces that are being tracked and their corresponding states. Based on the **hsrp track** command.
Priority decrement	Value by which the standby priority is decremented or incremented when the tracked interface goes down or up, respectively. Default is 10.

Related Commands

Command	Description
authentication (hsrp), on page 301	Configures an authentication string for HSRP.
hsrp ipv4, on page 307	Activates the HSRP.
preempt (hsrp), on page 310	Configures HSRP preemption and preemption delay.
priority (hsrp), on page 311	Configures HSRP priority.
timers (hsrp), on page 324	Configures the time between hello packets and the time before other routers declare the active Hot Standby or standby router to be down.
track(object), on page 328	Configures an interface so that the Hot Standby priority changes based on the availability of other interfaces.

show hsrp mgo

To display Hot Standby Router Protocol (HSRP) mgo information across all interfaces, use the **show hsrp mgo** command in XR EXEC mode.

show hsrp mgo [{ **brief** *session-name* }]

Syntax Description

brief	(Optional) Displays information in a brief format.
session-name	(Optional) Display information for a single MGO Session.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read

Example

This example shows Hot Standby Router Protocol (HSRP) mgo information for interface HSRP3.

```
Router# show hsrp mgo HSRP3

HSRP3
  Primary group Bundle-Ether1.1 IPv4 group 1
  State is Active
  Slave groups:
    Interface                Grp
    Bundle-Ether1.2            2
    Bundle-Ether1.3            3
    Bundle-Ether1.4            4
    Bundle-Ether1.5            5
```

This example shows Hot Standby Router Protocol (HSRP) mgo information across all interfaces in a brief format.

```
Router# show hsrp mgo brief
```

```
Name            Interface      AF   Grp    State Slaves
HSRP1           Gi0/0/0/1       IPv4   1   Active    100
HSRP2           Te0/1/0/0.1     IPv4   2  Standby     50
HSRP3           BE1             IPv4   1   Active      4
HSRP4           BE1             IPv6  10   Active     11
```

Related Commands

Command	Description
show hsrp, on page 315	Displays HSRP information.

show hsrp statistics

To display Hot Standby Router Protocol (HSRP) statistics information across all interfaces, use the **show hsrp statistics** command in XR EXEC mode.

show hsrp [{ *interface-type* *interface-path-id group-number* }] **statistics**

Syntax Description

interface-type interface-path-id	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
group-number	(Optional) Group number of the interface.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read

Example

This sample output is from the **show hsrp statistics** command:

```
Router# show hsrp statistics
```

```
Protocol:
  Transitions to Active                2
  Transitions to Standby               2
  Transitions to Speak                 0
  Transitions to Listen                2
  Transitions to Learn                 0
  Transitions to Init                  0

Packets Sent:                         12
  Hello:                               7
  Resign:                              0
  Coup:                                2
  Adver:                               3

Valid Packets Received:               13
  Hello:                               8
  Resign:                              2
  Coup:                                0
  Adver:                               3

Invalid packets received:             0
  Too long:                           0
  Too short:                          0
  Mismatching/unsupported versions:   0
  Invalid opcode:                     0
  Unknown group:                      0
  Inoperational group:                0
  Conflicting Source IP:              0
  Failed Authentication:              2
  Invalid Hello Time:                 0
  Mismatching Virtual IP:             0
```

Related Commands

Command	Description
show hsrp, on page 315	Displays HSRP information.

show hsrp summary

To display Hot Standby Router Protocol (HSRP) summary information across all interfaces, use the **show hsrp summary** command in XR EXEC mode mode.

show hsrp summary

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read

Example

This sample output is from the **show hsrp summary** command:

```
Router# show hsrp summary
                 Groups                  VIPs
State  Sessions Slaves Total     Up  Down  Total
-----   ---------------------   -----------------
ALL          60    900    960    860  2020   2880

ACTIVE       10    190    200    200   300    500
STANDBY      15    235    250    250   600    850
SPEAK        10    190    200    200   400    600
LISTEN       10    190    200    200   400    600
LEARN         5      5     10     10    20     30
INIT         10     90    100      0   300    300

48   HSRP IPv4 interfaces    (43   up, 5   down)
5   Tracked IPv4 interfaces (4    up, 1    down)
5    BFD sessions       (3    up, 2    down)
```

Related Commands

Command	Description
show hsrp, on page 315	Displays HSRP information.

hsrp slave follow

To instruct the subordinate group to inherit its state from a specified group, use the **hsrp slave follow** command in HSRP slave submode.

follow *mgo-session-name*

Syntax Description

mgo-session-name	Name of the MGO session from which the subordinate group will inherit the state.

Command Default None

Command Modes HSRP Slave Submode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read, write

Example

This example shows how to instruct the subordinate group to inherit its state from a specified group.

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp slave
Router(config-hsrp-slave)# follow m1
```

subordinate primary virtual IPv4 address

To configure the primary virtual IPv4 address for the subordinate group, use the subordinate primary virtual IPv4 address command in the HSRP slave submode.

address *ip-address*

Syntax Description

ip-address	IP address of the Hot Standby router interface.

Command Default None

Command Modes HSRP Slave Submode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read, write

Example

This example shows how to configure the primary virtual IPv4 address for the subordinate group.

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp slave
Router(config-hsrp-slave)# address 10.2.1.4
```

Related Commands

Command	Description
hsrp slave follow, on page 321	Instructs the subordinate group to inherit its state from a specified group.

subordinate secondary virtual IPv4 address

To configure the secondary virtual IPv4 address for the subordinate group, use the **subordinate secondary virtual IPv4 address** command in the HSRP slave submode.

address *ip-address* **secondary**

Syntax Description

ip-address	IP address of the Hot Standby router interface.
secondary	Sets the secondary hot standby IP address.

Command Default

None

Command Modes

HSRP Slave Submode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
hsrp	read, write

Example

This example shows how to configure the secondary virtual IPv4 address for the subordinate group.

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tengige 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp slave
Router(config-hsrp-slave)# address 10.2.1.4 secondary
```

Related Commands

Command	Description
hsrp slave follow, on page 321	Instructs the subordinate group to inherit its state from a specified group.

timers (hsrp)

To configure the time between hello packets and the time before other routers declare the active Hot Standby or standby router to be down, use the **hsrp timers** command in HSRP group submode. To restore the timers to their default values, use the **no** form of this command.

timers { *hello-seconds* | **msec** *hello-milliseconds* } { *hold-seconds* | **msec** *hold-milliseconds* }
no timers

Syntax Description

hello-seconds	Hello interval in seconds. Range is from 1 to 255. Default is 3.
msec *hello-milliseconds*	Hello interval in milliseconds. Range is from 100 to 3000.
hold-seconds	Time in seconds before the active or standby router is declared to be down. Range is from 1 to 255. Default is 10.
msec *hold-milliseconds*	Time in milliseconds before the active or standby router is declared to be down. Range is from 100 to 3000.

Command Default

The default hello-seconds is 3. (If the **msec** keyword is specified, there is no default value.)

The default hold-seconds is 10. (If the **msec** keyword is specified, there is no default value.)

Command Modes

HSRP Group Submode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

Nonactive routers learn timer values from the active router, unless millisecond timer values are being used. If millisecond timer values are being used, all routers must be configured with the millisecond timer values. This rule applies if either the hello time or the hold time is specified in milliseconds.

The timers configured on the active router always override any other timer settings. All routers in a Hot Standby group should use the same timer values. Normally, the hold time is greater than or equal to three times the hello time (holdtime > 3 * hellotime).

You must specify either the *hello-seconds* argument or the **msec** keyword and *hello-milliseconds* argument, depending on whether you want the hello time in seconds or milliseconds. You must also specify either the *hold-seconds* argument or **msec** keyword and *hold-milliseconds* argument, depending on whether you want the hold time in seconds or milliseconds.

Task ID

Task ID	Operations
hsrp	read, write

Examples

This example shows how to set, for group number 1 on Ten Gigabit Ethernet interface 0/2/0/1, the time between hello packets to 5 seconds and the time after which a router is considered to be down to 15 seconds. The configured timer values are used only if the router is active (or before they have been learned).

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tengige 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp 1
Router(config-hsrp-gp)# timers 5 15
Router(config-hsrp-gp)#
```

This example shows how to set, for group number 1 on Ten Gigabit Ethernet interface 0/2/0/1, the time between hello packets to 200 milliseconds and the time after which a router is considered to be down to 1000 milliseconds. The configured timer values are always used because milliseconds have been specified.

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp 1 version 2
Router(config-hsrp-gp)# timers msec 200 msec 1000
Router(config-hsrp-gp)#
```

Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

Related Commands

Command	Description
show hsrp, on page 315	Displays HSRP information.

track (hsrp)

To configure an interface so that the Hot Standby priority changes on the basis of the availability of other interfaces, use the **hsrp track** command in HSRP group submode. To remove the tracking, use the **no** form of this command.

track *type* *interface-path-id* [*priority-decrement*]
no track *type* *interface-path-id* [*priority-decrement*]

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
priority-decrement	(Optional) Amount by which the Hot Standby priority for the router is decremented (or incremented) when the interface goes down (or comes back up). Range is 1 to 255.

Command Default The default priority-decrement is 10.

Command Modes HSRP Group Submode

Command History

Release	Modification
Release 7.1.1	This command was introduced. This command replaced the **hsrp track** command.

Usage Guidelines

The **hsrp track** command ties the Hot Standby priority of the router to the availability of its interfaces. It is useful for tracking interfaces that are not configured for the Hot Standby Router Protocol (HSRP). Only IP interfaces are tracked. A tracked interface is up if IP on that interface is up. Otherwise, the tracked interface is down.

When a tracked interface goes down, the Hot Standby priority decreases by 10. If an interface is not tracked, its state changes do not affect the Hot Standby priority. For each group configured for Hot Standby, you can configure a separate list of interfaces to be tracked.

The optional *priority-decrement* argument specifies by how much to decrement the Hot Standby priority when a tracked interface goes down. When the tracked interface comes back up, the priority is incremented by the same amount.

When multiple tracked interfaces are down and *priority-decrement* values have been configured, these configured priority decrements are cumulative. If tracked interfaces are down, but none of them were configured with priority decrements, the default decrement is 10 and it is cumulative.

The **hsrp preempt** command must be used in conjunction with this command on all routers in the group whenever the best available router should be used to forward packets. If the **hsrp preempt** command is not used, then the active router stays active, regardless of the current priorities of the other HSRP routers.

Task ID

Task ID	Operations
hsrp	read, write

Examples

This example shows how to configure an interface so that the Hot Standby priority changes on the basis of the availability of other interfaces.

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp 1 version 2
Router(config-hsrp-gp)# track tenGigE 0/4/0/4 2
Router(config-hsrp-gp)#
```

Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

Related Commands

Command	Description
preempt (hsrp), on page 310	Configures HSRP preemption and preemption delay.
priority (hsrp), on page 311	Configures HSRP priority.
show hsrp, on page 315	Displays HSRP information.

track(object)

To enable tracking of a named object with the specified decrement, use the **track (object)** command in HSRP group submode. To remove the tracking, use the **no** form of this command.

track object *name* [*priority-decrement*]
no track object *name* [*priority-decrement*]

Syntax Description

object *name*	Object tracking. Name of the object to be tracked.
priority-decrement	(Optional) Amount by which the Hot Standby priority for the router is decremented (or incremented) when the interface goes down (or comes back up). Range is 1 to 255.

Command Default

The default priority-decrement is 10.

Command Modes

HSRP Group Submode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
hsrp	read, write

Examples

This example shows how to configure object tracking under the HSRP group submode.

```
Router# configure
Router(config)# router hsrp
Router(config-hsrp)# interface tenGigE 0/4/0/4
Router(config-hsrp-if)# address-family ipv4
Router(config-hsrp-ipv4)# hsrp 1 version 2
Router(config-hsrp-gp)# track object t1 2
Router(config-hsrp-gp)#
```

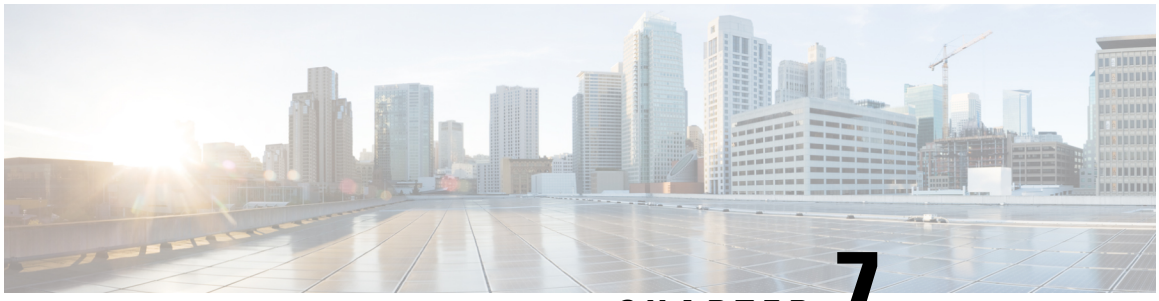
Note

- The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 2 for IPv6 address families.
- The HSRP version 2 extended group range must be restricted to 0-255, even though the configuration up to 0-4095 is accepted.

Note Starting with IOS XR Release 7.4.1, the HSRP version 2 extended group range configurable in the router is restricted to 0-255.

Related Commands

Command	Description
preempt (hsrp), on page 310	Configures HSRP preemption and preemption delay.
priority (hsrp), on page 311	Configures HSRP priority.
show hsrp, on page 315	Displays HSRP information.



CHAPTER 7

LPTS Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This chapter describes the Cisco IOS XR software commands used to monitor Local Packet Transport Services on NCS 5000 routers.

For detailed information about LPTS concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

clear lpts ifib statistics

To clear the Internal Forwarding Information Base (IFIB) statistics, use the **clear lpts ifib statistics** command in XR EXEC mode.

clear lpts ifib statistics [**location** *node-id*]

Syntax Description

location *node-id*	Clears the IFIB statistics for the designated node. The *node-id* argument is entered in standard *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
lpts	execute

Examples

The following example shows how to clear the IFIB statistics for the RP:

```
RP/0/RP0/CPU0:router# clear lpts ifib statistics
```

clear lpts pifib statistics

To clear the Pre-Internal Forwarding Information Base (Pre-IFIB) statistics, use the **clear lpts pifib statistics** command in XR EXEC mode.

clear lpts pifib statistics [**location** *node-id*]

Syntax Description

location *node-id*	Clears the Pre-IFIB statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
lpts	execute

Examples

The following example shows how to clear the Pre-IFIB statistics for the RP:

```
RP/0/RP0/CPU0:router# clear lpts pifib statistics location 0/RP0/CPU0
```

flow (LPTS)

To configure the policer for the Local Packet Transport Services (LPTS) flow type, use the **flow** command in pifib policer global configuration mode or pifib policer per-node configuration mode. To disable this feature, use the **no** form of this command.

flow *flow-type* **rate** *rate*
no flow *flow-type* **rate** *rate*

Syntax Description

flow-type	List of supported flow types.
rate *rate*	Specifies the rate in packets per seconds (PPS). The range is from 0 to 50000.

Command Default

The default behavior is to load the policer values from the static configuration file that is platform dependant.

Command Modes

Pifib policer global configuration

Pifib policer per-node configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The table lists the supported flow types and the parameters that are used to define a policer.

Table 39: List of Supported Flow Types

Flow Type	Description	Default Packet Rate (Recommended)
BGP-default	SRC port 179 and Dest Port 179 with protocol as TCP.	4000
fragment	IPv4/v6 fragmented packets.	1000
ICMP-default	All ICMP type packets.	2500
ISIS default	All ISIS protocol packets.	3500

Flow Type	Description	Default Packet Rate (Recommended)
LDP-UDP	UDP with Destination Port 646.	2000
OSPF-MC-default	OSPFv2 (224.0.0.5 and 224.0.0.6) and OSPFv3 (FF02::5 and FF02::6).	3500
OSPF-UC-default	OSPFv2 and OSPFv3 Unicast DBD packets.	3000
RAW-default	RAW default entry in LPTS.	500
RSVP-default	All RSVP protocol packets (RSVP signalling, refresh etc...).	14500
TCP-default	All TCP protocol packets (TCP-known, cfg-peer, listen).	25500
Third party applications	All third party application packets.	10000
UDP-default	All UDP protocol packets (UDP-known, CFG-peer, listen).	25500

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to configure the LPTS policer for the bgp-default flow type for all line cards:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# lpts pifib hardware police
RP/0/RP0/CPU0:router(config-pifib-policer-global)# flow bgp-default rate 4000
```

The following example shows how to configure LPTS policer for the Intermediate System-to-Intermediate System (IS-IS)-default flow type for a specific line card:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:routerconfig)# lpts pifib hardware police location 0/2/CPU0
RP/0/RP0/CPU0:router(config-pifib-policer-per-node)# flow isis-default rate 22222
```

lpts pifib hardware police

To configure the ingress policers and to enter pifib policer global configuration mode or pifib policer per-node configuration mode, use the **lpts pifib hardware police** command in XR Config mode. To set the policer to the default value, use the **no** form of this command.

lpts pifib hardware police [**location** *node-id*] [**flow** *flow-type* { **default** } [**rate** *rate*]
no lpts pifib hardware police [**location** *node-id*] [**flow** *flow-type* { **default** } [**rate** *rate*]

Syntax Description

location *node-id*	(Optional) Designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
flow *flow-type* **rate** *rate*	LPTS flow type and the policer rate in packets per second (PPS).
default	Indicates generic flows which are policed with default-rate. For example, BGP (*, 179), any packet with port:179 policed with default rate.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Provided that the apllication and the IP-SLA processing rates support it, you can specify the flow rate for IP-SLA flow entries to up to 1500.

Task ID

Task ID	Operations
lpts	read, write
config-services	read, write

Examples

This example shows how to configure the **lpts pifib hardware police** command for all line cards:

```
RP/0/RP0/CPU0:router(config)# lpts pifib hardware police
RP/0/RP0/CPU0:router(config-pifib-policer-global)#
```

This example shows how to configure the **lpts pifib hardware police** command for a specific line card:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# lpts pifib hardware police location 0/2/CPU0 flow fragment
rate 1000
```

lpts pifib hardware domain

To configure LPTS ingress domain, use the **lpts pifib hardware domain** command in the configuration mode.

lpts pifib hardware domain *name*

Syntax Description

domain *name*	Specifies ingress domain name.

Command Default

No ingress domain is configured.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.6.3	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operations
lpts	read, write

Task ID	Operations
config-services	read, write

This example shows how to configure the ingress domain using the **lpts pifib hardware domain** command:

```
RP/0/RP0/CPU0:router(config)# lpts pifib hardware domain ACCESS
RP/0/RP0/CPU0:router(config-lpts-domain-ACCESS)#
```

lpts pifib hardware dynamic-flows

To configure LPTS flow types and define the maximum LPTS entries for each flow type in the TCAM use the **lpts pifib hardware dynamic-flows** in configuration mode.

lpts pifib hardware dynamic-flows location *node-id* **flow** *flow-type* **max** *maximum-flow-entries*

Syntax Description

location*node-id*	Configures Dynamic LPTS per node. The *node-id* argument is entered inthe rack/slot/module notation. For more information, use the question mark (?) online help function
flow *flow-type*	Configures speficied flow type.
max *maximum-flow-entries*	Configures maximum flow entries per node. **Note** The maximum flow entry value of zero denotes that a flow type is not configured. For more information, use the question mark (?) online help function

Command Default

Dynamic LPTS is disabled

Command Modes

Configuration

Command History

Release	Modification
Release 6.2.2	This command was introduced.

Usage Guidelines

The sum of maximum LPTS entries configured for all flow types must not exceed 8000 entries. User can configure only configurable LPTS flow types listed in below table.

Table 40: Configurable Flow Types and Default Maximum Flow Entries

Flow Type	Default Maximum Flow Entries
BGP-known	900
BGP-cfg-peer	900
IP-SLA	50
LDP-TCP-known	300
LDP-TCP-cfg-peer	300
SSH-known	150
Telnet Known	150
NTP known	150
LDP-UDP	300
OSPF-uc-known	300
OSPF-mc-known	600
RSVP known	300
ISIS known	300
TPA	5
PIM-mcast-known	300
IGMP	1200
SNMP	300
VRRP	150
DNS	40
All-routers	300

Note You can increase the flow entries for IP-SLA to 500 by decreasing the other flow entries in such a way that the total of flow entries add up to 8000.

In this example you will configure the BGP-known and ISIS-known LPTS flow type in the TCAM and define the maximum flow entries as 1800 and 500 for node location 0/1/CPU0.

```
Router#configure
Router(config)#lpts pifib hardware dynamic-flows location 0/1/CPU0
Router(config-pifib-flows-per-node)#flow bgp-known max 1800
Router(config-pifib-flows-per-node)#flow ISIS-known max 500
```

Cisco NCS 540 Series Routers

The sum of maximum LPTS entries configured for all flow types must not exceed 2000 entries.

IPv6 LPTS entries take more TCAM space as compared to IPv4 entries. Thus, a system with many IPv6 LPTS entries cannot achieve a scale ~2000 entries.

Users can configure LPTS flow types listed in below table. This is applicable on the following NCS 540 variants

N540X-6Z18G-SYS-A, N540X-6Z18G-SYS-D, N540X-8Z16G-SYS-A, N540X-8Z16G-SYS-D, N540X-4Z14G2Q-A, N540X-4Z14G2Q-D

Table 41: Configurable Flow Types and Default Maximum Flow Entries

Flow Type	Default Maximum Flow Entries
BGP-known	222
BGP-cfg-peer	222
IP-SLA	15
LDP-TCP-known	74
LDP-TCP-cfg-peer	74
SSH-known	37
Telnet Known	37
NTP known	37
LDP-UDP	74
OSPF-uc-known	74
OSPF-mc-known	148
RSVP known	74
ISIS known	74
TPA	5
PIM-mcast-known	74
IGMP	287
SNMP	74
VRRP	37
DNS	10
All-routers	74

In this example you will configure the ISIS-known LPTS flow type in the TCAM and define the maximum flow entries as 100 for node location 0/RP0/CPU0.

```
Router# configure
Router(config)# lpts pifib hardware dynamic-flows location 0/RP0/CPU0
Router(config-pifib-flows-per-node)# flow isis known max 100
Router(config-pifib-flows-per-node)# commit
```

Task ID

Task ID	Operation
lpts	read, write
config-services	read, write

lpts punt police

To configure the ingress policer for the multicast, and broadcast punted traffic or to configure the ingress policer for the protocol punted traffic, use the **lpts punt police** command in XR Config mode. To set the policer to the default value, use the **no** form of this command.

lpts punt police { **bcast** | **domain** *name* | **interface** *name* | **mcast** | **protocol** { **arp | cdp | lacp** } } **rate** *rate*

Syntax Description

bcast	Specifies broadcast packets.
domain *name*	Specifies LPTS domain name.
interface *name*	Specifies specific interface location.
mcast	Specifies multicast packets.
protocol	Specifies protocol packets. Following protocols are supported: • ARP • CDP • LACP
rate*rate*	LPTS policer rate in packets per second (PPS). **Note** The PPS minimum and maximum range depends on a platform.

Command Default

No rate limit is configured.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.6.3	This command was introduced.

Usage Guidelines

After configuring the policer rates, the commit is accepted successfully. However, it is recommended to verify if there's any error message captured in the syslog.

Task ID

Task ID	Operations
lpts	read, write
config-services	read, write

Examples

This example shows how to configure the rate limit the multicast, broadcast and protocol punted traffic using the **lpts punt police** command at the global level:

```
RP/0/RP0/CPU0:router(config)# lpts punt police
RP/0/RP0/CPU0:router(config-lpts-punt-policer-global)# bcast rate 1000
RP/0/RP0/CPU0:router(config-lpts-punt-policer-global)# mcast rate 1000
RP/0/RP0/CPU0:router(config-lpts-punt-policer-global)# protocol arp rate 700
RP/0/RP0/CPU0:router(config-lpts-punt-policer-global)# protocol lacp rate 700
```

show lpts bindings

To display the binding information in the Port Arbitrator, use the **show lpts bindings** command in XR EXEC mode.

show lpts bindings [**location** *node-id*] [**client-id** {**clnl** | **ipsec** | **ipv4-io** | **ipv6-io** | **mpa** | **tcp** | **test** | **udp** | **raw**}] [**brief**] [**vrf** *vrf-name*]

Syntax Description

location *node-id*	(Optional) Displays information for the specified node. The *node-id* argument is entered in the *rack/slot/module* notation.
client-id	(Optional) Type of client. It can be one of the following values: • **clnl** —ISO connectionless protocol (used by IS-IS) • **ipsec** —Secure IP • **ipv4-io** —Traffic processed by the IPv4 stack • **ipv6-io** —Traffic processed by the IPv6 stack • **mpa** —Multicast Port Arbitrator (multicast group joins) • **tcp** —Transmission Control Protocol • **test** —Test applications • **udp** —User Datagram Protocol • **raw** —Raw IP

brief	(Optional) Displays summary output.
vrf *vrf-name*	(Optional) Name of assigned VRF.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show lpts bindings** command displays the Local Packet Transport Services (LPTS) bindings (requests to receive traffic of a particular type). Bindings are aggregated into flows by the LPTS Port Arbitrator; flows are then programmed into the Internal Forwarding Information Base (IFIB) and Pre-IFIB to direct packets to applications.

If you specify the optional **client-id** keyword and type of client, only bindings from that client are shown. If you specify the optional **location** keyword and *node-id* argument, only bindings from clients on that node are displayed.

Task ID

Task ID	Operations
lpts	read

Examples

The following sample output is from the **show lpts bindings** command, displaying bindings for all client ID types:

```
RP/0/RP0/CPU0:router# show lpts bindings

@ - Indirect binding; Sc - Scope

-----------------------------------------
Location   :0/1/CPU0
Client ID  :IPV4_IO
Cookie     :0x00000001
Clnt Flags :
Layer 3    :IPV4
Layer 4    :ICMP
Local Addr :any
Remote Addr:any
Local Port :any
Remote Port:any
Filters    :Type / Intf or Pkt Type / Source Addr / Location
 INCLUDE_TYPE / type 8
 INCLUDE_TYPE / type 13
 INCLUDE_TYPE / type 17
-----------------------------------------
Location   :0/2/CPU0
Client ID  :IPV4_IO
Cookie     :0x00000001
Clnt Flags :
```

```
Layer 3    :IPV4
Layer 4    :ICMP
Local Addr :any
Remote Addr:any
Local Port :any
Remote Port:any
Filters    :Type / Intf or Pkt Type / Source Addr / Location
 INCLUDE_TYPE / type 8
 INCLUDE_TYPE / type 13
 INCLUDE_TYPE / type 17
----------------------------------------
Location   :0/RP1/CPU0
Client ID  :TCP
Cookie     :0x4826f1f8
Clnt Flags :REUSEPORT
Layer 3    :IPV4
Layer 4    :TCP
Local Addr :any
Remote Addr:any
Local Port :7
Remote Port:any
----------------------------------------
Location   :0/RP1/CPU0
Client ID  :TCP
Cookie     :0x4826fa0c
Clnt Flags :REUSEPORT
Layer 3    :IPV4
Layer 4    :TCP
Local Addr :any
Remote Addr:any
Local Port :9
Remote Port:any
----------------------------------------
Location   :0/RP1/CPU0
Client ID  :TCP
Cookie     :0x482700d0
Clnt Flags :REUSEPORT
Layer 3    :IPV4
Layer 4    :TCP
Local Addr :any
Remote Addr:any
Local Port :19
Remote Port:any
----------------------------------------
Location   :0/RP1/CPU0
Client ID  :IPV4_IO
Cookie     :0x00000001
Clnt Flags :
Layer 3    :IPV4
Layer 4    :ICMP
Local Addr :any
Remote Addr:any
Local Port :any
Remote Port:any
Filters    :Type / Intf or Pkt Type / Source Addr / Location
 INCLUDE_TYPE / type 8
 INCLUDE_TYPE / type 13
 INCLUDE_TYPE / type 17
```

This table describes the significant fields shown in the display.

Table 42: show lpts bindings Command Field Descriptions

Field	Description
Location	Node location, in the format of *rack/slot/module*.
Client ID	LPTS client type.
Cookie	Client's unique tag for the binding.
Clnt Flags	REUSEPORT -- client has set the SO_REUSEPORT or SO_REUSEADDR socket option.
Layer 3	Layer 3 protocol (IPv4, IPv6, CLNL).
Layer 4	Layer 4 protocol (TCP, UDP).
Local Addr	Local (destination) address.
Remote Addr	Remote (source) address.
Local Port	Local (destination) TCP or UDP port, or ICMP/IGMP packet type, or IPsec SPI.
Remote Port	Remote (source) TCP or UDP port.

The following sample output is from the **show lpts bindings brief** command:

```
RP/0/RP0/CPU0:router# show lpts bindings brief

@ - Indirect binding; Sc - Scope

 Location   Clnt Sc L3   L4    VRF-ID   Local,Remote Address.Port  Interface
 ---------- ---- -- ---- ----- -------- -------------------------- ------------
 0/1/CPU0   IPV4 LO IPV4 ICMP  *        any.ECHO any               any
 0/1/CPU0   IPV4 LO IPV4 ICMP  *        any.TSTAMP any             any
 0/1/CPU0   IPV4 LO IPV4 ICMP  *        any.MASKREQ any            any
 0/1/CPU0   IPV6 LO IPV6 ICMP6 *        any.ECHOREQ any            any
 0/3/CPU0   IPV4 LO IPV4 ICMP  *        any.ECHO any               any
 0/3/CPU0   IPV4 LO IPV4 ICMP  *        any.TSTAMP any             any
```

This table describes the significant fields shown in the display.

Table 43: show lpts bindings brief Command Field Descriptions

Field	Description
Location	Node location, in the format of *rack/slot/module*.
Clnt ID	LPTS client type.
Sc	Scope (LR = Logical-Router, LO = Local).
Layer 3	Layer 3 protocol.
Layer 4	Layer 4 protocol.

Field	Description
VRF-ID	VPN routing and forwarding (VRF) identification (vrfid) number.
Local,Remote Address.Port	Local (destination) and Remote (source) addresses and ports or packet types.
Interface	Inbound interface.

show lpts clients

To display the client information for the Port Arbitrator, use the **show lpts clients** command in XR EXEC mode.

show lpts clients [**times**]

Syntax Description

times	(Optional) Displays information about binding request rates and service times.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show lpts clients** command displays the clients connected to the local packet transport services (LPTS) port arbitrator (PA).

Task ID

Task ID	Operations
lpts	read

Examples

The following sample output is from the **show lpts clients** command:

```
RP/0/RP0/CPU0:router# show lpts clients

o_flgs - open flags ; clid - client id
clid            loc             flags   o_flgs
RAW(3)          0/RP1/CPU0      0x1     0x2
TCP(1)          0/RP1/CPU0      0x1     0x2
IPV4_IO(5)      0/1/CPU0        0x3     0x2
IPV4_IO(5)      0/2/CPU0        0x3     0x2
IPV4_IO(5)      0/RP1/CPU0      0x3     0x2
MPA(7)          0/RP1/CPU0      0x3     0x0
```

This table describes the significant fields shown in the display.

Table 44: show lpts clients Command Field Descriptions

Field	Description
Clid	LPTS client ID.
Loc	Node location, in the format *rack/slot/module*.
Flags	Client flags. **Note** The client flags are used only for debugging purposes.
o_flags	Open flags. **Note** The open flags are used only for debugging purposes.

The following sample output is from the **show lpts clients times** command. The output shows samples for the last 30 seconds, 1 minute, 5 minutes, 10 minutes, and a total (if nonzero). The number of transactions, number of updates, and the minimum/average/maximum time in milliseconds to process each transaction is shown.

```
RP/0/RP0/CPU0:router# show lpts clients times

o_flgs - open flags ; clid - client id
clid            loc     flags   o_flgs
RAW(3)          0/RP1/CPU0      0x1     0x2
   30s:2 tx 2 upd 2/2/3ms/tx
    1m:2 tx 2 upd 2/2/3ms/tx
    5m:2 tx 2 upd 2/2/3ms/tx
   10m:2 tx 2 upd 2/2/3ms/tx
 total:2 tx 2 upd 2/-/3ms/tx
TCP(1)          0/RP1/CPU0      0x1     0x2
 total:3 tx 3 upd 1/-/1ms/tx
IPV4_IO(5)      0/1/CPU0        0x3     0x2
 total:1 tx 1 upd 0/-/0ms/tx
IPV4_IO(5)      0/2/CPU0        0x3     0x2
 total:1 tx 1 upd 1/-/1ms/tx
IPV4_IO(5)      0/RP1/CPU0      0x3     0x2
 total:1 tx 1 upd 3/-/3ms/tx
MPA(7)          0/RP1/CPU0      0x3     0x0
```

show lpts flows

To display information about Local Packet Transport Services (LPTS) flows, use the **show lpts flows** command in XR EXEC mode.

show lpts flows [**brief**]

Syntax Description

brief (Optional) Displays summary output.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines The **show lpts flows** command is used to display LPTS flows, which are aggregations of identical binding requests from multiple clients and are used to program the LPTS Internal Forwarding Information Base (IFIB) and Pre-IFIB.

Task ID

Task ID	Operations
lpts	read

Examples The following sample output is from the **show lpts flows** command:

```
RP/0/RP0/CPU0:router# show lpts flows

----------------------------------------
L3-proto    : IPV4(2)
L4-proto    : ICMP(1)
VRF-ID      : * (000000000)
Local-IP    : any
Remote-IP   : any
Pkt-Type    : 8
Remote-Port : any
Interface   : any (0x0)
Flow-type   : ICMP-local
Min-TTL     : 0
Slice       : RAWIP4_FM
Flags       : 0x20 (in Pre-IFIB)
Location    : (drop)
Element References
location / count / scope
* / 3 / LOCAL
```

This table describes the significant fields shown in the display.

Table 45: show lpts flows Command Field Descriptions

Field	Description
L3-proto	Layer 3 protocol (IPv4, IPv6, CLNL).
L4-proto	Layer 4 protocol (TCP, UDP, and so on).
VRF-ID	VPN routing and forwarding (VRF) identification (vrfid) number.
Local-IP	Local (destination) IP address.

Field	Description
Remote-IP	Remote (source) IP address.
Pkt-Type	ICMP or IGMP packet type.
Remote-Port	Remote (source) TCP or UDP port.
Interface	Ingress interface.
Flow-type	Flow classification for hardware packet policing.
Min-TTL	Minimum time-to-live value expected from in the incoming packet. Any packet received with a lower TTL value will be dropped.
Slice	IFIB slice.
Flags	• Has FGID: Delivered to multiple destinations. • No IFIB entry: IFIB entry suppressed. • Retrying FGID allocation. • In Pre-IFIB: Entry is in Pre-IFIB as well. • Deliver to one: If multiple bindings, will deliver to only one.
Location	*rack/slot/module* to deliver to.
Element References	• location: *rack/slot/module* of client. • count: number of clients at that location. • scope: binding scope (LR:Logical Router, LOCAL:Local).

The following sample output is from the **show lpts flows brief** command:

```
RP/0/RP0/CPU0:router# show lpts flows brief

+ - Additional delivery destination; L - Local interest; P - In Pre-IFIB

 L3   L4    VRF-ID   Local, Remote Address.Port      Interface    Location    LP
 ---- ----- -------- ------------------------------- ------------ ----------- --
 IPV4 ICMP  *        any.ECHO any                    any          (drop)      LP
 IPV4 ICMP  *        any.TSTAMP any                  any          (drop)      LP
 IPV4 ICMP  *        any.MASKREQ any                 any          (drop)      LP
 IPV6 ICMP6 *        any.ECHOREQ any                 any          (drop)      LP
 IPV4 any   default  224.0.0.2 any                   Gi0/1/0/1    0/5/CPU0     P
```

This table describes the significant fields shown in the display.

Table 46: show lpts flows brief Command Field Descriptions

Field	Description
L3	Layer 3 protocol (IPv4, IPv6, CLNL).
L4	Layer 4 protocol.
VRF-ID	VPN routing and forwarding (VRF) identification (vrfid) number.

Field	Description
Local, Remote Address.Port	Local (destination) and remote (source) IP addresses and TCP or UDP ports, or ICMP/IGMP packet types, or IPSec Security Parameters Indices.
Interface	Ingress interface.
Location	Delivery location: • *rack/slot/module*—Individual location. • [0xNNNNN]—Multiple locations (platform-dependent value). • (drop)—Do not deliver to any application.
LP	Local interest (to be processed by IPv4 or IPv6 stack directly) or entry is resident in Pre-IFIB.

show lpts ifib

To display the entries in the Internal Forwarding Information Base (IFIB), use the **show lpts ifib** command in XR EXEC mode.

show lpts ifib [**entry**] [{**type** {**bgp4** | **bgp6** | **isis** | **mcast4** | **mcast6** | **ospf-mc4** | **ospf-mc6** | **ospf4** | **ospf6** | **raw4** | **raw6** | **tcp4** | **tcp6** | **udp4** | **udp6**} | **all**}] [**brief** [**statistics**]] [**slices**] [**times**] [**location** *node-id*]

Syntax Description

entry	(Optional) Displays the IFIB entries.
type	(Optional) Displays the following protocol types. • **bgp4** —IPv4 Border Gateway Protocol (BGP) slice • **bgp6** —IPv6 BGP slice • **isis** —Intermediate System-to-Intermediate System (IS-IS) slice • **mcast4** —IPv4 multicast slice • **mcast6** —IPv6 multicast slice • **ospf-mc4** —IPv4 Open Shortest Path First (OSPF) multicast slice • **ospf-mc6** —IPv6 OSPF multicast slice • **ospf4** —IPv4 OSPF slice • **ospf6** —IPv6 OSPF slice • **raw4** —IPv4 raw IP • **raw6** —IPv6 raw IP • **tcp4** —IPv4 Transmission Control Protocol (TCP) slice • **tcp6** —IPv6 TCP slice • **udp4** —IPv4 UDP slice • **udp6** —IPv6 UDP slice
all	Displays all IFIB types.
brief	(Optional) Displays the IFIB entries in brief format.
statistics	(Optional) Displays the IFIB table with statistics information.

slices	(Optional) Displays IFIB slices.
times	(Optional) Displays the IFIB update transaction times.
location *node-id*	(Optional) Specifies the location of the Flow Manager. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use this command to display detailed information about the entries in an IFIB slice. This command is useful for debugging problems with delivering packets to applications.

When the **statistics** keyword is used, detailed statistics are displayed for packet count, number of entries in each slice, and a total entries count.

Task ID

Task ID	Operations
lpts	read

Examples

The following sample output is from the **show lpts ifib** command:

```
RP/0/RP0/CPU0:router# show lpts ifib

O - Opcode; A - Accept Counter; D - Drop Counter; F - Flow Type; L - Listener Tag;
I - Local Flag; Y - SYN; T - Min TTL; DV - Deliver; DP - Drop; RE - Reassemble; na - Not
Applicable
-----------------------------------------------------
VRF-ID           : default (0x60000000)
Port/Type        : any
Source Port      : any
Dest IP          : any
Source IP        : any
Layer 4          : 88 (88)
Interface        : any (0x0)
O/A/D/F/L/I/Y/T  : DELIVER/0/0/IPv4_STACK/0/0/0
Deliver List     : 0/5/CPU0
-----------------------------------------------------
```

This table describes the significant fields shown in the display.

Table 47: show lpts ifib entries Command Field Descriptions

Field	Description
VRF-ID	VPN routing and forwarding (VRF) identification (vrfid) number.
Port/Type	Destination (local) TCP or UDP port number, or ICMP/IGMP packet type, or IPSec Security Parameters Index.t2222
Source Port	Source (remote) TCP or UDP port.
Dest IP	Destination (local) IP address.
Source IP	Source (remote) IP address.
Layer 4	Layer 4 protocol number (6 = TCP). **Note** Only the common Layer 4 protocol names are displayed.
Interface	Ingress interface name.
O/S/P/R/L/I/Y	• O: Opcode (DELIVER, DROP, or REASSEMBLE • S: Stats counter • P: Packet forwarding priority (LO, MED, or HIGH) • R: Rate limit (LO, MED, or HIGH) • L: Listener tag (IPv4_STACK, IPv6_STACK, or CLNL_STACK) • I: Local-interest flag (0 or 1) • Y: TCP SYN flag (0 or 1)
Deliver List	• (drop)—Drop packet • *rack/slot/module*—Deliver to single destination • [0xNNNN]—Deliver to multiple destinations (platform-dependent format)

The following sample output is from the **show lpts ifib brief** command:

```
RP/0/RP0/CPU0:router# show lpts ifib brief

 Slice    Local, Remote Address.Port            L4    Interface    Dlvr
 -------- ------------------------------------- ----- ------------ -----------
 TCP4     any.7 any                             TCP   any          0/RP1/CPU0
 TCP4     any.9 any                             TCP   any          0/RP1/CPU0
```

The following sample output is from the **show lpts ifib brief statistics** command:

```
RP/0/RP0/CPU0:router# show lpts ifib brief statistics

 Slice    Local, Remote Address.Port            L4    Interface    Accept/Drop
 -------- ------------------------------------- ----- ------------ -----------
 TCP4     any.7 any                             TCP   any          0/0
 TCP4     any.9 any                             TCP   any          0/0
 TCP4     any.19 any                            TCP   any          0/0
```

```
 Slice    Num. Entries Accepts/Drops
 -------- ------------ -------------
TCP4     3            0/0
Total    3            0/0
```

show lpts ifib slices

To display Internal Forwarding Information Base (IFIB) slice information, use the **show lpts ifib slices** command in XR EXEC mode.

show lpts ifib slices [**type** {**bgp4** | **bgp6** | **isis** | **mcast4** | **mcast6** | **ospf-mc4** | **ospf-mc6** | **ospf4** | **ospf6** | **raw4** | **raw6** | **tcp4** | **tcp6** | **udp4** | **udp6**}] [**all**] [**statistics**] [**times**]

Syntax Description

type	(Optional) Enter protocol types. • **bgp4** —IPv4 Border Gateway Protocol (BGP) slice • **bgp6** —IPv6 BGP slice • **isis** —Intermediate System-to-Intermediate System (IS-IS) slice • **mcast4** —IPv4 multicast slice • **mcast6** —IPv6 multicast slice • **ospf-mc4** —IPv4 Open Shortest Path First (OSPF) multicast slice • **ospf-mc6** —IPv6 OSPF multicast slice • **ospf4** —IPv4 OSPF slice • **ospf6** —IPv6 OSPF slice • **raw4** —IPv4 raw IP • **raw6** —IPv6 raw IP • **tcp4** —IPv4 Transmission Control Protocol (TCP) slice • **tcp6** —IPv6 TCP slice • **udp4** —IPv4 UDP slice • **udp6** —IPv6 UDP slice
all	(Optional) Displays all entries.
statistics	(Optional) Displays the statistics for slice lookups.
times	(Optional) Displays the IFIB update transaction times.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show lpts ifib slices** command when troubleshooting IFIB entries and slice assignments. This command is especially useful when troubleshooting problems with delivering packets to applications.

Task ID

Task ID	Operations
lpts	read

Examples

The following sample output is from the **show lpts ifib slices** command:

```
RP/0/RP0/CPU0:router# show lpts ifib slices

Slice    L3   L4     Port  Location
-------- ---- ------ ----- --------
RAWIP4   IPV4 any    any   0/RP0/CPU0
RAWIP6   IPV6 any    any   0/RP0/CPU0
OSPF4    IPV4 OSPF   any   0/RP0/CPU0
OSPF6    IPV6 OSPF   any   0/RP0/CPU0
OSPF_MC4 IPV4 any    any   0/RP0/CPU0
OSPF_MC6 IPV6 any    any   0/RP0/CPU0
BGP4     IPV4 TCP    179   0/RP0/CPU0
BGP6     IPV6 TCP    179   0/RP0/CPU0

UDP4     IPV4 UDP    any   0/RP0/CPU0
UDP6     IPV6 UDP    any   0/RP0/CPU0
TCP4     IPV4 TCP    any   0/RP0/CPU0
TCP6     IPV6 TCP    any   0/RP0/CPU0
ISIS     CLNS -      any   0/RP0/CPU0
MCAST4   IPV4 any    any   0/RP0/CPU0
MCAST6   IPV6 any    any   0/RP0/CPU0
```

The following sample output is from the **show lpts ifib slices times** command:

```
RP/0/RP0/CPU0:router# show lpts ifib slices times

Slice    L3   L4     Port  Location
-------- ---- ------ ----- --------
RAWIP4   IPV4 any    any   0/RP0/CPU0
RAWIP6   IPV6 any    any   0/RP0/CPU0
OSPF4    IPV4 OSPF   any   0/RP0/CPU0
OSPF6    IPV6 OSPF   any   0/RP0/CPU0
OSPF_MC4 IPV4 any    any   0/RP0/CPU0
OSPF_MC6 IPV6 any    any   0/RP0/CPU0
BGP4     IPV4 TCP    179   0/RP0/CPU0
BGP6     IPV6 TCP    179   0/RP0/CPU0

UDP4     IPV4 UDP    any   0/RP0/CPU0
UDP6     IPV6 UDP    any   0/RP0/CPU0
TCP4     IPV4 TCP    any   0/RP0/CPU0
TCP6     IPV6 TCP    any   0/RP0/CPU0
ISIS     CLNS -      any   0/RP0/CPU0
MCAST4   IPV4 any    any   0/RP0/CPU0
MCAST6   IPV6 any    any   0/RP0/CPU0
  Flow Manager 0/RP0/CPU0:
   total:5 tx 13 upd 1/-/1ms/tx
```

The following sample output is from the **show lpts ifib slices statistics** command:

```
RP/0/RP0/CPU0:router# show lpts ifib slices all statistics

Slice    L3   L4     Port  Location   Lookups RmtDlvr Rejects RLDrops NoEntry
-------- ---- ------ ----- ---------- ------- ------- ------- ------- -------
RAWIP4   IPV4 any    any   0/0/CPU0   5       0       0       0       0
RAWIP6   IPV6 any    any   0/0/CPU0   0       0       0       0       0
OSPF4    IPV4 OSPF   any   0/0/CPU0   0       0       0       0       0
OSPF6    IPV6 OSPF   any   0/0/CPU0   0       0       0       0       0
OSPF_MC4 IPV4 any    any   0/0/CPU0   0       0       0       0       0
OSPF_MC6 IPV6 any    any   0/0/CPU0   0       0       0       0       0
BGP4     IPV4 TCP    179   0/0/CPU0   0       0       0       0       0
BGP6     IPV6 TCP    179   0/0/CPU0   0       0       0       0       0

UDP4     IPV4 UDP    any   0/0/CPU0   3704    0       979     0       0
UDP6     IPV6 UDP    any   0/0/CPU0   0       0       0       0       0
TCP4     IPV4 TCP    any   0/0/CPU0   0       0       0       0       0
TCP6     IPV6 TCP    any   0/0/CPU0   0       0       0       0       0
ISIS     CLNS -      any   0/0/CPU0   0       0       0       0       0
MCAST4   IPV4 any    any   0/0/CPU0   0       0       0       0       0
MCAST6   IPV6 any    any   0/0/CPU0   0       0       0       0       0
  Flow Manager 0/0/CPU0:
   Packets in: 3792
   Packets delivered locally without lookups: 83
   Slice lookups: 3709
     Rejects: 979
```

This table describes the significant fields shown in the display.

Table 48: show lpts ifib slices statistics Command Field Descriptions

Field	Description
Slice	Slice number.
L3-proto	Layer 3 protocol (IPv4, IPv6, CLNL).
L4-proto	Layer 4 protocol (TCP, UDP, and others).
Port	Local (destination) TCP or UDP port.
Location	Node location, in the format *rack/slot/module*.

show lpts ifib statistics

To display Internal Forwarding Information Base (IFIB) statistics, use the **show lpts ifib statistics** command in .

show lpts ifib statistics [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays IFIB statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
lpts	read

Examples

The following sample output is from the **show lpts ifib statistics** command:

```
RP/0/# show lpts ifib statistics

Flow Manager 0/RP0/CPU0:
   Packets in:254
   Packets delivered locally without lookups:0
   Slice lookups:254
     Post-lookup error drops:
      Failed ipv4_netio_input:1
     Rejects:254
    Packets delivered locally:0
    Packets delivered remotely:0
```

This table describes the significant fields shown in the display.

Table 49: show lpts ifib statistics Command Field Descriptions

Field	Description
Packets in	Packets presented to the LPTS decaps node in netio.
Packets delivered locally without lookups	Packets previously resolved on a LC delivered directly to L3.
Slice lookups	Packets requiring slice lookups.
Post-lookup error drops	Packets dropped after a slice lookup.
Rejects	Packets that caused a TCP RST or ICMP Port/Protocol Unreachable.
Packets delivered locally	Packets delivered to local applications after slice lookups.
Packets delivered remotely	Packets delivered to applications on remote RPs.

Note The sample output is an example only and displays only those fields showing a value. No display exists for nonzero values. This command may show other values depending on your router configuration.

show lpts ifib times

To display Internal Forwarding Information Base (IFIB) update transaction times, use the **show lpts ifib times** command in XR EXEC mode.

show lpts ifib times [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays IFIB update transaction times for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
lpts	read

Examples

The following sample output is from the **show lpts ifib times** command:

```
RP/0/RP0/CPU0:router# show lpts ifib times

Slice    L3   L4     Port  Location
-------- ---- ------ ----- --------
RAWIP4   IPV4 any    any   0/RP1/CPU0
RAWIP6   IPV6 any    any   0/RP1/CPU0
OSPF4    IPV4 OSPF   any   0/RP1/CPU0
OSPF6    IPV6 OSPF   any   0/RP1/CPU0
OSPF_MC4 IPV4 any    any   0/RP1/CPU0
OSPF_MC6 IPV6 any    any   0/RP1/CPU0
BGP4     IPV4 TCP    179   0/RP1/CPU0
BGP6     IPV6 TCP    179   0/RP1/CPU0
UDP4     IPV4 UDP    any   0/RP1/CPU0
UDP6     IPV6 UDP    any   0/RP1/CPU0
TCP4     IPV4 TCP    any   0/RP1/CPU0
TCP6     IPV6 TCP    any   0/RP1/CPU0
ISIS     CLNS -      any   0/RP1/CPU0
MCAST4   IPV4 any    any   0/RP1/CPU0
MCAST6   IPV6 any    any   0/RP1/CPU0
Flow Manager 0/RP0/CPU0:
 total:5 tx 13 upd 1/-/1ms/tx
```

This table describes the significant fields shown in the display.

Table 50: show lpts ifib times Command Field Descriptions

Field	Description
Slice	Slice number.
L3 Protocol	Layer 3 protocol (IPv4, IPV6, CLNL).
L4 Protocol	Layer 4 protocol (TCP, UDP, and so on).
Port	Local (destination) TCP or UDP port.
Location	Node location, in the format *rack/slot/module*.

show lpts pifib

To display Pre-Internal Forwarding Information Base (Pre-IFIB) entries, use the **show lpts pifib** command in XR EXEC mode.

show lpts pifib [entry] [hardware {**entry | police**} [**brief**] **[location** *node-id*]

Syntax Description

entry	(Optional) Pre-IFIB entry.
hardware	(Optional) Displays hardware for Pre-IFIB.
entry	(Optional) Displays the entries for Pre-IFIB.
police	(Optional) Displays the policer values that are being use.
brief	(Optional) Pre-IFIB entries in brief format.
location *node-id*	(Optional) The *node-id* argument is entered in the *rack/slot/module* notation (for example, 0/7/CPU0).

Command Default

By default, all entries are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show lpts pifib** command with the **brief** keyword to perform the following functions:

- Display entries of all or part of a Pre-IFIB.

- Display a short description of each entry in the LPTS Pre-IFIB, optionally displaying packet counts for each entry.

Note These statistics are used only for packets that are processed by a line card, route processor, or distributed route processor.

Pre-IFIB statistics for packets processed by line card hardware are counted separately.

By default, all the defaults including the statistics for **hardware** are displayed.

Task ID

Task ID	Operations
lpts	read

Examples

The following is sample output for the **show lpts pifib** command:

```
RP/0/RP0/CPU0:router#  show lpts pifib entry brief location 0/3/CPU0

* - Any VRF; I - Local Interest;
X - Drop; R - Reassemble;

 Type       VRF-ID   L4     Interface    Deliver      Local-Address,Port Remote-Address,Port

 ---------- -------- ------ ------------ ------------ -------------------------------------

 ISIS       *        -      any          0/RP0/CPU0   - -
 IPv4_frag  *        any    any          R            any any
 IPv4_echo  *        ICMP   any          I            any,ECHO any
 IPv4       *        ICMP   any          0/RP0/CPU0   any,ECHOREPLY any
 IPv4       *        ICMP   any          I            any,TSTAMP any
 IPv4       *        ICMP   any          I           any,MASKREQ any
 IPv4       *        TCP    any          0/RP0/CPU0   any any,179
 IPv4       *        TCP    any          0/RP0/CPU0   any,179 any
 IPv4       *        TCP    any          0/RP0/CPU0   any any
 IPv4       *        UDP    any          0/RP0/CPU0   any,1701 any
 IPv4       *        UDP    any          0/RP0/CPU0   any any
 IPv4       *        OSPF   any          0/RP0/CPU0   224.0.0.5 any
 IPv4       *        OSPF   any          0/RP0/CPU0   224.0.0.6 any
 IPv4       *        OSPF   any          0/RP0/CPU0   any any
 IPv4       *        any    any          0/RP0/CPU0   any any
 IPv6_frag  *        any    any          R            any any
 IPv6_echo  *        ICMP6  any          I           any,ECHOREQ any
```

The following is sample output for the **show lpts pifib type** command using the **ipv4** and **tcp** keywords.

```
RP/0/RP0/CPU0:router# show lpts pifib type ipv4 tcp

O - Opcode; F - Flow Type; L - Listener Tag; I - Local Flag; T - Min TTL;
na - Not Applicable
-------------------------------------------------
L3 Protocol       : IPV4
L4 Protocol       : TCP
```

```
VRF-ID            : default (0x60000000)
Destination IP    : any
Source IP         : any
Port/Type         : Port:23
Source Port       : any
Is Fragment       : 0
Is SYN            : 0
Interface         : any (0x0)
O/F/L/I/T         : DELIVER/TELNET-default/IPv4_LISTENER/0/0
Deliver List      : 0/RP0

/CPU0
Accepts/Drops     : 0/0
Is Stale          : 0
---------------------------------------------------
```

The following is sample output from the **show lpts pifib** command with the **entry** and **brief** keywords added command:

```
RP/0/RP0/CPU0:router# show lpts pifib entry brief

* - Critical Flow; I - Local Interest;
X - Drop; R - Reassemble;

 Type       VRF-ID   Local, Remote Address.Port L4    Interface    Deliver
 ---------- -------- -------------------------- ----- ------------ -------------

 ISIS       *        - -                        -     any          0/0/CPU0
 IPv4_frag  *        any any                    any   any          R
 IPv4_IXMP  *        any.ECHO any               ICMP  any          XI
 IPv4_IXMP  *        any.TSTAMP any             ICMP  any          XI
 IPv4_IXMP  *        any.MASKREQ any            ICMP  any          XI
 IPv4_IXMP  *        any any                    ICMP  any          0/0/CPU0
 IPv4_IXMP  *        any any                    IGMP  any          0/0/CPU0
 IPv4_mcast *        224.0.0.5 any              any   any          0/0/CPU0
 IPv4_mcast *        224.0.0.6 any              any   any          0/0/CPU0
 IPv4_mcast *        224.0.0.0/4 any            any   any          0/0/CPU0

 IPv4_TCP   *        any.179 any                TCP   any          0/0/CPU0
 IPv4_TCP   *        any any.179                TCP   any          0/0/CPU0
 IPv4_TCP   *        any any                    TCP   any          0/0/CPU0
 IPv4_UDP   *        any any                    UDP   any          0/0/CPU0
 IPv4_IPsec *        any any                    ESP   any          0/0/CPU0
 IPv4_IPsec *        any any                    AH    any          0/0/CPU0
 IPv4_rawIP *        any any                    OSPF  any          0/0/CPU0
 IPv4_rawIP *        any any                    any   any          0/0/CPU0
 IPv6_frag  *        any any                    any   any          R
 IPv6_ICMP  *        any.na any                 ICMP6 any          XI
 IPv6_ICMP  *        any any                    ICMP6 any          0/0/CPU0
 IPv6_mcast *        ff02::5 any                any   any          0/0/CPU0
 IPv6_mcast *        ff02::6 any                any   any          0/0/CPU0
 IPv6_mcast *        ff00::/8 any               any   any          0/0/CPU0
 IPv6_TCP   *        any.179 any                TCP   any          0/0/CPU0
 IPv6_TCP   *        any any.179                TCP   any          0/0/CPU0
 IPv6_TCP   *        any any                    TCP   any          0/0/CPU0
 IPv6_UDP   *        any any                    UDP   any          0/0/CPU0
 IPv6_IPsec *        any any                    ESP   any          0/0/CPU0
 IPv6_IPsec *        any any                    AH    any          0/0/CPU0
 IPv6_rawIP *        any any                    OSPF  any          0/0/CPU0
 IPv6_rawIP *        any any                    any   any          0/0/CPU0
```

The following sample output is from the **show lpts pifib** command with the **entry, brief,** and **entry brief statistics** keywords added:

```
RP/0/RP0/CPU0:router# show lpts pifib entry brief statistics

* - Critical Flow; I - Local Interest;
X - Drop; R - Reassemble;

 Type       VRF-ID   Local, Remote Address.Port L4    Interface    Accepts/Drops

 ---------- -------- -------------------------- ----- ------------ -------------

 ISIS       *        - -                        -     any          0/0
 IPv4_frag  *        any any                    any   any          0/0
 IPv4_IXMP  *        any.ECHO any               ICMP  any          0/0
 IPv4_IXMP  *        any.TSTAMP any             ICMP  any          0/0
 IPv4_IXMP  *        any.MASKREQ any            ICMP  any          0/0
 IPv4_IXMP  *        any any                    ICMP  any          5/0
 IPv4_IXMP  *        any any                    IGMP  any          0/0
 IPv4_mcast *        224.0.0.5 any              any   any          0/0
 IPv4_mcast *        224.0.0.6 any              any   any          0/0
 IPv4_mcast *        224.0.0.0/4 any            any   any          0/0
 IPv4_TCP   *        any.179 any                TCP   any          0/0
 IPv4_TCP   *        any any.179                TCP   any          0/0
 IPv4_TCP   *        any any                    TCP   any          0/0
 IPv4_UDP   *        any any                    UDP   any          4152/0
 IPv4_IPsec *        any any                    ESP   any          0/0
 IPv4_IPsec *        any any                    AH    any          0/0
 IPv4_rawIP *        any any                    OSPF  any          0/0


----------------------


statistics:

Type            Num. Entries         Accepts/Drops

------          ------------         -------------
ISIS            1                    0/0
IPv4_frag       1                    0/0
IPv4_IXMP       5                    5/0
IPv4_mcast      3                    0/0
IPv4_TCP        3                    0/0
IPv4_UDP        1                    4175/0
IPv4_IPsec      2                    0/0
IPv4_rawIP      2                    0/0
IPv6_frag       1                    0/0
IPv6_ICMP       2                    0/0
IPv6_mcast      3                    0/0
IPv6_TCP        3                    0/0
IPv6_UDP        1                    0/0
IPv6_IPsec      2                    0/0
IPv6_rawIP      2                    0/0
Total           32

Packets into Pre-IFIB: 4263
Lookups: 4263
Packets delivered locally: 4263
Packets delivered remotely: 0
```

This table describes the significant fields shown in the display for the **show lpts pifib** command with the **brief** and **statistics** keywords .

Table 51: show lpts pifib Command Field Descriptions

Field	Description
Type	Hardware entry type.
VRF ID	VPN routing and forwarding (VRF) identification (vrfid) number.
Local, Remote Address. Port	Indicates local address (in the form of local port and type) and remote address (remote port).
L4	Layer 4 protocol of the entry.
Interface	Interface for this entry.
Accepts/Drops	Number of packets sent to DestAddr/Number of packets dropped due to policing.
Num. Entries	Number of pre-ifib entries of the listed type.
Packets into Pre-IFIB	Packets presented for pre-IFIB lookups.
Lookups	Packets looked up.
Packets delivered locally	Packets delivered to local applications or the local stack (*n* duplicated) packets duplicated for delivery to applications and the local stack.
Packets delivered remotely	Packets delivered to applications or for lookup on other RPs.

show lpts pifib hardware entry

To display entries in the Local Packet Transport Services (LPTS) pre-IFIB hardware table, use the **show lpts pifib hardware entry** command in XR EXEC mode.

show lpts pifib hardware entry [{**brief**}] [**location** {**all***node_id*}]

Syntax Description

brief	(Optional) Displays summary hardware entry information.
location all	(Optional) Specifies all locations.
location *node-id*	(Optional) Displays pre-Internal Forwarding Information Base (IFIB) information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

Displays hardware entry information in brief.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
lpts	read

Examples

The following sample output is from the **show lpts pifib hardware entry** command with the **location** keyword:

```
RP/0/RP0/CPU0:router# show lpts pifib hardware entry brief location 0/3/CPU0

* - Read on clear stats
-----------------------------------------------------

DestIP             L4Proto  port/Type          remotePort    npu    ListenerTag
Flowtype                DestNode           Accepted* Dropped*  OOS
------------------ -----    ----------------- ---------- ------ ------------------
-----------------       ----------------- --------- --------- ---------
0.0.0.0            0        any                0            0      IPv4_REASS
Fragment                Local LC           0         0
0.0.0.0            1        ICMP_Dflt          0            0      RAWIP4_FM
ICMP-default            Local LC           0         0          *
224.0.0.5          89       any                0            0      IPv4_STACK
OSPF-mc-default         Deliver RP         72        0          *
224.0.0.6          89       any                0            0      IPv4_STACK
OSPF-mc-default         Deliver RP         0         0          *
0.0.0.0            89       any                0            0      OSPF4_FM
OSPF-uc-default         Deliver RP         30        0          *
0.0.0.0            6        Port:179           0            0      BGP4_FM
BGP-default             Local LC           0         0          *
0.0.0.0            6        Port:any           179          0      BGP4_FM
BGP-default             Local LC           25        0          *
0.0.0.0            6        Port:any           0            0      TCP4_FM
TCP-default             Local LC           0         0          *
0.0.0.0            17       Port:any           0            0      UDP4_FM
UDP-default             Local LC           67        0          *
0.0.0.0            46       any                0            0      RAWIP4_FM
RSVP-default            Local LC           0         0          *
0.0.0.0            0        any                0            0      RAWIP4_FM
Raw-default             Local LC           0         0          *
::                 0        any                0            0      IPv6_REASS
Fragment                Local LC           0         0          *
::                 58       ICMP6_LL           0            0      RAWIP6_FM
ICMP-default            Local LC           10        0          *
::                 58       ICMP6_MD           0            0      RAWIP6_FM
ICMP-default            Local LC           3         0          *
::                 58       ICMP6_Dflt         0            0      RAWIP6_FM
ICMP-default            Local LC           4         0          *
0:2ff::500:0       89       any                0            0      IPv6_STACK
OSPF-mc-default         Deliver RP         76        0          *
0:2ff::600:0       89       any                0            0      IPv6_STACK
OSPF-mc-default         Deliver RP         0         0          *
```

```
::                  89       any                0          0      OSPF6_FM
OSPF-uc-default          Deliver RP          44         0        *
::                  6        Port:179           0          0      BGP6_FM
BGP-default              Local LC            16         0        *
::                  6        Port:any           179        0      BGP6_FM
BGP-default              Local LC            16         0        *
::                  6        Port:any           0          0      TCP6_FM
TCP-default              Local LC            0          0        *
::                  17       Port:any           0          0      UDP6_FM
UDP-default              Local LC            0          0        *
::                  0        any                0          0      RAWIP6_FM
Raw-default              Local LC            0          0        *
any                 0        ISIS_Dflt          0          0      CLNS_STACK
ISIS-default             Deliver RP          56         0        *
any                 0        ISIS_Jumbo         0          0      CLNS_STACK
ISIS-default             Deliver RP          0          0        *
```

This table describes the significant fields shown in the display.

Table 52: show lpts pifib hardware entry Command Field Descriptions

Field	Description
DestIP	IP address of the destination node.
L4 Protocol	Layer 4 protocol of the entry.
Port/Type	Port or type for this entry.
remotePort	Remote port for this entry.
npu	Network Processor Unit.
ListenerTag	Name of the listener node.
Flowtype	Type of the LPTS flow.
DestNode	Destination node to which to send the packet.
Accepted/Dropped	Number of packets sent to DestAddr/Number of packets dropped due to policing.
OOS	* indicates statistics are exhausted

show lpts pifib hardware police

To display the policer configuration value set, use the **show lpts pifib hardware police** command in XR EXEC mode.

show lpts pifib hardware police [**location** {**all***node-id*}]

Syntax Description

location *node-id*	(Optional) Displays pre-Internal Forwarding Information Base (IFIB) information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
all	Specifies all locations.

Command Default

If no policer is configured, the default value is the configured rate.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.2	Monitor LPTS host path drops via `Cisco-IOS-XR-lpts-pre-ifib-oper` YANG data model.
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
lpts	read

Examples

This sample output is from the **show lpts pifib hardware police** command with the **location** keyword for 0/3/CPU0:

```
RP/0/RP0/CPU0:router#show lpts pifib hardware police location 0/3/CPU0


-------------------------------------------------------------
                Node 0/3/CPU0:
-------------------------------------------------------------
 Burst = 100ms for all flow types
-------------------------------------------------------------
FlowType               Policer Type    Cur. Rate Burst     npu
---------------------- ------- ------- --------- --------- ---------
Fragment               32102   np      1000      100       0
OSPF-mc-default        32104   np      3500      1000      0
OSPF-uc-default        32106   np      3000      1000      0
ISIS-default           32108   np      3500      1000      0
BGP-default            32118   np      4000      1250      0
ICMP-default           32126   np      10000     100       0
LDP-TCP-default        32130   np      4000      2000      0
LDP-UDP                32131   np      2000      1000      0
RSVP-default           32138   np      14500     700       0
UDP-default            32163   np      25500     100       0
TCP-default            32167   np      25500     100       0
Raw-default            32171   np      500       100       0
TPA                    32196   np      10000     6000      0
```

This table describes the significant fields shown in the display.

Table 53: show lpts pifib hardware police Command Field Descriptions

FIeld	Description
FlowType	Type of flow that is binding between a tuple and a destination.
Policer	Policer Values in PPS.
Type	Type of LPTS entry.
Cur. Rate	Packet rate set for the entry.
Burst	Accepable burst size for the policer.
npu	Network Processor Unit.

show lpts pifib statistics

To display Pre-Internal Forwarding Information Base (Pre-IFIB) statistics, use the **show lpts ifib statistics** command in XR EXEC mode.

show lpts pifib statistics [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays Pre-IFIB statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
lpts	read

Examples

The following sample output is from the **show lpts pifib statistics** command:

```
RP/0/RP0/CPU0:router# show lpts pifib statistics
```

```
Packets into Pre-IFIB:80
Lookups:80
Packets delivered locally:80
Packets delivered remotely:0
```

This table describes the significant fields shown in the display.

Table 54: show lpts pifib statistics Command Field Descriptions

Field	Description
Packets into Pre-IFIB	Packets presented for pre-IFIB lookups.
Lookups	Packets looked up.
Packets delivered locally	Packets delivered to local applications or the local stack (*n* duplicated) packets duplicated for delivery to applications and the local stack.
Packets delivered remotely	Packets delivered to applications or for lookup on other RPs.

show lpts port-arbitrator statistics

To display local packet transport services (LPTS) port arbitrator statistics, use the **show lpts port-arbitrator statistics** command in XR EXEC mode.

show lpts port-arbitrator statistics

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
lpts	read

Examples

The following sample output is from the **show lpts port-arbitrator statistics** command:

```
RP/0/RP0/CPU0:router# show lpts port-arbitrator statistics
```

```
LPTS Port Arbitrator statistics:
 PA FGID-DB library statistics:
  0 FGIDs in use, 512 cached, 0 pending retries
  0 free allocation slots, 0 internal errors, 0 retry attempts
  1 FGID-DB notify callback, 0 FGID-DB errors returned
  FGID-DB permit mask: 0x7 (alloc mark rack0)
  PA API calls:
            1 init              1 realloc_done
            8 alloc             8 free
           16 join             16 leave
            8 detach
  FGID-DB API calls:
            1 register          1 clear_old
            1 alloc             0 free
           16 join             16 leave
            0 mark              1 mark_done
```

show lpts vrf

To display the Local Packet Transport Services (LPTS) VPN routing and forwarding (VRF) instance identification numbers and names, use the **show lpts vrf** command in XR EXEC mode.

show lpts vrf

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
lpts	read

Examples

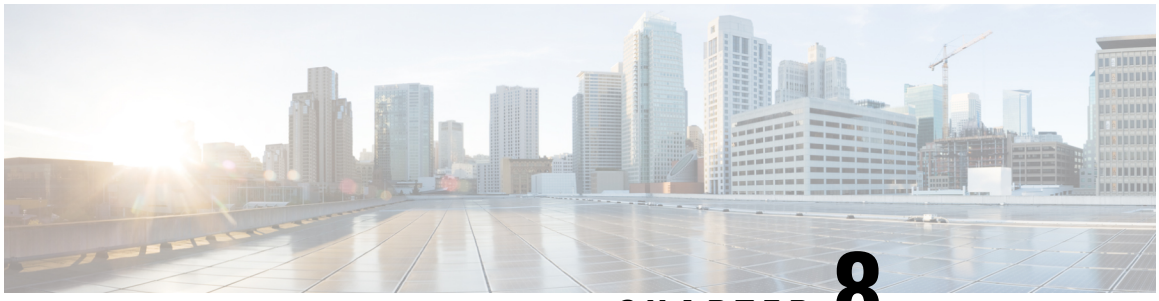
The following sample output is from the **show lpts vrf** command:

```
RP/0/RP0/CPU0:router# show lpts vrf

VRF-ID      VRF-NAME
0x00000000  *
0x60000000  default
```

This table describes the significant fields shown in the display.

Table 55: show lpts vrf Command Field Descriptions

Field	Description
VRF-ID	VPN routing and forwarding (VRF) identification (vrfid) number.
VRF-NAME	Name given to the VRF.



CHAPTER 8

Network Stack IPv4 and IPv6 Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This chapter describes the commands available on the NCS 5000 routers Cisco IOS XR software to configure and monitor features related to IP Version 4 (IPv4) and IP Version 6 (IPv6).

For detailed information about network stack concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

clear ipv6 neighbors

To delete all entries in the IPv6 neighbor discovery cache, except static entries, use the **clear ipv6 neighbors** command in XR EXEC mode.

clear ipv6 neighbors [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) The designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

None

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If the location option is specified, only the neighbor entries specified in the **location** *node-id* keyword and argument are cleared.

Task ID

Task ID	Operations
network	read, write

Task ID	Operations
IPv6	execute

Examples

In the following example, only the highlighted entry is deleted:

```
RP/0/RP0/CPU0:router# clear ipv6 neighbors ?
location specify a node name

RP/0/RP0/CPU0:router# show ipv6 neighbor

IPv6 Address Age Link-layer Addr State Interface
8888::3 - 1234.2345.9877 REACH HundredGigE0/0/0/0
8888::8 - 1234.2345.9877 REACH HundredGigE0/0/0/0
fe80::205:1ff:fe9f:6400 1335 0005.019f.6400 STALE HundredGigE0/0/0/0
fe80::206:d6ff:fece:3808 1482 0006.d6ce.3808 STALE HundredGigE0/0/0/0
fe80::200:11ff:fe11:1112 1533 0000.1111.1112 STALE HundredGigE0/0/0/2

RP/0/RP0/CPU0:router# clear ipv6 neighbors location 0/2/0
RP/0/RP0/CPU0:router# show ipv6 neighbor

IPv6 Address Age Link-layer Addr State Interface
8888::3 - 1234.2345.9877 REACH HundredGigE0/0/0/0
8888::8 - 1234.2345.9877 REACH HundredGigE0/0/0/0
fe80::205:1ff:fe9f:6400 1387 0005.019f.6400 STALE HundredGigE0/0/0/0
fe80::206:d6ff:fece:3808 1534 0006.d6ce.3808 STALE HundredGigE0/0/0/0
```

clear ipv6 path-mtu

To clear the learnt path maximum transmission unit (MTU) values of IPv6 packets, use the **clear ipv6 path-mtu** command in the XR Config mode.

clear ipv6 path-mtu [**vrf** {*vrf-name* | **all**} [**location** *node-id*]] [**address** { *ipv6-address* } [**location** *node-id*]]

Syntax Description

location *node-id*	(Optional) The designated node. The node-id argument is entered in the *rack/slot/module* notation.
ipv6-address	(Optional) Specific IPv6 address.

Command Default

None.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If the location option is specified, only the entries of the node specified in the **location** *node-id* keyword and argument are cleared. Path MTU discovery for IPv6 packets is supported only for applications using TCP and Ping protocol.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example shows how to clear learnt values of path MTU values of IPv6 packets:

```
RP/0/RP0/CPU0:router(config)#  clear ipv6 path-mtu vrf all
```

hw-module fib ipv4 scale host-optimized disable

Before configuring the URPF loose mode on a router, you must disable the default scale on the line card without TCAM. To disable the default scale on a line card, use the **hw-module tcam fib ipv4 scale host-optimized disable** command in XR Config mode.

hw-module tcam fib ipv4 scale host-optimized disable

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.3.1	This command was introduced.

Usage Guidelines

After configuring this command, you must reload the line card for the configuration to take effect.

Task ID

Task ID	Operations
config-services	read, write
root-lr	read, write

Examples

The following example shows how to disable the default scale on a line card without TCAM using the **hw-module tcam fib ipv4 scale host-optimized disable** command.

```
RP/0/RP0/CPU0:router(config)# hw-module tcam fib ipv4 scale host-optimized disable
RP/0/RP0/CPU0:router(config)# commit
RP/0/RP0/CPU0:router(config)# end
 RP/0/RP0/CPU0:router# reload location all
```

hw-module tcam fib ipv4 scaledisable

Before configuring the URPF loose mode on a router, you must disable the default scale on the line card with TCAM. To disable the default scale on a line card, use the **hw-module tcam fib ipv4 scaledisable** command in Admin Configuration modeSystem Admin Config mode.

hw-module tcam fib ipv4 scaledisable

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

Admin Configuration modeSystem Admin Config mode

Command History

Release	Modification
Release 7.3.1	This command was introduced.

Usage Guidelines

After configuring this command, you must reload the line card for the configuration to take effect.

Task ID

Task ID	Operations
config-services	read, write
root-lr	read, write

Examples

The following example shows how to disable the default scale on a line card with TCAM using the **hw-module tcam fib ipv4 scaledisable** command.

```
RP/0/RP0/CPU0:router(config)# hw-module tcam fib ipv4 scaledisable
RP/0/RP0/CPU0:router(config)# commit
RP/0/RP0/CPU0:router(config)# end
 commitRP/0/RP0/CPU0:router# reload location all
```

icmp ipv4 rate-limit unreachable

To limit the rate that IPv4 Internet Control Message Protocol (ICMP) destination unreachable messages are generated, use the **icmp ipv4 rate-limit unreachable** command in XR Config mode. To remove the rate limit, use the **no** form of this command.

icmp ipv4 rate-limit unreachable [**DF**] *milliseconds*
no icmp ipv4 rate-limit unreachable [**DF**] *milliseconds*

Syntax Description

DF	(Optional) Limits the rate at which ICMP destination unreachable messages are sent when code 4 fragmentation is needed and data fragmentation is (DF) set, as specified in the IP header of the ICMP destination unreachable message.
milliseconds	Time period (in milliseconds) between the sending of ICMP destination unreachable messages. Range is 1 to 4294967295.

Command Default

The default value is one ICMP destination unreachable message every 500 milliseconds.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The Cisco IOS XR software maintains two timers: one for general destination unreachable messages and one for DF destination unreachable messages. Both share the same time limits and defaults. If the **DF** option is not configured, the **icmp ipv4 rate-limit unreachable** command sets the time values for DF destination unreachable messages. If the **DF** option is configured, its time values remain independent from those of general destination unreachable messages.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write

Examples

The following example shows how to set the time interval for the ICMP destination unreachable message to be generated at a minimum interval of 10 ms:

```
RP/0/RP0/CPU0:router(config)# icmp ipv4 rate-limit unreachable 10
```

ipv4 address (network)

To set a primary or secondary IPv4 address for an interface, use the **ipv4 address** command in interface configuration mode. To remove an IPv4 address, use the **no** form of this command.

ipv4 address *ipv4-address mask* [**secondary**] [**route-tag** *route-tag value*]
no ipv4 address *ipv4-address mask* [**secondary**] [**route-tag** *route-tag value*]
[`algorithm` *algo-no*]

Syntax Description

ipv4-address	IPv4 address.
mask	Mask for the associated IP subnet. The network mask can be specified in either of two ways: • The network mask can be a four-part dotted decimal address. For example, 255.0.0.0 indicates that each bit equal to 1 means the corresponding address bit belongs to the network address. • The network mask can be indicated as a slash (/) and number. For example, /8 indicates that the first 8 bits of the mask are ones, and the corresponding bits of the address are network address.
secondary	(Optional) Specifies that the configured address is a secondary IPv4 address. If this keyword is omitted, the configured address is the primary IPv4 address.
route-tag	(Optional) Specifies that the configured address has a route tag to be associated with it.
route-tag value	(Optional) Value of the route tag. Range is 1 to 4294967295.
algorithm	(Optional) Associates the Flexible Algorithm with the IP address of the interface.
algo-no	Defines the Flexible Algorithm number. Range is from 128-255. 0 is default algorithm value **Note** If *algo-no* is not provided, 0 is taken as default.

Command Default

No IPv4 address is defined for the interface.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.
Release 7.6.1	The keyword algorithm was added.

Usage Guidelines

An interface can have one primary IPv4 address and multiple secondary IPv4 addresses. Packets generated by the software always use the primary IPv4 address. Therefore, all networking devices on a segment should share the same primary network number.

Note The same IPv4 address configured on two different interfaces causes an error message to display that indicates the conflict. The interface located in the highest rack, slot, module, instance, and port is disabled.

Hosts can determine subnet masks using the IPv4 Internet Control Message Protocol (ICMP) mask request message. Networking devices respond to this request with an ICMP mask reply message.

You can disable IPv4 processing on a particular interface by removing its IPv4 address with the **no ipv4 address** command. If the software detects another host using one of its IPv4 addresses, it will display an error message on the console.

The optional **secondary** keyword allows you to specify an unlimited number of secondary addresses. Secondary addresses are treated like primary addresses, except that the system never generates datagrams other than routing updates with secondary source addresses. IPv4 broadcasts and Address Resolution Protocol (ARP) requests are handled properly, as are interface routes in the IP routing table.

Secondary IPv4 addresses can be used in a variety of situations. The following are the most common applications:

- There may not be enough host addresses for a particular network segment. For example, your subnetting allows up to 254 hosts per logical subnet, but on one physical subnet you need to have 300 host addresses. Using secondary IPv4 addresses on the networking devices allows you to have two logical subnets using one physical subnet.
- Many older networks were built using Level 2 bridges. The judicious use of secondary addresses can aid in the transition to a subnetted, router-based network. Routers on an older, bridged segment can be easily made aware that there are many subnets on that segment.

The route-tag feature attaches a tag to all IPv4 addresses. The tag is propagated from the Management Agents (MA) to the Address Repository Managers (RPM) to routing protocols, thus enabling the user to control the redistribution of connected routes by looking at the route tags via RPL scripts.

The algorithm command is used to associate the IP address of an interface to an IP flexible algorithm.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write

Examples

The following example shows how to set 192.168.1.27 as the primary address and 192.168.7.17 and 192.168.8.17 as the secondary addresses on hundredGigE interface 0/0/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/0/0/1
RP/0/RP0/CPU0:router(config-if)# ipv4 address 192.168.1.27 255.255.255.0
RP/0/RP0/CPU0:router(config-if)# ipv4 address 192.168.7.17 255.255.255.0 secondary
RP/0/RP0/CPU0:router(config-if)# ipv4 address 192.168.8.17 255.255.255.0 secondary
RP/0/RP0/CPU0:router(config-if)# ipv4 address 192.168.8.17 255.255.255.0 secondary algorithm
 128
```

ipv4 assembler max-packets

To configure the maximum number of packets that are allowed in assembly queues, use the **ipv4 assembler max-packets** command in XR Config mode. To disable this feature, use the **no** from of this command.

ipv4 assembler max-packets *percentage value*
no ipv4 assembler max-packets *percentage value*

Syntax Description

percentage value	Percentage of total packets available in the system. The range is from 1 to 50.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write

Examples

The following example shows how to configure the maximum number of packets for the assembly queue:

```
RP/0/RP0/CPU0:router(config)# ipv4 assembler max-packets 35
```

ipv4 assembler timeout

To configure the number of seconds an assembly queue can hold before a timeout occurs, use the **ipv4 assembler timeout** command in XR Config mode. To disable this feature, use the **no** form of this command.

ipv4 assembler timeout *seconds*
no ipv4 assembler timeout *seconds*

Syntax Description

seconds	Number of seconds an assembly queue can hold before a timeout occurs. The range is from 1 to 120.

Command Default None

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write

Examples The following example shows how to configure an assembly queue before a timeout occurs:

```
RP/0/RP0/CPU0:router(config)# ipv4 assembler timeout 88
```

ipv4 conflict-policy

To enable IP Address Repository Manager (IPARM) conflict resolution, use the **ipv4 conflict-policy** command in XR Config mode. To disable the IPARM conflict resolution, use the **no** form of the command.

ipv4 conflict-policy {**highest-ip** | **longest-prefix** | **static**}
no ipv4 conflict-policy {**highest-ip** | **longest-prefix** | **static**}

Syntax Description

highest-ip	Keeps the highest ip address in the conflict set.
longest-prefix	Keeps the longest prefix match in the conflict set.
static	Keeps the existing interface running across new address configurations.

Command Default The precedence rule adopted is loopback > physical > other virtual interfaces. Within virtual interfaces, there is an alphabetical preference, for example, loopback1 > loopback2 > tunnel. Among physical interfaces, the lower rack or slot takes control.

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use **ipv4 conflict-policy** command to set an IPARM policy that resolves a conflict in the configured addresses. The policy tells IPARM what address to select from the addresses in conflict. The policy then forces the address in conflict to become inactive.

Task ID

Task ID	Operations
ipv4	read, write
ip-services	read, write

Examples

The following example shows how to enable the static policy for conflict resolution:

```
RP/0/RP0/CPU0:router(config)# ipv4 conflict-policy static
```

ipv4 directed-broadcast

To enable forwarding of IPv4 directed broadcasts on an interface, use the **ipv4 directed-broadcast** command in interface configuration mode. To disable forwarding of IPv4 directed broadcast on an interface, use the **no** form of this command.

ipv4 directed-broadcast
no ipv4 directed-broadcast

Syntax Description

This command has no keywords or arguments.

Command Default

By default, directed broadcasts are dropped.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

A directed broadcast is a packet sent to a specific network. IPv4 directed broadcasts are dropped and not forwarded. Dropping IPv4 directed broadcasts makes routers less susceptible to denial-of-service (DoS) attacks.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write

Examples

The following example shows how to enable the forwarding of IPv4 directed broadcasts on interface 0/1/1/0:

```
RP/0/RP0/CPU0:router(config)# interface  0/1/1/0
RP/0/RP0/CPU0:router(config-if)# ipv4 directed-broadcast
```

ipv4 helper-address

To configure the address to which the software forwards User Datagram Protocol (UDP) broadcasts, including BOOTP, received on an interface, use the **ipv4 helper-address** command in interface configuration mode. To remove an IPv4 helper address, use the **no** form of this command.

{**ipv4 helper-address** [**vrf** *vrf-name*][*destination-address*]}
{**no ipv4 helper-address** [**vrf** *vrf-name*][*destination-address*]}

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
destination-address	Destination broadcast or host address to be used when UDP broadcasts are forwarded. There can be more than one helper address per interface.

Command Default

IPv4 helper addresses are disabled. Default VRF is assumed if the VRF is not specified.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use this command with the **forward-protocol udp** command in XR Config mode, which specifies by port number the broadcast packets that are forwarded. UDP is enabled by default for well-known ports. The **ipv4 helper-address** command specifies the destination to which the UDP packets are forwarded.

One common application that requires IPv4 helper addresses is Dynamic Host Configuration Protocol (DHCP), which is defined in RFC 1531. DHCP protocol information is carried inside of BOOTP packets. To enable BOOTP broadcast forwarding for a set of clients, configure an IPv4 helper address on the networking device interface physically closest to the client. The IPv4 helper address should specify the address of the DHCP server. If you have multiple servers, you can configure one IPv4 helper address for each server. Because BOOTP packets are forwarded by default, DHCP information can now be forwarded by the networking device. The DHCP server now receives broadcasts from the DHCP clients.

A DHCP relay profile must be configured to perform DHCP Relay. The **ip helper-address** command is used to forward broadcast UDP (non-DHCP) packets.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write

Examples

The following example shows how to specify that all UDP broadcast packets received on HundredGigEinterface 0/1/0/0 are forwarded to 192.168.1.0:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ipv4 helper-address 192.168.1.0
```

ipv4 mask-reply

To enable the software to respond to IPv4 Internet Control Message Protocol (ICMP) mask requests by sending ICMP mask reply messages, use the **ipv4 mask-reply** command in interface configuration mode. To restore the default, use the **no** form of this command.

ipv4 mask-reply
no ipv4 mask-reply

Syntax Description

This command has no keywords or arguments.

Command Default

IPv4 mask replies are not sent.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

This command enables the software to respond to IPv4 ICMP mask requests by sending ICMP mask reply messages.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write

Examples

The following example enables the sending of ICMP mask reply messages on HundredGigEinterface 0/1/0/0:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ipv4 mask-reply
```

ipv4 mtu

To set the maximum transmission unit (MTU) size of IPv4 packets sent on an interface, use the **ipv4 mtu** command in interface configuration mode.

To set the MTU size of IPv4 packets sent on a sub-interface, use the **ipv4 mtu** command in sub-interface configuration mode.

To restore the default MTU size, use the **no** form of this command.

ipv4 mtu *bytes*
no ipv4 mtu

Syntax Description

bytes	MTU in bytes. Range is 68 to 65535 bytes for IPv4 packets. The maximum MTU size that can be set on an interface depends on the interface medium.

Command Default

If no MTU size is configured for IPv4 packets sent on an interface, the interface derives the MTU from the Layer 2 MTU.

Command Modes

Interface configuration

Sub-interface configuration (to set MTU for a specific sub-interface)

Command History

Release	Modification
Release 7.11.1	This command was made available in sub-interface configuration mode also.
Release 6.0	This command was introduced.

Usage Guidelines

The router punts the packets that needs fragmentation; whereas the software path drops the subscriber traffic that needs fragmentation.

The maximum MTU size that can be set on an interface depends on the interface medium. If the Layer 2 MTU is smaller than the Layer 3 MTU, the Cisco IOS XR software uses the Layer 2 MTU value for the Layer 3 MTU. Conversely, if the Layer 3 MTU is smaller than the Layer 2 MTU, the software uses Layer 3 MTU value. In other words the Cisco IOS XR software uses the lower of the two values for the MTU.

All devices on a physical medium must have the same protocol MTU to operate.

Note Changing the MTU value (with the **mtu** interface configuration command) can affect the IPv4 MTU value. If the current IPv4 MTU value is the same as the MTU value, and you change the MTU value, the IPv4 MTU value will be modified automatically to match the new MTU. However, the reverse is not true; changing the IPv4 MTU value has no effect on the value for the **mtu** command.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write
config-services	read, write

Examples

This example shows how to set the maximum IPv4 packet size for HundredGigE interface 0/0/0/1 to 1500 bytes:

```
RP/0/(config)# interface HundredGigE0/0/0/1
RP/0/(config-if)# ipv4 mtu 1500
```

This example shows how to set the maximum IPv4 packet size for HundredGigE interface 0/0/0/1.1 to 2500 bytes:

```
RP/0/(config)# interface HundredGigE0/0/0/1.1
RP/0/(config-subif)# ipv4 mtu 2500
```

ipv4 redirects

To enable the sending of IPv4 Internet Control Message Protocol (ICMP) redirect messages if the software is forced to resend a packet through the same interface on which it was received, use the **ipv4 redirects** command in interface configuration mode. To restore the default, use the **no** form of this command.

ipv4 redirects
no ipv4 redirects

Syntax Description This command has no keywords or arguments.

Command Default ICMP redirect messages are disabled by default on the interface.

Command Modes Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

ICMP redirect messages are disabled by default on the interface.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write

Examples

The following example shows how to disable the sending of ICMP IPv4 redirect messages on &;HundredGigE interface 0/1/1/0:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/1/0
RP/0/RP0/CPU0:router(config-if)# ipv4 redirects
```

ipv4 source-route

To allow the processing of any IPv4 datagrams containing a source-route header option, use the **ipv4 source-route** command in XR EXEC mode. To have the software discard any IP datagram that contains a source-route option, use the **no** form of this command.

ipv4 source-route
no ipv4 source-route

Syntax Description

This command has no keywords or arguments.

Command Default

The software discards any IPv4 datagrams containing a source-route header option.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

By default, any IPv4 datagram which contains a source-route header option is discarded.

Task ID

Task ID	Operations
ipv4	read, write

Task ID	Operations
network	read, write

Examples

The following example shows how to allow the processing of any IPv4 datagrams containing a source-route header option:

```
RP/0/RP0/CPU0:router(config)# ipv4 source-route
```

ipv4 unnumbered (point-to-point)

To enable IPv4 processing on a point-to-point interface without assigning an explicit IPv4 address to that interface, use the **ipv4 unnumbered** command in an interface configuration mode. To disable this feature, use the **no** form of this command.

ipv4 unnumbered *interface-type interface-instance*
no ipv4 unnumbered *interface-type interface-instance*

Syntax Description

interface-type	Interface type. For more information, use the question mark (?) online help function.
interface-instance	Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0 /CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

IPv4 processing on a point-to-point interface is disabled unless an IPv4 address is assigned explicitly to that interface.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

For release Release 4.2.0 onward, to enter the dynamic template configuration mode, run the **dynamic-template** command in the XR Config mode.

Whenever the unnumbered interface generates a packet (for example, for a routing update), it uses the address of the specified interface as the source address of the IPv4 packet. It also uses the IPv4 address of the specified interface in determining which routing processes are sending updates over the unnumbered interface. Restrictions include the following:

- You cannot use the **ping** EXEC command to determine whether the interface is up because the interface has no address. Simple Network Management Protocol (SNMP) can be used to remotely monitor interface status.

The interface you specify by the *interface-type* and *interface-number* arguments must be enabled (listed as "up" in the **show interfaces** command display).

Task ID

Task ID	Operations
ipv4	read, write
network	read, write
config-services	read, write

Examples

This example shows how the HundredGigE interface 0/0/0/1 is assigned the loopback interface address 5:

```
RP/0/RP0/CPU0:router(config)# interface loopback 5
RP/0/RP0/CPU0:router(config-if)# ipv4 address 192.168.6.6 255.255.255.0
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/0/0/1
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback 5
```

ipv4 unreachables disable

To disable the generation of IPv4 Internet Control Message Protocol (ICMP) unreachable messages, use the **ipv4 unreachables disable** command in an interface configuration mode. To re-enable the generation of ICMP unreachable messages, use the **no** form of this command.

ipv4 unreachables disable
no ipv4 unreachables disable

Syntax Description

This command has no keywords or arguments.

Command Default IPv4 ICMP unreachables messages are generated.

Command Modes Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines If the software receives a nonbroadcast packet destined for itself that uses a protocol it does not recognize, it sends an ICMP protocol unreachable message to the source.

If the software receives a datagram that it cannot deliver to its ultimate destination because it knows of no route to the destination address, it replies to the originator of that datagram with an ICMP host unreachable message.

This command affects a number of ICMP unreachable messages.

Task ID

Task ID	Operations
ipv4	read, write
network	read, write
config-services	read, write

Examples This example shows how to disable the generation of ICMP unreachable messages on HundredGigE interface 0/0/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/0/0/1
RP/0/RP0/CPU0:router(config-if)# ipv4 unreachables disable
```

ipv4 virtual address

To define an IPv4 virtual address for a network of management Ethernet interfaces, use the **ipv4 virtual interface** command in XR Config mode. To remove an IPv4 virtual address from the configuration, use the **no** form of this command.

ipv4 virtual address {[**vrf** *vrf-name*] *ipv4-address/mask* | **use-as-src-addr**}
no ipv4 virtual address {[**vrf** *vrf-name*] *ipv4-address/mask* | **use-as-src-addr**}

Syntax Description

vrf *vrf-name*	(Optional) Configures the virtual address on a per VPN routing and forwarding (VRF) basis for the management interfaces The *vrf-name* argument specifies the name of the VRF.
ipv4 address	Virtual IPv4 address and the mask that is to be unconfigured.

mask	Mask for the associated IP subnet. The network mask can be specified in either of two ways: • The network mask can be a four-part dotted-decimal address. For example, 255.0.0.0 indicates that each bit equal to 1 means the corresponding address bit belongs to the network address. • The network mask can be indicated as a slash (/) and number. For example, /8 indicates that the first 8 bits of the mask are ones, and the corresponding bits of the address are network address. A slash between numbers is required as part of the notation.
use-as-src-addr	Enables the virtual address to be used as the default SRC address on sourced packets.

Command Default

No IPv4 virtual address is defined for the configuration.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.5.2	This release supports virtual addresses for the hosted Linux networking stack.
Release 6.0	This command was introduced.

Usage Guidelines

Configuring an IPv4 virtual address enables you to access the router from a single virtual address with a management network. An IPv4 virtual address persists across route processor (RP) failover situations.

Configuring an IPv4 virtual address enables you to access a dual RP router from a single address without prior knowledge of which RP is active. An IPv4 virtual address persists across RP failovers. For this to happen, the virtual IPv4 address must share a common IPv4 subnet with a Management Ethernet interface on both RPs.

If you disable the **ipv4 virtual address** command with the **vrf** keyword, the virtual IP address is unconfigured for the corresponding VRF or for the default if no VRF is specified. This results in the removal of the entry for the virtual IP address in the VRF table and in the ARP cache.

The default VRF is chosen when no VRF is specified. The virtual IP address is activated on a management interface that is attached to a default VRF.

The **use-as-src-addr** keyword eliminates the need for configuring a loopback interface as the source interface (that is, update source) for management applications. When an update source is not configured, management applications allow the transport processes (TCP, UDP, raw_ip) to pick a suitable source address. The transport processes, in turn, consult the FIB to do so. If a Management Ethernet's IP address is picked as the source address and if the **use-as-src-addr keyword** is configured, then the transport processes replace the Management Ethernet's IP address with a relevant virtual IP address. This functionality works across RP switchovers.

Cisco IOS XR Software Release 7.5.2 and later also supports virtual addresses for the hosted Linux networking stack.

Task ID

Task ID	Operations
ipv4	read, write

Task ID	Operations
network	read, write

Examples

The following example shows how to define an IPv4 virtual address:

```
RP/0/RP0/CPU0:router(config)# ipv4 virtual address 10.3.32.154/8
```

The following example show how to configure the virtual IP addresses for management interfaces on a per VRF basis:

```
RP/0/RP0/CPU0:router(config)# ipv4 virtual address vrf ppp 10.26.3.4/16
```

ipv6 address

To configure an IPv6 address for an interface and enable IPv6 processing on the interface using an EUI-64 interface ID in the low-order 64 bits of the address, use the **ipv6 address** command in interface configuration mode. To remove the address from the interface, use the **no** form of this command.

ipv6 address *ipv6-prefix/prefix-length* [**eui-64**] [**route-tag** *route-tag value*]
no ipv6 address *ipv6-prefix/prefix-length* [**eui-64**] [**route-tag** *route-tag value*]
[`algorithm` *algo-no*]

Syntax Description

ipv6-prefix	The IPv6 network assigned to the interface. This argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
/ *prefix-length*	The length of the IPv6 prefix. A decimal value that indicates how many of the high-order contiguous bits of the address compose the prefix (the network portion of the address). A slash (/) must precede the decimal value.
eui-64	(Optional) Specifies an interface ID in the low-order 64 bits of the IPv6 address.
route-tag	(Optional) Specifies that the configured address has a route tag to be associated with it.
route-tag value	(Optional) Value of the route tag. Range is 1 to 4294967295.
algorithm	(Optional) Associates the Flexible Algorithm with the IP address of the interface.
algo-no	Defines the Flexible Algorithm number. Range is from 128-255. 0 is default algorithm value **Note** If *algo-no* is not provided, 0 is taken as default.

Command Default No IPv6 address is defined for the interface.

Command Modes Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.
Release 7.6.1	The keyword algorithm was added.

Usage Guidelines If the value specified for the / *prefix-length* argument is greater than 64 bits, the prefix bits have precedence over the interface ID.

Using the **no ipv6 address** command without arguments removes all manually configured IPv6 addresses from an interface.

If the Cisco IOS XR software detects another host using one of its IPv6 addresses, it displays an error message on the console.

The route-tag feature attaches a tag to all IPv6 addresses. The tag is propagated from the Management Agents (MA) to the Address Repository Managers (RPM) to routing protocols, thus enabling the user to control the redistribution of connected routes by looking at the route tags via RPL scripts.

The algorithm command is used to associate the IP address of an interface to an IP flexible algorithm.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write

Examples The following example assigns IPv6 address 2001:0DB8:0:1::/64 to HundredGigE interface 0/0/0/1 and specifies an EUI-64 interface ID in the low-order 64 bits of the address:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/0/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 address 2001:0DB8:0:1::/64 eui-64
RP/0/RP0/CPU0:router(config-if)# ipv6 address 2001:0DB8:0:1::/64 algorithm 130
```

ipv6 address link-local

To configure an IPv6 link-local address for an interface and enable IPv6 processing on the interface, use the **ipv6 address link-local** command in interface configuration mode. The *ipv6-address* value specified with this command overrides the link-local address that is automatically generated for the interface. To remove the address from the interface, use the **no** form of this command.

ipv6 address *ipv6-address* **link-local** [**route-tag** *route-tag value*]
no ipv6 address *ipv6-address* **link-local** [**route-tag** *route-tag value*]

Syntax Description

ipv6-address	The IPv6 address assigned to the interface. This argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
link-local	Specifies a link-local address. The *ipv6-address* value specified with this command overrides the link-local address that is automatically generated for the interface.
route-tag	(Optional) Specifies that the configured address has a route-tag to be associated with it.
route-tag value	(Optional) Displays the route-tag value. Range is 1 to 4294967295.

Command Default

No IPv6 address is defined for the interface.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If the Cisco IOS XR software detects another host using one of its IPv6 addresses, the software displays an error message on the console.

The system automatically generates a link-local address for an interface when IPv6 processing is enabled on the interface, typically when an IPv6 address is configured on the interface. To manually specify a link-local address to be used by an interface, use the **ipv6 address link-local** command.

A double colon may be used as part of the *ipv6-address* argument when consecutive 16-bit values are denoted as zero. You can configure multiple IPv6 addresses per interfaces, but only one link-local address.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write

Examples

The following example shows how to assign FE80::260:3EFF:FE11:6770 as the link-local address for HundredGigE interface 0/0/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/0/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 address FE80::260:3EFF:FE11:6770 link-local
```

ipv6 assembler

To configure the maximum number of packets that are allowed in assembly queues or to configure the number of seconds an assembly queue will hold before timeout , use the **ipv6 assembler** command in the appropriate configuration mode. To disable this feature, use the **no** form of this command.

ipv6 assembler {**max-packets** *value* | **timeout** *seconds*}
no ipv6 assembler {**max-packets** *value* | **timeout** *seconds*}

Syntax Description

max-packets	Maximum packets allowed in assembly queues.
timeout	Number of seconds an assembly queue will hold before timeout.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ipv6	read, write

Example

The following example shows how to configure the maximum number of packets that are allowed in assembly queues:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# ipv6 assembler max-packets 100
```

ipv6 conflict-policy

To enable IP Address Repository Manager (IPARM) conflict resolution, use the **ipv6 conflict-policy** command in XR Config mode mode. To disable the IPARM conflict resolution, use the **no** form of the command.

ipv6 conflict-policy {**highest-ip** | **longest-prefix** | **static**}
no ipv6 conflict-policy {**highest-ip** | **longest-prefix** | **static**}

Syntax Description

highest-ip	Keeps the highest IP address in the conflict set.
longest-prefix	Keeps the longest prefix match in the conflict set.
static	Keeps the existing interface running across new address configurations.

Command Default

Default is the lowest rack/slot if no conflict policy is configured.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ipv6	read, write
ip-services	read, write

Examples

The following example shows how to enable the longest prefix policy for conflict resolution:

```
RP/0/RP0/CPU0:router(config)# ipv6 conflict-policy longest-prefix
```

hw-module fib scale ipv6 custom-lem

To insert a custom IPv6 prefix length into the largest exact match (LEM) memory, use the **hw-module fib scale ipv6 custom-lem** command in the global configuration mode.

hw-module fib scale ipv6 custom-lem *value*

Syntax Description

value	IPv6 prefix length between 40 and 64.

Command Default

None

Command Modes

XR Configuration

Command History

Release	Modification
Release 7.4.1	The command was introduced.

Usage Guidelines

Note

- Do not configure the IPv6 internet-optimized-disable command and the hw-module custom-lem command together.
- You can configure only one single length at a time. You can choose only one prefix length value to be put into the LEM memory.
- Make sure that the IPv6 length that you chose is nibble granular, that is multiples of 4.
- This feature is only supported on NCS57 line cards with no eTCAM.

Task ID

Task ID	Operations
configure-services	read, write
root-lr	read, write

Examples

The following example shows how to insert a custom prefix length into the LEM memory.

```
RP/0/RP0/CPU0:Router#config
RP/0/RP0/CPU0:Router(config)#hw-module fib ipv6 scale custom-lem 64
RP/0/RP0/CPU0:Router(config)#commit
```

ipv6 enable

To enable IPv6 processing on an interface that has not been configured with an explicit IPv6 address, use the **ipv6 enable** command in an appropriate configuration mode. To disable IPv6 processing on an interface that has not been configured with an explicit IPv6 address, use the **no** form of this command.

ipv6 enable
no ipv6 enable

Syntax Description

None

Command Default

IPv6 is disabled.

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **ipv6 enable** command automatically configures an IPv6 link-local unicast address on the interface while also enabling the interface for IPv6 processing. The **no ipv6 enable** command does not disable IPv6 processing on an interface that is configured with an explicit IPv6 address.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR EXEC mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) shows how to enable IPv6 processing on HundredGigE interface 0/0/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/0/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 enable
```

For BNG, this example show how to enable IPv6 processing on dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp foo
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 enable
```

ipv6 hop-limit

To configure the maximum number of hops used in router advertisements and all IPv6 packets that are originated by the router, use the **ipv6 hop-limit** command in XR Config mode mode. To return the hop limit to its default value, use the **no** form of this command.

ipv6 hop-limit *hops*
no ipv6 hop-limit *hops*

Syntax Description

hops	Maximum number of hops. Range is 1 to 255.

Command Default

hops : 64 hops

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write

Examples The following example shows how to configure a maximum number of 15 hops for router advertisements and all IPv6 packets that are originated from the router:

```
RP/0/RP0/CPU0:router(config)# ipv6 hop-limit 15
```

ipv6 icmp error-interval

To configure the interval and bucket size for IPv6 Internet Control Message Protocol (ICMP) error messages on all nodes, use the **ipv6 icmp error-interval** command in XR Config mode mode. To return the interval to its default setting, use the **no** form of this command.

ipv6 icmp error-interval *milliseconds* [*bucketsize*]
no ipv6 icmp error-interval

Syntax Description

milliseconds	Time interval (in milliseconds) between tokens being placed in the bucket. Range is 0 to 2147483647.
bucketsize	(Optional) The maximum number of tokens stored in the bucket. The acceptable range is 1 to 200 with a default of 10 tokens.

Command Default ICMP rate limiting is enabled by default. To disable ICMP rate limiting, set the interval to zero.

milliseconds : 100 milliseconds

bucketsize : 10 tokens

Command Modes XR Config mode

Command History

Release	Modification
	This command was introduced.

Usage Guidelines Use the **ipv6 icmp error-interval** command in XR Config mode mode to limit the rate at which IPv6 ICMP error messages are sent for each node. A token bucket algorithm is used with one token representing one IPv6 ICMP error message. Tokens are placed in the virtual bucket at a specified interval until the maximum number of tokens allowed in the bucket is reached.

The *milliseconds* argument specifies the time interval between tokens being placed in the bucket. The optional *bucketsize* argument is used to define the maximum number of tokens stored in the bucket. Tokens are removed from the bucket when IPv6 ICMP error messages are sent, which means that if the *bucketsize* argument is set to 20, a rapid succession of 20 IPv6 ICMP error messages can be sent. When the bucket is empty of tokens, IPv6 ICMP error messages are not sent until a new token is placed in the bucket.

Use the **show ipv6 traffic** EXEC command to display IPv6 ICMP rate-limited counters.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write

Examples

The following example shows an interval of 50 milliseconds and a bucket size of 20 tokens being configured for IPv6 ICMP error messages:

```
RP/0/RP0/CPU0:router(config)# ipv6 icmp error-interval 50 20
```

ipv6 mtu

To set the maximum transmission unit (MTU) size of IPv6 packets sent on an interface, use the **ipv6 mtu** command in an appropriate configuration mode.

To set the MTU size of IPv6 packets sent on a sub-interface, use the **ipv6 mtu** command in sub-interface configuration mode.

To restore the default MTU size, use the **no** form of this command.

ipv6 mtu *bytes*
no ipv6 mtu

Syntax Description

bytes	MTU in bytes. Range is 1280 to 65535 for IPv6 packets. The maximum MTU size that can be set on an interface depends on the interface medium.

Command Default

If no MTU size is configured for IPv6 packets sent on an interface, the interface derives the MTU from the Layer 2 MTU.

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Sub-interface configuration (to set MTU for a specific sub-interface)

Command History

Release	Modification
Release 7.11.1	This command was made available in sub-interface configuration mode also.
Release 6.0	This command was introduced.

Usage Guidelines

If an IPv6 packet exceeds the MTU set for the interface, only the source router of the packet can fragment it.

The maximum MTU size that can be set on an interface depends on the interface medium. If the Layer 2 MTU is smaller than the Layer 3 MTU, the Cisco IOS XR software uses the Layer 2 MTU value for the Layer 3 MTU. Conversely, If the Layer 3 MTU is smaller than the Layer 2 MTU, the software uses Layer 3 MTU value. In other words the Cisco IOS XR software uses the lower of the two values for the MTU.

All devices on a physical medium must have the same protocol MTU to operate.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR Config mode.

Note Changing the MTU value (with the **mtu** interface configuration command) can affect the IPv6 MTU value. If the current IPv6 MTU value is the same as the MTU value, and you change the MTU value, the IPv6 MTU value will be modified automatically to match the new MTU. However, the reverse is not true; changing the IPv6 MTU value has no effect on the value for the **mtu** command.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) shows how to set the maximum IPv6 packet size for HundredGigE interface 0/0/0/1 to 1350 bytes:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/0/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 mtu 1350
```

For BNG, this example shows how to set the maximum IPv6 packet size to 1350 bytes in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp foo
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 mtu 1350
```

This example shows how to set the maximum IPv6 packet size for HundredGigE interface 0/0/0/1.1 to 2500 bytes:

```
RP/0/(config)# interface HundredGigE0/0/0/1.1
RP/0/(config-subif)# ipv6 mtu 2500
```

IPv6 nd proxy-nd

To configure the IPv6 Neighbor Discovery proxy on an interface, use the **ipv6 nd proxy-nd** command in the interface configuration mode.

ipv6 nd proxy-nd

Syntax Description

proxy-nd	Enables Neighbor Discovery Proxy on an interface.

Command Default

The default value is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.6.1	This command was introduced.

Usage Guidelines

This feature is not supported on Cisco NCS 5700 Series routers and routers with the Cisco NC57 line cards installed and that are operating in native or compatibility mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write

Examples

This example configures an interface to act as a proxy interface and allow hosts on the same subnet to communicate. The host thinks that they are communicating directly with each other but each host will have the router as their neighbor.

```
Router#configure terminal
Router(config)#interface HundredGigE0/5/0/11
Router(config-if)#ipv6 nd proxy-nd
Router(config-if)#commit
```

ipv6 nd dad attempts

To configure the number of consecutive neighbor solicitation messages that are sent on an interface while duplicate address detection is performed on the unicast IPv6 addresses of the interface, use the **ipv6 nd dad**

attempts command in an appropriate configuration mode. To return the number of messages to the default value, use the **no** form of this command.

ipv6 nd dad attempts *value*
no ipv6 nd dad attempts *value*

Syntax Description

value	Number of neighbor solicitation messages. Range is 0 to 600. Configuring a value of 0 disables duplicate address detection processing on the specified interface; a value of 1 configures a single transmission without follow-up transmissions.

Command Default

Duplicate address detection on unicast IPv6 addresses with the sending of one neighbor solicitation message is enabled. The default is one message.

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Duplicate address detection verifies the uniqueness of new unicast IPv6 addresses before the addresses are assigned to interfaces (the new addresses remain in a tentative state while duplicate address detection is performed). Duplicate address detection uses neighbor solicitation messages to verify the uniqueness of unicast IPv6 addresses.

The DupAddrDetectTransmits node configuration variable (as specified in RFC 2462, *IPv6 Stateless Address Autoconfiguration*) is used to automatically determine the number of consecutive neighbor solicitation messages that are sent on an interface while duplicate address detection is performed on a tentative unicast IPv6 address.

The interval between the sending of duplicate address detection neighbor solicitation messages (the duplicate address detection timeout interval) is specified by the neighbor discovery-related variable RetransTimer (as specified in RFC 2461, *Neighbor Discovery for IP Version 6 [IPv6]*), which is used to determine the time between retransmissions of neighbor solicitation messages to a neighbor when the address is being resolved or when the reachability of a neighbor is being probed. This is the same management variable used to specify the interval for neighbor solicitation messages during address resolution and neighbor unreachability detection. Use the **ipv6 nd ns-interval** command to configure the interval between neighbor solicitation messages that are sent during duplicate address detection.

Duplicate address detection is suspended on interfaces that are administratively down. While an interface is administratively down, the unicast IPv6 addresses assigned to the interface are set to a pending state. Duplicate address detection is automatically restarted on an interface when the interface returns to being administratively up.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the .

Note An interface returning to administratively up restarts duplicate address detection for all of the unicast IPv6 addresses on the interface. While duplicate address detection is performed on the link-local address of an interface, the state for the other IPv6 addresses is still set to tentative. When duplicate address detection is completed on the link-local address, duplicate address detection is performed on the remaining IPv6 addresses.

When duplicate address detection identifies a duplicate address, the state of the address is set to duplicate and the address is not used. If the duplicate address is the link-local address of the interface, the processing of IPv6 packets is disabled on the interface and an error message similar to the following is issued:

```
ipv6_nd[145]: %IPV6_ND-3-ADDRESS_DUPLICATE : Duplicate address 111::1 has been detected
```

If the duplicate address is a global address of the interface, the address is not used and an error message similar to the following is issued:

```
%IPV6-4-DUPLICATE: Duplicate address 3000::4 on &HundredGigE;
```

All configuration commands associated with the duplicate address remain as configured while the state of the address is set to duplicate.

If the link-local address for an interface changes, duplicate address detection is performed on the new link-local address and all of the other IPv6 address associated with the interface are regenerated (duplicate address detection is performed only on the new link-local address).

Task ID

Task ID	Operations
ipv6	read, write
config-services	read, write

Examples

This example (not applicable for BNG) shows how to set the number of consecutive neighbor solicitation messages for interface 0/2/0/1 to 1 and then display the state (tentative or duplicate) of the unicast IPv6 address configured for an interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/2/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 nd dad attempts 1
RP/0/RP0/CPU0:router(config-if)# Uncommitted changes found, commit them before
exiting(yes/no/cancel)? [cancel]:y

RP/0/RP0/CPU0:router# show ipv6 interface
HundredGigE/2/0/0 is Up, line protocol is Up
  IPv6 is disabled, link-local address unassigned
  No global unicast address is configured
HundredGigE/2/0/1 is Up, line protocol is Up
  IPv6 is enabled, link-local address is fe80::203:fdff:fe1b:4501
  Global unicast address(es):
    1:4::1, subnet is 1:4::/64 [DUPLICATE]
  MTU is 1514 (1500 is available to IPv6)
```

```
  ICMP redirects are disabled
  ND DAD is enabled, number of DAD attempts 1
  ND reachable time is 0 milliseconds
  ND advertised retransmit interval is 0 milliseconds
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  Hosts use stateless autoconfig for addresses.
HundredGigE/2/0/2 is Shutdown, line protocol is Down
  IPv6 is enabled, link-local address is fe80::200:11ff:fe11:1111 [TENTATIVE]
  Global unicast address(es):
    111::2, subnet is 111::/64 [TENTATIVE]
  MTU is 1514 (1500 is available to IPv6)
  ICMP redirects are enabled
  ND DAD is enabled, number of DAD attempts 1
  ND reachable time is 0 milliseconds
  ND advertised retransmit interval is 0 milliseconds
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  Hosts use stateless autoconfig for addresses.
```

For BNG, this example shows how to display the state (tentative or duplicate) of the unicast IPv6 address on the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 nd dad attempts 1
```

ipv6 nd managed-config-flag

To set the managed address configuration flag in IPv6 router advertisements, use the **ipv6 nd managed-config-flag** command in an appropriate configuration mode. To clear the flag from IPv6 router advertisements, use the **no** form of this command.

ipv6 nd managed-config-flag
no ipv6 nd managed-config-flag

Syntax Description

This command has no keywords or arguments.

Command Default

The managed address configuration flag is not set in IPv6 router advertisements.

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Setting the managed address configuration flag in IPv6 router advertisements indicates to attached hosts whether they should use stateful autoconfiguration to obtain addresses. If the flag is set, the attached hosts should use stateful autoconfiguration to obtain addresses. If the flag is not set, the attached hosts should not use stateful autoconfiguration to obtain addresses.

Hosts may use stateful and stateless address autoconfiguration simultaneously.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR EXEC mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) shows how to configure the managed address configuration flag in IPv6 router advertisements on HundredGigE interface 0/1/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 nd managed-config-flag
```

For BNG, this example shows how to configure the managed address configuration flag in IPv6 router advertisements on dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 nd managed-config-flag
```

ipv6 nd ns-interval

To configure the interval between IPv6 neighbor solicitation retransmissions on an interface, use the **ipv6 nd ns-interval** command in an appropriate configuration mode. To restore the default interval, use the **no** form of this command.

ipv6 nd ns-interval *milliseconds*
no ipv6 nd ns-interval

Syntax Description

milliseconds	Interval (in milliseconds) between IPv6 neighbor solicit transmissions. Range is 1000 to 3600000.

Command Default

0 milliseconds (unspecified) is advertised in router advertisements, and the value 1000 is used for the neighbor discovery activity of the router itself.

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

This value is included in all IPv6 router advertisements sent out from this interface. Very short intervals are not recommended in normal IPv6 operation. When a nondefault value is configured, the configured time is both advertised and used by the router itself.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR Config mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) configures an IPv6 neighbor solicit transmission interval of 9000 milliseconds for HundredGigE interface 0/1/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 nd ns-interval 9000
```

For BNG, this example configures an IPv6 neighbor solicit transmission interval of 9000 milliseconds in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 nd ns-interval 9000
```

ipv6 nd other-config-flag

To set the other stateful configuration flag in IPv6 router advertisements, use the **ipv6 nd other-config-flag** command in an appropriate configuration mode. To clear the flag from IPv6 router advertisements, use the **no** form of this command.

ipv6 nd other-config-flag
no ipv6 nd other-config-flag

Syntax Description

This command has no keywords or arguments.

Command Default

The other stateful configuration flag is not set in IPv6 router advertisements.

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The setting of the other stateful configuration flag in IPv6 router advertisements indicates to attached hosts how they can obtain autoconfiguration information other than addresses. If the flag is set, the attached hosts should use stateful autoconfiguration to obtain the other (nonaddress) information.

Note If the managed address configuration flag is set using the **ipv6 nd managed-config-flag** command, then an attached host can use stateful autoconfiguration to obtain the other (nonaddress) information regardless of the setting of the other stateful configuration flag.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR Config mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) configures the "other stateful configuration" flag in IPv6 router advertisements on HundredGigE interface 0/1/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 nd other-config-flag
```

For BNG, this example configures the "other stateful configuration" flag for IPv6 router advertisements in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 nd other-config-flag
```

ipv6 nd prefix

To configure how IPv6 prefixes are advertised in IPv6 router advertisements, use the **ipv6 nd prefix** command in interface configuration mode. To advertise a prefix with default parameter values, use the **no** form of this command. To prevent a prefix (or prefixes) from being advertised, use the **no- adv** keyword.

ipv6 nd prefix {*ipv6prefix/prefix-length* | **default** [{*valid-lifetime* | **at** | **infinite** | **no-adv** | **no-autoconfig** | **off-link**}]}
no ipv6 nd prefix {*ipv6prefix/prefix-length* | **default** [{*valid-lifetime* | **at** | **infinite** | **no-adv** | **no-autoconfig** | **off-link**}]}

Syntax Description

ipv6-prefix	The IPv6 network number to include in router advertisements. This keyword must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
/prefix-length	The length of the IPv6 prefix. A decimal value that indicates how many of the high-order contiguous bits of the address compose the prefix (the network portion of the address). A slash (/) must precede the decimal value.
default	(Optional) Specifies all prefixes.
valid-lifetime	(Optional) The amount of time (in seconds) that the specified IPv6 prefix is advertised as being valid. The range of values is 0 to 4294967295 seconds.
at	(Optional) The date and time at which the lifetime and preference expire. The prefix is valid until this specified date and time are reached. Dates are expressed in the form *date-valid-expire month-valid-expire hh:mm-valid-expire date-prefer-expire month-prefer-expire hh:mm-prefer-expire.*
infinite	(Optional) The valid lifetime does not expire.
no-adv	(Optional) The prefix is not advertised.
no-autoconfig	(Optional) Indicates to hosts on the local link that the specified prefix cannot be used for IPv6 autoconfiguration.
off-link	(Optional) Indicates that the specified prefix is assigned to the link. Nodes sending traffic to such addresses that contain the specified prefix consider the destination to be locally reachable on the link. This prefix should not be used for *onlink* determination.

Command Default

All prefixes configured on interfaces that originate IPv6 router advertisements are advertised with a valid lifetime of 2592000 seconds (30 days) and a preferred lifetime of 604800 seconds (7 days), and with both the “onlink” and “autoconfig” flags set.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

This command allows control over the individual parameters per prefix, including whether or not the prefix should be advertised.

To control how prefixes are advertised, use the **ipv6 nd prefix** command. By default, prefixes configured as addresses on an interface using the **ipv6 address** command are advertised with default values. If you configure prefixes for advertisement using the **ipv6 nd prefix** command, only the specified prefixes are advertised with the configured values, all other prefixes are advertised with default values.

The default keyword can be used to set default parameters for all prefixes.

A date can be set to specify the expiration of a prefix. The valid and preferred lifetimes are counted down in real time. When the expiration date is reached, the prefix is no longer advertised.

When onlink is “on” (by default), the specified prefix is assigned to the link. Nodes sending traffic to such addresses that contain the specified prefix consider the destination to be locally reachable on the link.

When autoconfig is “on” (by default), it indicates to hosts on the local link that the specified prefix can be used for IPv6 autoconfiguration.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write

Examples

The following example includes the IPv6 prefix 2001:0DB8::/35 in router advertisements sent out HundredGigE interface 0/1/0/0 with a valid lifetime of 1000 seconds and a preferred lifetime of 900 seconds:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/0
RP/0/RP0/CPU0:router(config-if)# ipv6 nd prefix 2001:0DB8::/35 1000 900
```

ipv6 nd ra-interval

To configure the interval between IPv6 router advertisement transmissions on an interface, use the **ipv6 nd ra-interval** command in an appropriate configuration mode. To restore the default interval, use the **no** form of this command.

ipv6 nd ra-interval *seconds*
no ipv6 nd ra-interval *seconds*

Syntax Description

seconds	The interval (in seconds) between IPv6 router advertisement transmissions.

Command Default

seconds : 200 seconds

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The interval between transmissions should be less than or equal to the IPv6 router advertisement lifetime if the router is configured as a default router by using the **ipv6 nd ra-lifetime** command. To prevent synchronization with other IPv6 nodes, randomly adjust the actual value used to within 20 percent of the specified value.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR Config mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) configures an IPv6 router advertisement interval of 201 seconds on HundredGigE interface 0/1/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 nd ra-interval 201
```

For BNG, this example configures an IPv6 router advertisement interval of 201 seconds in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 nd ra-interval 201
```

ipv6 nd ra-lifetime

To configure the router lifetime value in IPv6 router advertisements on an interface, use the **ipv6 nd ra-lifetime** command in an appropriate configuration mode. To restore the default lifetime, use the **no** form of this command.

ipv6 nd ra-lifetime *seconds*
no ipv6 nd ra-lifetime

Syntax Description

seconds	The validity (in seconds) of this router as a default router on this interface.

Command Default

seconds : 1800 seconds

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Usage Guidelines

The router lifetime value is included in all IPv6 router advertisements sent out the interface. The value indicates the usefulness of the router as a default router on this interface. Setting the value to 0 indicates that the router should not be considered a default router on this interface. The router lifetime value can be set to a nonzero value to indicate that it should be considered a default router on this interface. The nonzero value for the router lifetime value should not be less than the router advertisement interval.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR Config mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) configures an IPv6 router advertisement lifetime of 1801 seconds on HundredGigE interface 0/1/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 nd ra-lifetime 1801
```

For BNG, this example configures an IPv6 router advertisement lifetime of 1801 seconds in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 nd ra-lifetime 1801
```

ipv6 nd reachable-time

To configure the amount of time that a remote IPv6 node is considered reachable after some reachability confirmation event has occurred, use the **ipv6 nd reachable-time** command in an appropriate configuration mode. To restore the default time, use the **no** form of this command.

ipv6 nd reachable-time *milliseconds*
no ipv6 nd reachable-time

Syntax Description

milliseconds	The amount of time (in milliseconds) that a remote IPv6 node is considered reachable. The range is from 0 to 3600000.

Command Default

0 milliseconds (unspecified) is advertised in router advertisements and 30000 (30 seconds) is used for the neighbor discovery activity of the router itself.

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The configured time enables the router to detect unavailable neighbors. Shorter configured times enable the router to detect unavailable neighbors more quickly; however, shorter times consume more IPv6 network bandwidth and processing resources in all IPv6 network devices. Very short configured times are not recommended in normal IPv6 operation.

The configured time is included in all router advertisements sent out of an interface so that nodes on the same link use the same time value. A value of 0 indicates that the configured time is unspecified by this router.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR Config mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) shows how to configure an IPv6 reachable time of 1,700,000 milliseconds for HundredGigE interface 0/1/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 nd reachable-time 1700000
```

For BNG, this example shows how to configure an IPv6 reachable time of 1,700,000 milliseconds in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 nd reachable-time 1700000
```

ipv6 nd redirects

To send Internet Control Message Protocol (ICMP) redirect messages, use the **ipv6 nd redirects** command in interface configuration mode. To restore the system default, use the **no** form of this command.

ipv6 nd redirects
no ipv6 nd redirects

Syntax Description

This command has no keywords or arguments.

Command Default

The default value is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

This command has no keywords or arguments.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write

Examples

The following example shows how to redirect IPv6 nd-directed broadcasts on HundredGigE interface 0/2/0/2:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/2/0/2
RP/0/RP0/CPU0:router(config-if)# ipv6 nd redirects
```

ipv6 nd scavenge-timeout

To set the lifetime for neighbor entries in the stale state, use the **ipv6 nd scavenge-timeout** command in XR Config mode mode. To disable this feature, use the **no** form of this command.

ipv6 nd scavenge-timeout *seconds*
no ipv6 nd scavenge-timeout *seconds*

Syntax Description

seconds	RA lifetime in seconds. The range is from 0 to 43200.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

When the scavenge-timer for a neighbor entry expires, the entry is cleared.

Task ID

Task ID	Operations
ipv6	read, write

Task ID	Operations
network	read, write

Examples

The following example shows how to set the lifetime for the neighbor entry:

```
RP/0/RP0/CPU0:router(config)# ipv6 nd scavenge-timeout 3000
```

ipv6 nd suppress-ra

To suppress IPv6 router advertisement transmissions on a LAN interface, use the **ipv6 nd suppress-ra** command in an appropriate configuration mode. To reenable the sending of IPv6 router advertisement transmissions on a LAN interface, use the **no** form of this command.

ipv6 nd suppress-ra
no ipv6 nd suppress-ra

Syntax Description

This command has no keywords or arguments.

Command Default

IPv6 router advertisements are automatically sent on other types of interlaces if IPv6 unicast routing is enabled on the interfaces. IPv6 router advertisements are not sent on other types of interfaces.

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **no ipv6 nd suppress-ra** command to enable the sending of IPv6 router advertisement transmissions on non-LAN interface types (for example, serial or tunnel interfaces).

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR Config mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) shows how to suppress IPv6 router advertisements on HundredGigE interface 0/1/0/1:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ipv6 nd suppress-ra
```

For BNG, this example shows how to suppress IPv6 router advertisements in the dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 nd suppress-ra
```

ipv6 neighbor

To configure a static entry in the IPv6 neighbor discovery cache, use the **ipv6 neighbor** command in XR Config mode mode. To remove a static IPv6 entry from the IPv6 neighbors discovery cache, use the **no** form of this command.

ipv6 neighbor *ipv6-address interface-type interface-instance hardware-address*
no ipv6 neighbor *ipv6-address interface-type interface-instance hardware-address*

Syntax Description

ipv6-address	The IPv6 address that corresponds to the local data-link address. This argument must be in the form documented in RFC 2373 where the address is specified in hexadecimal using 16-bit values between colons.
interface-type	Interface type. For more information, use the question mark (?) online help function.

interface-instance	Either a physical interface instance or a virtual interface instance as follows:
	• Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation.
	  • *rack*: Chassis number of the rack.
	  • *slot*: Physical slot number of the modular services card or line card.
	  • *module*: Module number. A physical layer interface module (PLIM) is always 0.
	  • *port*: Physical port number of the interface.
	Note In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0 /CPU0/0.
	• Virtual interface instance. Number range varies depending on interface type.
	For more information about the syntax for the router, use the question mark (?) online help function.

hardware-address	The local data-link address (a 48-bit address).

Command Default Static entries are not configured in the IPv6 neighbor discovery cache.

Command Modes XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines The **ipv6 neighbor** command is similar to the **arp** (global) command.

If an entry for the specified IPv6 address already exists in the neighbor discovery cache—learned through the IPv6 neighbor discovery process—the entry is automatically converted to a static entry.

Use the **show ipv6 neighbors** command to display static entries in the IPv6 neighbors discovery cache. A static entry in the IPv6 neighbor discovery cache has one state: reach (reachable)—The interface for this entry is up. If the interface for the entry is down, the **show ipv6 neighbors** command does not show the entry.

Note Reachability detection is not applied to static entries in the IPv6 neighbor discovery cache; therefore, the descriptions for the reach (reachable) state are different for dynamic and static cache entries. See the **show ipv6 neighbors** command for a description of the reach (reachable) state for dynamic cache entries.

The **clear ipv6 neighbors** command deletes all entries in the IPv6 neighbors discovery cache, except static entries. The **no ipv6 neighbor** command deletes a specified static entry from the neighbor discovery cache; the command does not remove dynamic entries—learned from the IPv6 neighbor discovery process—from the cache. Disabling IPv6 on an interface by using the **no ipv6 enable** or the **no ipv6 unnumbered** command deletes all IPv6 neighbor discovery cache entries configured for that interface, except static entries (the state of the entry changes to reach [reachable]).

Static entries in the IPv6 neighbor discovery cache are not modified by the neighbor discovery process.

Note Static entries for IPv6 neighbors can be configured only on IPv6-enabled LAN and ATM LAN Emulation interfaces.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write

Examples The following example shows how to configure a static entry in the IPv6 neighbor discovery cache for a neighbor with the IPv6 address 2001:0DB8::45A and link-layer address 0002.7D1A.9472 on ethernet interface 0/RSP0/CPU0:

```
RP/0/RP0/CPU0:router(config)# ipv6 neighbor 2001:0DB8::45A 0002.7D1A.9472
```

ipv6 source-route

To enable processing of the IPv6 type source (type 0) routing header, use the **ipv6 source-route** command in XR EXEC mode mode. To disable the processing of this IPv6 extension header, use the **no** form of this command.

ipv6 source-route
no ipv6 source-route

Syntax Description

This command has no keywords or arguments.

Command Default

The **no** version of the **ipv6 source-route** command is the default.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **no ipv6 source-route** command (which is the default) prevents hosts from performing source routing using your routers. When the **no ipv6 source-route** command is configured and the router receives a packet with a type 0 source routing header, the router drops the packet and sends an IPv6 ICMP error message back to the source and logs an appropriate debug message.

Task ID

Task ID	Operation
network	read, write
ipv6	read, write

Example

The following example shows how to allow the processing of any IPv6 datagrams containing a source-route header option:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# ipv6 source-route
RP/0/RP0/CPU0:router(config)#
```

ipv6 tcp-mss-adjust

To enable the transit traffic of TCP flows to be a Maximum Segment Size (MSS) below the GRE tunnel interface or VLAN sub-interface MTU so that traffic fragmentation is prevented when a session is established for IPv6 packets, use the **ipv6 tcp-mss-adjust** command in the interface configuration submode. To disable the transit traffic of TCP flows to be a Maximum Segment Size (MSS) below the GRE tunnel interface or VLAN sub-interface MTU, use the **no** form of this command.

ipv6 tcp-mss-adjust enable
no ipv6 tcp-mss-adjust enable

Syntax Description

enable	Enables Maximum Segment Size (MSS) adjustment for tcp flows on the interface..

Command Default

None

Command Modes

Interface Configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

This command has no keywords or arguments.

Task ID

Task ID	Operation
mpls-te	read, write
ipv6	read, write

Example

This example shows how to enable the transit traffic of TCP flows for IPv6 packets using the **ipv6 tcp-mss-adjust** command:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface HundredEthernet 0/0/0/4.20
RP/0/RP0/CPU0:router(config-if)# ipv6 tcp-mss-adjust enable
```

ipv6 unreachables disable

To disable the generation of IPv6 Internet Control Message Protocol (ICMP) unreachable messages, use the **ipv6 unreachables disable** command in an appropriate configuration mode. To re-enable the generation of ICMP unreachable messages, use the **no** form of this command.

ipv6 unreachables disable
no ipv6 unreachables disable

Syntax Description

This command has no keywords or arguments.

Command Default

IPv6 ICMP unreachables messages are generated.

Command Modes

Interface configuration (not applicable for BNG)

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

If the software receives a nonbroadcast packet destined for itself that uses a protocol it does not recognize, it sends an ICMP protocol unreachable message to the source.

If the software receives a datagram that it cannot deliver to its ultimate destination because it knows of no route to the destination address, it replies to the originator of that datagram with an ICMP host unreachable message.

This command affects a number of ICMP unreachable messages.

For BNG, ensure you run this command in the dynamic template configuration mode. To enter the dynamic template configuration mode, run **dynamic-template** command in the XR EXEC mode.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write
config-services	read, write

Examples

This example (not applicable for BNG) shows how to disable the generation of ICMP unreachable messages on HundredGigE interface 0/6/0/0:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE0/6/0/0
RP/0/RP0/CPU0:router(config-if)# ipv6 unreachables disable
```

For BNG, this example shows how to disable the generation of ICMP unreachable messages on dynamic template configuration mode:

```
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp foo
RP/0/RP0/CPU0:router(config-dynamic-template-type)# ipv6 unreachables disable
```

ipv6 virtual address

To define an IPv6 virtual address for a network of management Ethernet interfaces, use the **ipv6 virtual address** command in XR Config mode. To remove an IPv6 virtual address from the configuration, use the **no** form of this command.

ipv6 virtual address {[**vrf** *vrf-name*]*ipv6-address/prefix-length* | **use-as-src-addr**}
no ipv6 virtual address {[**vrf** *vrf-name*]*ipv6-address/prefix-length* | **use-as-src-addr**}

Syntax Description

vrf *vrf-name*	(Optional) Configures the virtual address on a per VPN routing and forwarding (VRF) basis for the management interfaces The *vrf-name* argument specifies the name of the VRF.
ipv6 address	The virtual IPv6 address to be used.
prefix-length	The length of the IPv6 prefix. A decimal value that indicates how many of the high-order contiguous bits of the address comprise the prefix (the network portion of the address). A slash mark must precede the decimal value.
use-as-src-addr	Enables the virtual address to be used as the default SRC address on sourced packets.

Command Default

No IPv6 virtual address is defined for the configuration.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.5.2	This release supports virtual addresses for the hosted Linux networking stack.
Release 6.0	This command was introduced.

Usage Guidelines

Configuring an IPv6 virtual address enables you to access the router from a single virtual address with a management network. An IPv6 virtual address persists across route processor (RP) failover situations.

Configuring an IPv6 virtual address enables you to access a dual RP router from a single address without prior knowledge of which RP is active. An IPv6 virtual address persists across RP failovers. For this to happen, the virtual IPv6 address must share a common IPv6 subnet with a Management Ethernet interface on both RPs.

If you disable the **ipv6 virtual address** command with the **vrf** keyword, the virtual IP address is unconfigured for the corresponding VRF or for the default if no VRF is specified. This results in the removal of the entry for the virtual IP address in the VRF table and in the ARP cache.

The default VRF is chosen when no VRF is specified. The virtual IP address is activated on a management interface that is attached to a default VRF.

The **use-as-src-addr** keyword eliminates the need for configuring a loopback interface as the source interface (that is, update source) for management applications. When an update source is not configured, management applications allow the transport processes (TCP, UDP, raw_ip) to pick a suitable source address. The transport processes, in turn, consult the FIB to do so. If a Management Ethernet's IP address is picked as the source address and if the **use-as-src-addr keyword** is configured, then the transport processes replace the Management Ethernet's IP address with a relevant virtual IP address. This functionality works across RP switchovers.

Cisco IOS XR Software Release 7.5.2 and later also supports virtual addresses for the hosted Linux networking stack.

Task ID

Task ID	Operations
ipv6	read, write
network	read, write

Examples

The following example shows how to define an IPv6 virtual address:

```
RP/0/RP0/CPU0:router(config)# ipv6 virtual address 0:0:0:7272::72/64
```

The following example shows how to configure the virtual IP addresses for management interfaces on a per VRF basis:

```
RP/0/RP0/CPU0:router(config)# ipv6 virtual address vrf ppp 0:0:0:7272::72/64
```

local pool

To create one or more local address pools from which IP addresses are assigned when a peer connects, use the **local pool** command in XR Config mode. To restore the default behavior, use the **no** form of this command.

local pool [**ipv4**] [**vrf** *vrf_name*] {*poolname* | **default**} *first-ip-address* [*last-ip-address*]
no local pool [**ipv4**] [**vrf** *vrf_name*] {*poolname* | **default**} *first-ip-address* [*last-ip-address*]

Syntax Description

vrf	Specifies that a VRF name will be given. If is parameter is missing, the default VRF is assumed.
vrf_name	Specifies the name of the VRF to which the addresses of the pool belongs. If no name is given, the default VRF is assumed.
default	Creates a default local IPv4 address pool that is used if no other pool is named.
poolname	Specifies the name of the local IPv4 address pool.

first-ip-address	Specifies the first address in an IPv4 address range. If high-IP-address is not specified, the address range is considered to have only one address.
last-ip-address	(Optional) Specifies the last address in an IPv4 address range. If high-IP-address is not specified, the address range is considered to have only one address.

Command Default

Special default pool if VRF is not specified. By default, this functionality is disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use this command to create local address pools to use in assigning IP addresses when a peer connects. You can also add range of IP addresses to an existing pool. If no pool name is specified, the pool with the name "default" is used.

The optional **vrf** keyword and associated *vrf name* allows the association of an IPv4 address pool with a named VRF. Any IPv4 address pool created without the **vrf** keyword automatically becomes a member of a default VRF. An IPv4 address pool name can be associated with only one VRF. Subsequent use of the same pool name, within a pool group, is treated as an extension of that pool, and any attempt to associate an existing local IPv4 address pool name with a different VRF is rejected. Therefore, each use of a pool name is an implicit selection of the associated VRF.

Note To reduce the chances of inadvertent generation of duplicate addresses, the system allows creation of the default pool only in the default VRF.

All IPv4 address pools within a VRF are checked to prevent overlapping addresses; however, addresses may overlap across different VRFs.

Task ID

Task ID	Operations
ipv4	read, write
ipv6	read, write
network	read, write

Examples

The following example creates a local IPv4 address pool named “pool2,” which contains all IPv4 addresses in the range 172.16.23.0 to 172.16.23.255:

```
RP/0/RP0/CPU0:router(config)# local pool ipv4 pool2 172.16.23.0 172.16.23.255
```

The following example configures a pool of 1024 IP addresses:

```
RP/0/RP0/CPU0:router(config)#no local pool ipv4 default
RP/0/RP0/CPU0:router(config)#local pool ipv4 default 10.1.1.0 10.1.4.255
```

Note It is good practice to precede local pool definitions with a **no** form of the command to remove any existing pool, because the specification of an existing pool name is taken as a request to extend that pool with the new IPv4 addresses. To extend the pool, the **no** form of the command is not applicable.

The following example configures multiple ranges of IPv4 addresses into one pool:

```
RP/0/RP0/CPU0:router(config)#local pool ipv4 default 10.1.1.0 10.1.9.255
RP/0/RP0/CPU0:router(config)#local pool ipv4 default 10.2.1.0 10.2.9.255
```

The following examples show how to configure two pool groups and IPv4 address pools in the base system group:

```
RP/0/RP0/CPU0:router(config)#local pool vrf grp1 ipv4 p1_g1 10.1.1.1 10.1.1.50
RP/0/RP0/CPU0:router(config)#local pool vrf grp1 ipv4 p2_g1 10.1.1.100 10.1.1.110
RP/0/RP0/CPU0:router(config)#local pool vrf grp2 ipv4 p1_g2 10.1.1.1 10.1.1.40
RP/0/RP0/CPU0:router(config)#local pool ipv4 lp1 10.1.1.1 10.1.1.10
RP/0/RP0/CPU0:router(config)#local pool vrf grp1 ipv4 p3_g1 10.1.2.1 10.1.2.30
RP/0/RP0/CPU0:router(config)#local pool vrf grp2 ipv4 p2_g2 10.1.1.50 10.1.1.70
RP/0/RP0/CPU0:router(config)#local pool ipv4 lp2 10.1.2.1 10.1.2.10
```

In this example:

- VRF grp1 consists of pools p1_g1, p2_g1, and p3_g1.
- VRF grp2 consists of pools p1_g2 and p2_g2.
- Pools lp1 and lp2 are not explicitly associated with a vrf and are therefore members of the default vrf.

Note IPv4 address 10.1.1.1 overlaps in vrfs grp1, grp2 and the default vrf . There is no overlap within any vrf that includes the default vrf.

The following examples shows the configurations of IP address pools and groups for use by a VPN and VRF:

These examples show configuration of pools in two VRFs and the default VRF:

- VRF vpn1 consists of pools p1_vpn1, p2_vpn1, and p3_vpn1.
- VRF vpn2 consists of pools p1_vpn2 and p2_vpn2.
- Pools lp1 and lp2 are not associated with a VRF and therefore belong to the default VRF.

Note IPv4 address 10.1.1.1 overlaps across VRFs vpn1, vpn2 and the default VRF . There is no overlap within any VRF.

The VPN requires a configuration that selects the proper vrf by selecting the proper pool based on remote user data. Each user in a given VPN can select an address space using the pool and associated vrf appropriate for that VPN. Duplicate addresses in other VPNs (other vrfs) are not a concern, because the address space of a VPN is specific to that VPN. In the example, a user in VRF vpn1 is associated with a combination of the pools p1_vpn1, p2_vpn1, and p3_vpn1, and is allocated addresses from that address space. Addresses are returned to the same pool from which they were allocated.

show arm conflicts

To display IPv4 or IPv6 address conflict information identified by the Address Repository Manager (ARM), use the **show arm conflicts** command in XR EXEC mode.

show arm {**ipv4** | **ipv6**} [**vrf** *vrf-name*] **conflicts** [{**address** | **override** | **unnumbered**}]

Syntax Description

ipv4	Displays IPv4 address conflicts.
ipv6	Displays IPv6 address conflicts.
vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information. Available for IPv4 only.
vrf-name	(Optional) Name of a VRF.
address	(Optional) Displays address conflict information.
override	(Optional) Displays address conflict override information.
unnumbered	(Optional) Displays unnumbered interface conflict information.

Command Default

None

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show arm conflicts** command to display information about IPv4 or IPv6 address conflicts. You can use address conflict information to identify misconfigured IPv4 or IPv6 addresses.

Conflict information is displayed for interfaces that are forced down and for interfaces that are up.

Issuing the **show arm conflicts** command without specifying any optional keywords displays the output generated from both the **address** and **unnumbered** keywords.

Task ID

Task ID	Operations
network	read

Examples

The following sample output is from the **show arm ipv4 conflicts** command:

```
RP/0/RP0/CPU0:router# show arm ipv4 conflicts

F Forced down
| Down interface & addr                  Up interface & addr

F Lo2 10.1.1.2/24                         Lo1 10.1.1.1/24

Forced down interface          Up interface
tu2->tu1                       tu1->Lo1
```

The following is sample output from the **show arm ipv4 conflicts** command with the **address** keyword:

```
RP/0/RP0/CPU0:router# show arm ipv4 conflicts address

F Forced down
| Down interface & addr                  Up interface & addr

F Lo2 10.1.1.2/24                         Lo1 10.1.1.1/24
```

The following is sample output from the **show arm ipv4 conflicts** command with the **unnumbered** keyword:

```
RP/0/RP0/CPU0:router# show arm ipv4 conflicts unnumbered

Forced down interface          Up interface                  VRF
tu2->tu1                       tu1->Lo1
```

This table describes the significant fields shown in the display.

Table 56: show arm conflicts Command Field Descriptions

Field	Description
Forced down	Legend defining a symbol that may appear in the output for this command.
Down interface & addr	Forced down interface name, type, and address.
Up interface & addr	List of interfaces that are up.
Forced down interface	Unnumbered interfaces that are in conflict and forced down.
Up interface	Unnumbered interfaces that are in conflict and are up.

show arm registrations producers

To display producer registration information for the Address Repository Manager (ARM), use the **show arm registrations producers** command in XR EXEC mode.

show arm {**ipv4** | **ipv6**} **registrations producers**

Syntax Description

ipv4	Displays IPv4 producer registration information.
ipv6	Displays IPv6 producer registration information.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show arm registrations producers** command to display information on producers of IP ARM registrations. Registration information is displayed with the ID.

Task ID

Task ID	Operations
network	read

Examples

The following is sample output from the **show arm registrations producers** command:

```
RP/0/RP0/CPU0:router# show arm ipv4 registrations producers

Id    Node            Producer Id   IPC Version Connected?
0     0/0/0           ipv4_io       1.1         Y
4     0/1/0           ipv4_io       1.1         Y
3     0/2/0           ipv4_io       1.1         Y
2     0/4/0           ipv4_io       1.1         Y
1     0/6/0           ipv4_io       1.1         Y
```

This table describes the significant fields shown in the display.

Table 57: show arm registrations producers Command Field Descriptions

Field	Description
Id	An identifier used by the IP Address ARM (IP ARM) to keep track of the producer of the IP address.
Node	The physical node (RP/LC CPU) where the producer is running.
Producer Id	The string used by the producer when registering with IP ARM.
IPC Version	Version of the apis used by the producer to communicate with IP ARM.
Connected?	Status of whether the producer is connected or not.

show arm router-ids

To display the router identification information with virtual routing and forwarding table information for the Address Repository Manager (ARM), use the **show arm router-ids** command in XR EXEC mode.

show arm [**ipv4**] **router-ids**

Syntax Description

ipv4	(Optional) Displays IPv4 router information.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show arm router-ids** command with the **ipv4** keyword to display the selected router ID information for the router.

Task ID

Task ID	Operations
network	read

Examples

The following is sample output from the **show arm router-ids** command:

```
RP/0/RP0/CPU0:router# show arm router-ids

Router-ID         Interface

10.10.10.10       Loopback0
```

This table describes the significant fields shown in the display.

Table 58: show arm router-ids Command Field Descriptions

Field	Description
Router-ID	Router identification.
Interface	Interface identification.

show arm summary

To display summary information for the IP Address Repository Manager (ARM), use the **show arm summary** command in XR EXEC mode.

show arm {**ipv4** | **ipv6**} **summary**

Syntax Description

ipv4	Displays IPv4 summary information.
ipv6	Displays IPv6 summary information.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show arm summary** command to display a summary of the number of producers, address conflicts, and unnumbered interface conflicts in the router.

Task ID

Task ID	Operations
network	read

Examples

The following is sample output from the **show arm summary** command:

```
Router# show arm ipv4 summary

IPv4 Producers                          :          1
IPv4 address conflicts                  :          0
IPv4 unnumbered interface conflicts     :          0
IPv4 VRF known                          :          0
IPv4 DB Master version                  : 0x00000000
```

This table describes the significant fields shown in the display.

Table 59: show arm summary Command Field Descriptions

Field	Description
IPv4 Producers	Number of IPv4 producers on the router.
IPv4 address conflicts	Number of IPv4 address conflicts on the router.
IPv4 unnumbered interface conflicts	Number of IPv4 conflicts on unnumbered interfaces.
IPv4 DB Master version	IPv4 DB Master version

show arm vrf-summary

To display a summary of VPN routing and forwarding (VRF) instance information identified by the Address Repository Manager (ARM), use the **show arm vrf-summary** command in XR EXEC mode.

show arm {**ipv4** | **ipv6**} **vrf-summary**

Syntax Description

ipv4	Displays IPv4 address information.
ipv6	Displays IPv6 address information.

Command Default

None

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show arm vrf-summary** command to display information about an IPv4 VPN routing and forwarding instance.

Task ID

Task ID	Operations
network	read

Examples

The following example is output from the **show arm vrf-summary** command:

```
RP/0/RP0/CPU0:router# show arm vrf-summary

VRF IDs:        VRF-Names:
0x60000000      default
0x60000001      vrf1
0x60000002      vrf2
```

This table describes the significant fields shown in the display.

Table 60: show arm vrf-summary Command Field Descriptions

Field	Description
VRF IDs	VPN routing and forwarding (VRF) identification (vrfid) number.
VRF-Names	Name given to the VRF.

show clns statistics

To display Connectionless Network Service (CLNS) protocol statistics, use the **show clns statistics** command in XR EXEC mode.

show clns statistics

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use this command to display CLNS statistics.

Task ID

Task ID	Operations
isis	read

Examples

The following is sample output from the **show clns statistics** command:

```
RP/0/RP0/CPU0:router# show clns statistics

CLNS Statistics:
Last counter clear:                    2868 seconds ago
Total number of packets sent:          0
Total number of packets received:      0
Send packets dropped, buffer overflow: 0
Send packets dropped, out of memory:   0
Send packets dropped, other:           0
Receive socket max queue size:         0
Class    Overflow/Max   Rate Limit/Max
IIH             0/0             0/0
LSP             0/0             0/0
SNP             0/0             0/0
OTHER           0/0             0/0
Total          0               0
```

This table describes the significant fields shown in the display.

Table 61: show clns traffic Command Field Descriptions

Field	Description
Class	Indicates the packet type. Packets types are as follows: • IIH—Intermediate System-to-Intermediate-System hello packets • lsp—Link state packets • snp—Sequence number packets • other
Overflow/Max	Indicates the number of packet drops due to the socket queue being overflown. The count displays in an *x/y* format where *x* indicates the total number of packet drops and *y* indicates the maximum number of drops in a row.
Rate Limit/Max	Indicates the number of packet drops due to rate limitation. The count displays in an *x/y* format where *x* indicates the total number of packet drops and *y* indicates the maximum number of drops in a row.

show ipv4 interface

To display the usability status of interfaces configured for IPv4, use the **show ipv4 interface** command in the XR EXEC mode.

show ipv4 [**vrf** *vrf-name*] **interface** [{*type interface-path-id* | **brief** | **summary**}]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
type	Interface type. For more information, use the question mark (?) online help function.

interface-path-id	Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0 /CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
brief	(Optional) Displays the primary IPv4 addresses configured on the router's interfaces and their protocol and line states.
summary	(Optional) Displays the number of interfaces on the router that are assigned, unassigned, or unnumbered.

Command Default

If VRF is not specified, the software displays the default VRF.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show ipv4 interface** command provides output similar to the **show ipv6 interface** command, except that it is IPv4-specific.

The interface name will be displayed only if the name belongs to the VRF instance. If the *vrf-name* is not specified then the interface instance will be displayed only if the interface belongs to the default VRF.

Task ID

Task ID	Operations
ipv4	read
network	read

Examples

This is the sample output of the **show ipv4 interface** command:

```
RP/0/RP0/CPU0:router# show ipv4 interface


Bundle-Ether1 is Down, ipv4 protocol is Down
  Vrf is default (vrfid 0x60000000)
  Internet address is 40.30.1.2/24
  MTU is 1514 (1500 is available to IP)
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound  common access list is not set, access list is not set
  Proxy ARP is disabled
  ICMP redirects are never sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  Table Id is 0xe0000000
Bundle-Ether2 is Down, ipv4 protocol is Down
  Vrf is default (vrfid 0x60000000)
  Internet address is 40.30.2.2/24
  MTU is 1514 (1500 is available to IP)
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound  common access list is not set, access list is not set
  Proxy ARP is disabled
  ICMP redirects are never sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  Table Id is 0xe0000000
Bundle-Ether10 is Shutdown, ipv4 protocol is Down
  Vrf is default (vrfid 0x60000000)
  Internet protocol processing disabled
Bundle-Ether54 is Up, ipv4 protocol is Up
  Vrf is default (vrfid 0x60000000)
  Internet address is 10.0.9.0/31
  MTU is 1514 (1500 is available to IP)
  Helper address is not set
  Multicast reserved groups joined: 224.0.0.2 224.0.0.1 224.0.0.2
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound  common access list is not set, access list is not set
  Proxy ARP is disabled
  ICMP redirects are never sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  Table Id is 0xe0000000
Bundle-Ether1900 is Down, ipv4 protocol is Down
  Vrf is default (vrfid 0x60000000)
  Internet address is 10.0.54.1/30
  MTU is 9000 (8986 is available to IP)
  Helper address is not set
  Directed broadcast forwarding is disabled
  Outgoing access list is not set
  Inbound  common access list is not set, access list is not set
  Proxy ARP is disabled
  ICMP redirects are never sent
  ICMP unreachables are always sent
  ICMP mask replies are never sent
  Table Id is 0xe0000000
Bundle-Ether1901 is Down, ipv4 protocol is Down
  Vrf is default (vrfid 0x60000000)
```

```
Internet address is 10.0.55.1/30
MTU is 9000 (8986 is available to IP)
```

This table describes the significant fields shown in the display.

Table 62: show ipv4 interface Command Field Descriptions

Field	Description
Loopback0 is Up	If the interface hardware is usable, the interface is marked “Up.” For an interface to be usable, both the interface hardware and line protocol must be up.
line protocol is Up	If the interface can provide two-way communication, the line protocol is marked “Up.” For an interface to be usable, both the interface hardware and line protocol must be up.
Internet address	IPv4 Internet address and subnet mask of the interface.
Secondary address	Displays a secondary address, if one has been set.
MTU	Displays the IPv4 MTU[10] value set on the interface.
Multicast reserved groups joined	Indicates the multicast groups this interface belongs to.
Directed broadcast forwarding	Indicates whether directed broadcast forwarding is enabled or disabled.
Outgoing access list	Indicates whether the interface has an outgoing access list set.
Inbound access list	Indicates whether the interface has an incoming access list set.
Proxy ARP	Indicates whether proxy ARP[11] is enabled or disabled on an interface.
ICMP redirects	Specifies whether ICMPv4[12] redirects are sent on this interface.
ICMP unreachables	Specifies whether unreachable messages are sent on this interface.
Internet protocol processing disabled	Indicates an IPv4 address has not been configured on the interface.

[10] MTU = maximum transmission unit
[11] ARP = Address Resolution Protocoladdress resolution protocol
[12] ICMPv4 = Internet Control Message Protocol internet control message protocol version 4

show ipv4 traffic

To display the IPv4 traffic statistics, use the **show ipv4 traffic** command in the XR EXEC mode.

show ipv4 traffic [**brief**]

Syntax Description

brief	(Optional) Displays only IPv4 and Internet Control Message Protocol version 4 (ICMPv4) traffic.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show ipv4 traffic** command provides output similar to the **show ipv6 traffic** command, except that it is IPv4-specific.

Task ID

Task ID	Operations
ipv4	read
network	read

Examples

This is the sample output of the **show ipv4 traffic** command:

```
RP/0/RP0/CPU0:router# show ipv4 traffic


IP statistics:
  Rcvd:  486522 total, 55292 local destination
         0 format errors, 0 bad hop count
         0 unknown protocol, 0 not a gateway
         0 security failures, 0 bad source, 0 bad header
         842 with options, 0 bad, 0 unknown
  Opts:  0 end, 0 nop, 0 basic security, 0 extended security
         0 strict source rt, 0 loose source rt, 0 record rt
         0 stream ID, 0 timestamp, 842 alert, 0 cipso
  Frags: 0 reassembled, 0 timeouts, 0 couldn't reassemble, 0 fragments received
         0 fragmented, 0 fragment count, 0 fragment max drop
  Bcast: 0 sent, 0 received
  Mcast: 13042 sent, 417434 received
   Lisp: 0 encapped in v4, 0 decapped from v4
         0 encapped in v6, 0 decapped from v6
         0 encap errors, 0 decap errors
   Drop: 0 encapsulation failed, 19 no route, 0 too big
   Sent: 446780 total

ICMP statistics:
  Sent: 0 admin unreachable, 190147 network unreachable
        0 host unreachable, 0 protocol unreachable
        0 port unreachable, 0 fragment unreachable
        0 time to live exceeded, 0 reassembly ttl exceeded
        0 echo request, 0 echo reply
        0 mask request, 0 mask reply
        0 parameter error, 0 redirects
        190147 total
  Rcvd: 0 admin unreachable, 11 network unreachable
        0 host unreachable, 0 protocol unreachable
        0 port unreachable, 0 fragment unreachable
        0 time to live exceeded, 0 reassembly ttl exceeded
        0 echo request, 0 echo reply
        0 mask request, 0 mask reply
        0 redirect, 0 parameter error
```

```
        0 source quench, 0 timestamp, 0 timestamp reply
        0 router advertisement, 0 router solicitation
        11 total, 0 checksum errors, 0 unknown

UDP statistics:
        424354 packets input, 10881 packets output
        0 checksum errors, 13236 no port
        0 forwarded broadcasts

TCP statistics:
        53775 packets input, 56104 packets output
        0 checksum errors, 0 no port
```

This table describes the significant fields shown in the display.

Table 63: show ipv4 traffic Command Field Descriptions

Field	Description
bad hop count	Occurs when a packet is discarded because its TTL[13] field was decremented to zero.
encapsulation failed	Usually indicates that the router had no ARP request entry and therefore did not send a datagram.
format errors	Indicates a gross error in the packet format, such as an impossible Internet header length.
IP statistics Rcvd total	Indicates the total number of local destination and other packets received in the software plane. It does not account for the IP packets forwarded or discarded in hardware.
no route	Counted when the Cisco IOS XR software discards a datagram it did not know how to route.

[13] TTL = time-to-live

show ipv6 interface

To display the usability status of interfaces configured for IPv6, use the **show ipv6 interface** command in the XR EXEC mode.

show ipv6 [**vrf** *vrf-name*] **interface** [{**summary** | [*type interface-path-id*][**brief** [{**link-local** | **global**}]]}]

Syntax Description

vrf	(Optional) Displays VPN routing and forwarding (VRF) instance information.
vrf-name	(Optional) Name of a VRF.
type	(Optional) Interface type. For more information, use the question mark (?) online help function.

interface-path-id	(Optional) Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0 /CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
brief	(Optional) Displays the primary IPv6 addresses configured on the router interfaces and their protocol and line states.
link-local	(Optional) Displays the link local IPv6 address.
global	(Optional) Displays the global IPv6 address.
summary	(Optional) Displays the number of interfaces on the router that are assigned, unassigned, or unnumbered.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show ipv6 interface** command provides output similar to the **show ipv4 interface** command, except that it is IPv6-specific.

Use the **link-local** or **global** keywords along with the **brief** keyword to view the link local or global IPv6 addresses.

Task ID

Task ID	Operations
ipv6	read

Examples

This is the sample output of the **show ipv6 interface** command:

```
RP/0/RP0/CPU0:router# show ipv6 interface


  Bundle-Ether1 is Down, ipv6 protocol is Down, Vrfid is default (0x60000000)
  IPv6 is enabled, link-local address is fe80::e448:5cff:fe10:b484 [TENTATIVE]
  Global unicast address(es):
    40:30:1:1::2, subnet is 40:30:1:1::/64 [TENTATIVE]
  Joined group address(es): ff02::2 ff02::1
  MTU is 1514 (1500 is available to IPv6)
  ICMP redirects are disabled
  ICMP unreachables are enabled
  ND DAD is enabled, number of DAD attempts 1
  ND reachable time is 0 milliseconds
  ND cache entry limit is 1000000000
  ND advertised retransmit interval is 0 milliseconds
  ND router advertisements are sent every 160 to 240 seconds
  ND router advertisements live for 1800 seconds
  Hosts use stateless autoconfig for addresses.
  Outgoing access list is not set
  Inbound  common access list is not set, access list is not set
  Table Id is 0xe0800000
  Complete protocol adjacency: 0
  Complete glean adjacency: 0
  Incomplete protocol adjacency: 0
  Incomplete glean adjacency: 0
  Dropped protocol request: 0
  Dropped glean request: 0
```

This table describes the significant fields shown in the display.

Table 64: show ipv6 interface Command Field Descriptions

Field	Description
Bundle-Ether1 is Down	Indicates whether the interface hardware is currently active (whether line signal is present) and whether it has been taken down by an administrator. If the interface hardware is usable, the interface is marked “Up.” For an interface to be usable, both the interface hardware and line protocol must be up.
line protocol is Up (or down)	Indicates whether the software processes that handle the line protocol consider the line usable (that is, whether keepalives are successful). If the interface can provide two-way communication, the line protocol is marked “Up.” For an interface to be usable, both the interface hardware and line protocol must be up.
IPv6 is enabled, stalled, disabled (stalled and disabled are not shown in sample output)	Indicates that IPv6 is enabled, stalled, or disabled on the interface. If IPv6 is enabled, the interface is marked “enabled.” If duplicate address detection processing identified the link-local address of the interface as being a duplicate address, the processing of IPv6 packets is disabled on the interface and the interface is marked “stalled.” If IPv6 is not enabled, the interface is marked “disabled.”
link-local address	Displays the link-local address assigned to the interface.

Field	Description
TENTATIVE	The state of the address in relation to duplicate address detection. States can be any of the following: • duplicate—The address is not unique and is not being used. If the duplicate address is the link-local address of an interface, the processing of IPv6 packets is disabled on that interface. • tentative—Duplicate address detection is either pending or under way on this interface. **Note** If an address does not have one of these states (the state for the address is blank), the address is unique and is being used.
Global unicast addresses	Displays the global unicast addresses assigned to the interface.
ICMP redirects	State of Internet Control Message Protocol (ICMP) IPv6 redirect messages on the interface (the sending of the messages is enabled or disabled).
ND DAD	State of duplicate address detection on the interface (enabled or disabled).
number of DAD attempts	Number of consecutive neighbor solicitation messages that are sent on the interface while duplicate address detection is performed.
ND reachable time	Displays the neighbor discovery reachable time (in milliseconds) assigned to this interface.

This is the sample output of the **show ipv6 interface brief link-local** command:

```
RP/0/RP0/CPU0:router#show ipv6 interface brief link-local


Interface                  IPv6-Address                  Status     Protocol
Bundle-Ether1              fe80::e448:5cff:fe10:b484     Down       Down
Bundle-Ether2              fe80::e448:5cff:fe10:b483     Down       Down
Bundle-Ether10             unassigned                    Shutdown   Down
Bundle-Ether54             fe80::e448:5cff:fe10:b481     Up         Up
Bundle-Ether1900           fe80::e448:5cff:fe10:b48a     Down       Down
Bundle-Ether1901           fe80::e448:5cff:fe10:b489     Down       Down
Bundle-Ether1902           fe80::e448:5cff:fe10:b488     Down       Down
Bundle-Ether1903           fe80::e448:5cff:fe10:b487     Down       Down
Bundle-Ether1904           fe80::e448:5cff:fe10:b486     Down       Down
Bundle-Ether1905           unassigned                    Shutdown   Down
Bundle-Ether1906           fe80::e448:5cff:fe10:b48e     Down       Down
Loopback0                  fe80::9d4c:a5ff:fe2f:2615     Up         Up
Loopback1                  fe80::9d4c:a5ff:fe2f:2615     Up         Up
tunnel-te54                unassigned                    Down       Down
tunnel-te718               unassigned                    Up         Up
tunnel-te720               unassigned                    Up         Up
tunnel-te5454              unassigned                    Up         Up
MgmtEth0/RP0/CPU0/0        unassigned                    Up         Up
HundredGigE0/2/0/0         unassigned                    Shutdown   Down
HundredGigE0/2/0/1         unassigned                    Shutdown   Down
HundredGigE0/2/0/2         unassigned                    Shutdown   Down
HundredGigE0/2/0/3         unassigned                    Shutdown   Down
HundredGigE0/2/0/4         fe80::e448:5cff:fe10:b130     Shutdown   Down
```

```
HundredGigE0/2/0/5        unassigned                  Shutdown   Down
HundredGigE0/2/0/6        unassigned                  Shutdown   Down
HundredGigE0/2/0/7        unassigned                  Shutdown   Down
HundredGigE0/2/0/8        unassigned                  Down       Down
HundredGigE0/2/0/9        unassigned                  Shutdown   Down
HundredGigE0/2/0/10       unassigned                  Shutdown   Down
HundredGigE0/2/0/11       unassigned                  Shutdown   Down
HundredGigE0/2/0/12       unassigned                  Shutdown   Down
HundredGigE0/2/0/13       unassigned                  Shutdown   Down
HundredGigE0/2/0/15       unassigned                  Shutdown   Down
HundredGigE0/2/0/16       unassigned                  Shutdown   Down
HundredGigE0/2/0/17       unassigned                  Shutdown   Down
HundredGigE0/2/0/18       unassigned                  Shutdown   Down
HundredGigE0/2/0/19       unassigned                  Shutdown   Down
HundredGigE0/2/0/20       unassigned                  Shutdown   Down
HundredGigE0/2/0/21       unassigned                  Shutdown   Down
HundredGigE0/2/0/22       unassigned                  Shutdown   Down
HundredGigE0/2/0/23       unassigned                  Shutdown   Down
HundredGigE0/2/0/25       fe80::e448:5cff:fe10:b184   Shutdown   Down
HundredGigE0/2/0/26       unassigned                  Shutdown   Down
HundredGigE0/2/0/27       unassigned                  Shutdown   Down
HundredGigE0/2/0/28       unassigned                  Shutdown   Down
HundredGigE0/2/0/29       unassigned                  Shutdown   Down
HundredGigE0/2/0/31       unassigned                  Shutdown   Down
HundredGigE0/2/0/32       unassigned                  Shutdown   Down
HundredGigE0/2/0/33       unassigned                  Shutdown   Down
HundredGigE0/2/0/34       unassigned                  Shutdown   Down
HundredGigE0/2/0/35       unassigned                  Shutdown   Down
TenGigE0/2/0/14/0         unassigned                  Up         Up
TenGigE0/2/0/14/1         unassigned                  Up         Up
TenGigE0/2/0/14/2         unassigned                  Up         Up
TenGigE0/2/0/14/3         unassigned                  Up         Up
TenGigE0/2/0/24/0         fe80::e448:5cff:fe10:b180   Up         Up
```

This is the sample output of the **show ipv6 interface brief global** command:

```
RP/0/#show ipv6 interface brief global


Interface           IPv6-Address                  Status     Protocol
Bundle-Ether54            10:0:9::2                     Up         Up
Bundle-Ether1900          10:0:54::2                    Up         Up
Bundle-Ether1901          10:0:55::2                    Up         Up
Bundle-Ether1902          10:0:56::2                    Up         Up
Bundle-Ether1903          10:0:84::2                    Up         Up
Bundle-Ether1904          10:0:85::2                    Up         Up
Bundle-Ether1906          10:0:86::2                    Up         Up
```

This is the sample output of the **show ipv6 interface** *type interface-path-id* **brief link-local** command:

```
RP/0/RP0/CPU0:router#show ipv6 interface tenGigE 0/0/0/0 brief link-local

Interface                 IPv6-Address                  Status     Protocol
HundredGigE0/0/0/0    fe80::fe:8ff:fecb:26c5        Up         Up
```

This is the sample output of the **show ipv6 interface** *type interface-path-id* **brief global** command:

```
RP/0/RP0/CPU0:router#show ipv6 interface tenGigE 0/0/0/0 brief global

Interface                 IPv6-Address                  Status     Protocol
HundredGigE0/0/0/0    2001:db8::1                   Up         Up
```

show ipv6 neighbors

To display the IPv6 neighbor discovery cache information, use the **show ipv6 neighbors** command in the XR EXEC mode.

show ipv6 neighbors [{*type interface-path-id* | **location** *node-id*}]

Syntax Description

type	(Optional) Interface type. For more information, use the question mark (?) online help function.
interface-path-id	(Optional) Physical interface instance or a virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
location *node-id*	(Optional) Designates a node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

All IPv6 neighbor discovery cache information is displayed.

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

When the *interface-type* and *interface-number* arguments are not specified, cache information for all IPv6 neighbors is displayed. Specifying the *interface-type* and *interface-number* arguments displays only cache information about the specified interface.

Task ID

Task ID	Operations
ipv6	read

Examples

This is the sample output of the **show ipv6 neighbors** command when entered with an interface type and number:

```
RP/0/RP0/CPU0:router# show ipv6 neighbors HundredGigE0/0/0/2

IPv6 Address                              Age Link-layer Addr State Interface
2000:0:0:4::2                               0 0003.a0d6.141e  REACH tenGigE
FE80::203:A0FF:FED6:141E                    0 0003.a0d6.141e  REACH tenGigE
3001:1::45a                                 - 0002.7d1a.9472  REACH tenGigE
```

This is the sample output of the **show ipv6 neighbors** command:

```
RP/0/RP0/CPU0:router# show ipv6 neighbors

IPv6 Address                            Age Link-layer Addr State Interface
Location
[Mcast adjacency]                          - 0000.0000.0000 DELETE Hu0/2/0/25
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE Hu0/2/0/4
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE Te0/2/0/30/3
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 REACH Te0/2/0/30/2
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 REACH Te0/2/0/30/1
0/2/CPU0
fe80::d66d:50ff:fe38:9544               97   d46d.5038.9544 REACH Te0/2/0/30/0
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 REACH Te0/2/0/30/0
0/2/CPU0
10:0:8::2                               89   10f3.114c.719c REACH Te0/2/0/24/0
0/2/CPU0
fe80::12f3:11ff:fe4c:719c               135  10f3.114c.719c REACH Te0/2/0/24/0
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 REACH Te0/2/0/24/0
0/2/CPU0
10:0:9::2                               150  e607.2b8d.3484 REACH BE54
0/2/CPU0
fe80::e407:2bff:fe8d:3484               149  e607.2b8d.3484 REACH BE54
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 REACH BE54
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE BE1900
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE BE1901
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE BE1903
0/2/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE BE1904
0/2/CPU0
1000::2                                 50   0010.9400.000d REACH Hu0/4/0/0
0/4/CPU0
fe80::1                                 153  0010.9400.000d REACH Hu0/4/0/0
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 REACH Hu0/4/0/0
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE Hu0/4/0/6
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE Hu0/4/0/18
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE Hu0/4/0/25
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 REACH Te0/4/0/30/0
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 REACH Te0/4/0/30/1
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE BE1901
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE BE1902
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE BE1903
0/4/CPU0
[Mcast adjacency]                          - 0000.0000.0000 DELETE BE1906
0/4/CPU0
```

```
[Mcast adjacency]                           - 0000.0000.0000 DELETE Hu0/6/0/35
0/6/CPU0
200:1::2                                  157  0010.9400.0013 REACH Hu0/6/0/34
0/6/CPU0
fe80::1                                   130  0010.9400.0013 REACH Hu0/6/0/34
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 REACH Hu0/6/0/34
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE Hu0/6/0/16
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE Hu0/6/0/18
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE Hu0/6/0/19
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE Hu0/6/0/20
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE Hu0/6/0/21
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE Te0/6/0/2/2
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE Te0/6/0/2/1
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE BE2
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE BE1900
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE BE1902
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE BE1904
0/6/CPU0
[Mcast adjacency]                           - 0000.0000.0000 DELETE BE1906
0/6/CPU0
```

This is the sample output of the **show ipv6 neighbors** command when entered with a location:

```
RP/0/RP0/CPU0:router# show ipv6 neighbors  location 0/2/CPU0

IPv6 Address    Age Link-layer Addr State Interface     Location
2001:3::2       119  0013.9400.0002 REACH BE3           0/2/CPU0
2001:3::3       179  0013.9400.0003 DELAY BE3           0/2/CPU0
2001:3::4       166  0013.9400.0004 REACH BE3           0/2/CPU0
2001:3::5       78   0013.9400.0005 REACH BE3           0/2/CPU0
2001:3::6       19   0013.9400.0006 REACH BE3           0/2/CPU0
2001:3::7       173  0013.9400.0007 REACH BE3           0/2/CPU0
2001:3::8       140  0013.9400.0008 REACH BE3           0/2/CPU0
2001:3::9       163  0013.9400.0009 REACH BE3           0/2/CPU0
2001:3::a       40   0013.9400.000a REACH BE3           0/2/CPU0
2001:3::b       90   0013.9400.000b REACH BE3           0/2/CPU0
2001:3::c       35   0013.9400.000c REACH BE3           0/2/CPU0
2001:3::d       114  0013.9400.000d REACH BE3           0/2/CPU0
2001:3::e       117  0013.9400.000e REACH BE3           0/2/CPU0
2001:3::f       157  0013.9400.000f REACH BE3           0/2/CPU0
2001:3::10      9    0013.9400.0010 REACH BE3           0/2/CPU0
2001:3::11      120  0013.9400.0011 REACH BE3           0/2/CPU0
2001:3::12      87   0013.9400.0012 REACH BE3           0/2/CPU0
2001:3::13      180  0013.9400.0013 DELAY BE3           0/2/CPU0
2001:3::14      103  0013.9400.0014 REACH BE3           0/2/CPU0
2001:3::15      132  0013.9400.0015 REACH BE3           0/2/CPU0
2001:3::16      33   0013.9400.0016 REACH BE3           0/2/CPU0
2001:3::17      150  0013.9400.0017 REACH BE3           0/2/CPU0
2001:3::18      117  0013.9400.0018 REACH BE3           0/2/CPU0
2001:3::19      48   0013.9400.0019 REACH BE3           0/2/CPU0
2001:3::1a      67   0013.9400.001a REACH BE3           0/2/CPU0
```

```
2001:3::1b      91   0013.9400.001b REACH BE3           0/2/CPU0
2001:3::1c      33   0013.9400.001c REACH BE3           0/2/CPU0
2001:3::1d      174  0013.9400.001d DELAY BE3           0/2/CPU0
2001:3::1e      144  0013.9400.001e REACH BE3           0/2/CPU0
2001:3::1f      121  0013.9400.001f REACH BE3           0/2/CPU0
2001:3::20      53   0013.9400.0020 REACH BE3           0/2/CPU0
```

This table describes significant fields shown in the display.

Table 65: show ipv6 neighbors Command Field Descriptions

Field	Description
IPv6 Address	IPv6 address of neighbor or interface.
Age	Time (in minutes) since the address was confirmed to be reachable. A hyphen (-) indicates a static entry.
Link-layer Addr	MAC address. If the address is unknown, a hyphen (-) is displayed.
State	The state of the neighbor cache entry. These are the states for dynamic entries in the IPv6 neighbor discovery cache: • INCMP (incomplete)—Address resolution is being performed on the entry. A neighbor solicitation message has been sent to the solicited-node multicast address of the target, but the corresponding neighbor advertisement message has not yet been received. • reach (reachable)—Positive confirmation was received within the last ReachableTime milliseconds that the forward path to the neighbor was functioning properly. While in reach state, the device takes no special action as packets are sent. • stale—More than ReachableTime milliseconds have elapsed since the last positive confirmation was received that the forward path was functioning properly. While in stale state, the device takes no action until a packet is sent. • delay—More than ReachableTime milliseconds have elapsed since the last positive confirmation was received that the forward path was functioning properly. A packet was sent within the last DELAY_FIRST_PROBE_TIME seconds. If no reachability confirmation is received within DELAY_FIRST_PROBE_TIME seconds of entering the delay state, send a neighbor solicitation message and change the state to probe. • probe—A reachability confirmation is actively sought by resending neighbor solicitation messages every RetransTimer milliseconds until a reachability confirmation is received. These are the possible states for static entries in the IPv6 neighbor discovery cache: • reach (reachable)—The interface for this entry is up. • INCMP (incomplete)—The interface for this entry is down. **Note** Reachability detection is not applied to static entries in the IPv6 neighbor discovery cache; therefore, the descriptions for the INCMP (incomplete) and reach (reachable) states are different for dynamic and static cache entries.
Interface	Interface from which the address is reachable.

show ipv6 neighbors summary

To display summary information for the neighbor entries, use the **show ipv6 neighbors summary** command in the XR EXEC mode.

show ipv6 neighbors summary

Syntax Description

This command has no keywords or arguments.

Command Default

The default value is disabled.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Task ID

Task ID	Operations
ipv6	read

Examples

This is the sample output of the **show ipv6 neighbors summary** command that shows the summary information for the neighbor entries:

```
XR EXEC mode# show ipv6 neighbors summary

Mcast nbr entries:
    Subtotal: 0
Static nbr entries:
    Subtotal: 0
Dynamic nbr entries:
    Subtotal: 0

Total nbr entries: 0
```

show ipv6 traffic

To display the IPv6 traffic statistics, use the **show traffic** command in the XR EXEC mode.

show ipv6 traffic [**brief**]

Syntax Description

brief	(Optional) Displays only IPv6 and Internet Control Message Protocol version 6 (ICMPv6) traffic statistics.

Command Default None

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines The **show ipv6 traffic** command provides output similar to the **show ipv4 traffic** command, except that it is IPv6-specific.

Task ID

Task ID	Operations
ipv6	read
network	read

Examples This is the sample output of the **show ipv6 traffic** command:

```
RP/0/RP0/CPU0:router# show ipv6 traffic

 IPv6 statistics:
  Rcvd:  0 total, 0 local destination
         0 source-routed, 0 truncated
         0 format errors, 0 hop count exceeded
         0 bad header, 0 unknown option, 0 bad source
         0 unknown protocol
         0 fragments, 0 total reassembled
         0 reassembly timeouts, 0 reassembly failures
         0 reassembly max drop
         0  sanity address check drops
  Sent:  0 generated, 0 forwarded
         0 fragmented into 0 fragments, 0 failed
         0 no route, 0 too big
  Mcast: 0 received, 0 sent

ICMP statistics:
  Rcvd: 0 input, 0 checksum errors, 0 too short
        0 unknown error type
        unreach: 0 routing, 0 admin, 0 neighbor,
                 0 address, 0 port, 0 unknown
        parameter: 0 error, 0 header, 0 option,
                   0 unknown
        0 hopcount expired, 0 reassembly timeout,
        0 unknown timeout, 0 too big,
        0 echo request, 0 echo reply
  Sent: 0 output, 0 rate-limited
        unreach: 0 routing, 0 admin, 0 neighbor,
                 0 address, 0 port, 0 unknown
        parameter: 0 error, 0 header, 0 option
                 0 unknown
        0 hopcount expired, 0 reassembly timeout,
        0 unknown timeout, 0 too big,
        0 echo request, 0 echo reply

Neighbor Discovery ICMP statistics:
```

```
  Rcvd: 0 router solicit, 0 router advert, 0 redirect
        0 neighbor solicit, 0 neighbor advert
  Sent: 0 router solicit, 0 router advert, 0 redirect
        0 neighbor solicit, 0 neighbor advert

UDP statistics:
        0 packets input, 0 checksum errors
        0 length errors, 0 no port, 0 dropped
        0 packets output

TCP statistics:s
        0 packets input, 0 checksum errors, 0 dropped
        0 packets output, 0 retransmitted
```

This table describes the significant fields shown in the display.

Table 66: show ipv6 traffic Command Field Descriptions

Field	Description
Rcvd:	Statistics in this section refer to packets received by the router.
total	Total number of packets received by the software.
local destination	Locally destined packets received by the software.
source-routed	Packets seen by the software with RH.
truncated	Truncated packets seen by the software.
bad header	An error was found in generic HBH, RH, DH, or HA. Software only.
unknown option	Unknown option type in IPv6 header.
unknown protocol	Protocol specified in the IP header of the received packet is unreachable.
Sent:	Statistics in this section refer to packets sent by the router.
forwarded	Packets forwarded by the software. If the packet cannot be forwarded in the first lookup (for example, the packet needs option processing), then the packet is not included in this count, even if it ends up being forwarded by the software.
Mcast:	Multicast packets.
ICMP statistics:	Internet Control Message Protocol statistics.

show kim status

The Kernel Interface Module (KIM) is an IOS XR process that ensures IOS XR and Linux have consistent views of the required network state such as interfaces, routes, VRFs and so on.

To display the status of KIM, use the **show kim status** command in the XR EXEC mode. KIM is used to trigger the creation of route, interface, vrf and so on in the kernel. KIM also handles the programming of

Local Packet Transport Services (LPTS) in response to the events that applications use to open sockets (TCP, UDP) in the kernel.

show kim status [{ **vrf {** *vrf-name* | **all }** }]

Syntax Description

vrf	(Optional) Displays the KIM status of the VRF instance.
vrf-name	Displays the KIM status of the specified VRF instance.
all	Displays the KIM status of all the VRF instances.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.5.2	Extended support for virtual IP addresses.
Release 6.0	This command was introduced.

Usage Guidelines

Only the default VRF is supported.

Task ID

Task ID	Operations
system	read

Examples

This is the sample output of the **show kim status vrf default** command:

```
RP/0/RP0/CPU0:router# show kim status vrf default
Features:
  VRF namespaces                : Enabled
  VLAN interfaces               : Enabled
  VRF dataport interfaces       : Disabled
IM Connection                 : Connected (1 attempts/0 disconnects)
LPTS PA Connection            : Connected (0 disconnects)
Num socket bindings           : 0
Num Interfaces                : 56
Loopback interfaces           : 1
Mgmt interfaces               : 1
LC interfaces                 : 54
IPv4 RIB routes               : 0
IPv6 RIB routes               : 0
Forwarding LC NPU ID          : 144
Forwarding i/f MTU            : 1482
IPV4 Source Address           : via Default selection
                      Interface: Loopback999
                Chosen source IP: 9.9.9.9
IPV6 Source Address           : via Default selection
                      Interface: Loopback999
                Chosen source IP: 999:999::9
```

```
IPV4 Virtual Address          : 1.2.3.4/24
IPV6 Virtual Address          : None
```

show local pool

To display IPv4 local pool details, use the **show local pool** command in XR EXEC mode.

show {**local***other_pool_types*} **pool** [**vrf** *vrf_name*] {**ipv4** | **ipv6**} {**default***poolname*}

Syntax Description

local	Specifies that the address pool is local.
vrf	Specifies that a VRF name will be given. If is parameter is missing, the default VRF is assumed.
vrf_name	Specifies the name of the VRF to which the addresses of the pool belongs. If no name is given, the default VRF is assumed.
default	Creates a default local IPv4 address pool that is used if no other pool is named.
poolname	Specifies the name of the local IPv4 address pool.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Syntax Description

This command has no keywords or arguments.

Task ID

Task ID	Operations
ipv4	read
network	read

Examples

The following is sample output from the **show ipv4 local pool** with a poolname of P1:

```
RP/0/RP0/CPU0:router# show ipv4 local pool P1

Pool Begin End FreeInUse
P1 172.30.228.11172.30.228.1660
Available addresses:
172.30.228.11
172.30.228.12
172.30.228.13
172.30.228.14
172.30.228.15
172.30.228.16
Inuse addresses:
```

```
None
```

This table describes the significant fields shown in the display.

Table 67: show ipv4 local pool Command Descriptions

Field	Description
Pool	Name of the pool.
Begin	First IP address in the defined range of addresses in this pool.
End	Last IP address in the defined range of addresses in this pool.
Free	Number of addresses available.
InUse	Number of addresses in use.

show mpa client

To display information about the Multicast Port Arbitrator (MPA) clients, use the **show mpa client** command in XR EXEC mode.

show mpa client {**consumers** | **producers**}

Syntax Description

consumers	Displays the clients for the consumers.
producers	Displays the clients for the producers.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Task ID

Task ID	Operations
network	read

Examples

The following sample output is from the **show mpa client** command:

```
RP/0/RP0/CPU0:router# show mpa client consumers

List of producer clients for ipv4 MPA

Location     Protocol     Process
```

```
0/1/CPU0     255          raw
0/1/CPU0     17           udp
0/4/CPU0     17           udp
0/4/CPU0     255          raw
0/4/CPU1     17           udp
0/4/CPU1     255          raw
0/6/CPU0     17           udp
0/6/CPU0     255          raw
0/RP1/CPU0   17           udp
0/RP1/CPU0   255          raw
```

show mpa groups

To display Multicast Port Arbitrator (MPA) multicast group information, use the **show mpa groups** command in XR EXEC mode .

show mpa groups *type interface-path-id*

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0 /CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
network	read

Examples

The following sample output is from the **show mpa groups** command:

```
RP/0/RP0/CPU0:router# show mpa groupsHundredGigE0/0/0/2
Mon Jul 27 04:07:19.802 DST
HundredGigE0/0/0/2 :-
  224.0.0.1 : includes 0, excludes 1, mode EXCLUDE
    <no source filter>
  224.0.0.2 : includes 0, excludes 1, mode EXCLUDE
    <no source filter>
  224.0.0.5 : includes 0, excludes 1, mode EXCLUDE
    <no source filter>
  224.0.0.6 : includes 0, excludes 1, mode EXCLUDE
    <no source filter>
  224.0.0.13 : includes 0, excludes 1, mode EXCLUDE
    <no source filter>
  224.0.0.22 : includes 0, excludes 1, mode EXCLUDE
    <no source filter>
```

show mpa ipv4

To display information for Multicast Port Arbitrator (MPA) for IPv4, use the **show mpa ipv4** command in XR EXEC mode.

show mpa ipv4 {**client** {**consumers** | **producers**} | **groups** *type* *interface-path-id* | **trace**}

Syntax Description

client	Displays information about the MPA clients.
consumers	Displays the clients for the consumers.
producers	Displays the clients for the producers.
groups	Displays information about the MPA multicast group.
type	Interface type. For more information, use the question mark (?) online help function.

interface-path-id	Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RSP0) and the module is CPU0. Example: interface MgmtEth0/RSP0/CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.
trace	Displays MPA trace information

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
network	read

Examples

The following sample output is from the **show mpa ipv4** command:

```
RP/0/RP0/CPU0:router# show mpa ipv4 client producers

List of producer clients for ipv4 MPA

 Location     Protocol     Process
 0/1/CPU0     17           udp
 0/1/CPU0     255          raw
 0/4/CPU0     17           udp
 0/4/CPU0     255          raw
 0/4/CPU1     17           udp
 0/4/CPU1     255          raw
 0/6/CPU0     17           udp
```

```
0/6/CPU0      255          raw
0/RP0/CPU0    17           udp
0/RP0/CPU0    255          raw
0/RP1/CPU0    255          raw
0/RP1/CPU0    17           udp
```

show mpa ipv6

To display information for Multicast Port Arbitrator (MPA) for IPv6, use the **show mpa ipv6** command in XR EXEC mode.

show mpa ipv6 {**client** {**consumers** | **producers**} | **groups** *type* *interface-path-id* | **trace**}

Syntax Description

client	Displays information about the MPA clients.
consumers	Displays the clients for the consumers.
producers	Displays the clients for the producers.
groups	Displays information about the MPA multicast group.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Either a physical interface instance or a virtual interface instance as follows: • Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the modular services card or line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. • *port*: Physical port number of the interface. **Note** In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric ( ) and the module is CPU0. Example: interface MgmtEth0/ /CPU0/0. • Virtual interface instance. Number range varies depending on interface type. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

None

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
network	read

Examples

The following sample output is from the **show mpa ipv6** command:

```
RP/0/RP0/CPU0:router# show mpa ipv6 client producers

List of producer clients for ipv6 MPA

 Location     Protocol     Process

 0/RP1/CPU0   17           udp
 0/RP1/CPU0   255          raw
```

vrf (fallback-vrf)

To configure a fallback VRF for a destination that does not match any routes in the VRF configured for the destination, use the **fallback-vrf** *fallback-vrf-name* command in VRF configuration mode. To undo the configuration, use the **no** form of this command.

fallback-vrf *fallback vrf name* [**default**]

Syntax Description

fallback vrf name	Specifies a fallback VRF routing table.
default	If you use the **default** keyword, the global routing table is used for a route lookup.

Command Default

None

Command Modes

VRF configuration.

Command History

Release	Modification
Release 6.5.1	This command was introduced.

Task ID

Task ID	Operations
ip services	read, write

Examples

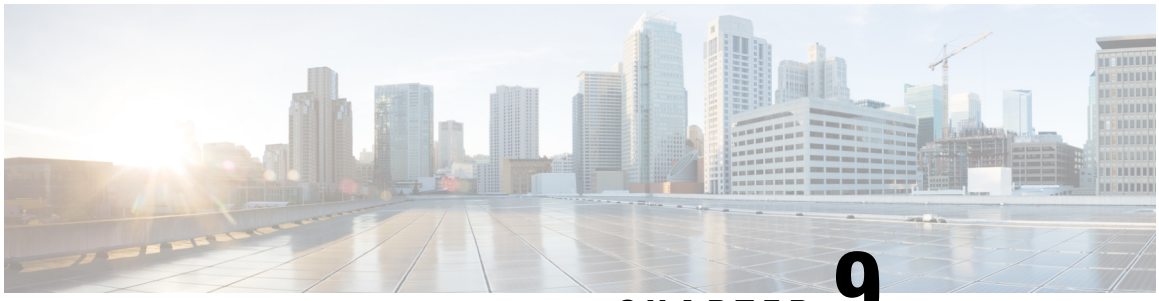
The following example shows how to configure a fallback VRF table using the **fallback-vrf** *fallback-vrf-name* command:

```
Router# configure
```

```
Router(config)# vrf vrf1
Router(config-vrf)# fallback-vrf vrf2
```

The following example shows how to configure a fallback VRF table using the **fallback-vrf default** command:

```
Router# configure
Router(config)# vrf vrf2
Router(config-vrf)# fallback-vrf default
```



CHAPTER 9

Prefix List Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This chapter describes the Cisco IOS XR software commands used to configure IP Version 4 (IPv4) and IP Version 6 (IPv6) prefix on NCS 5000 routers.

For detailed information about prefix list concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

clear prefix-list ipv4

To reset the hit count on an IP Version 4 (IPv4) prefix list, use the **clear prefix-list ipv4** command in XR EXEC mode.

clear prefix-list ipv4 *name* [*sequence-number*]

Syntax Description

name	Name of the prefix list from which the hit count is to be cleared.
sequence-number	(Optional) Sequence number of a prefix list. Range is 1 to 2147483646.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The hit count is a value indicating the number of matches to a specific prefix list entry. Use the **clear prefix-list ipv4** command to clear counters for a specified configured prefix list.

Use the *sequence-number* argument to clear counters for a prefix list with a specific sequence number.

Task ID

Task ID	Operations
acl	read, write

Examples

The following example displays IPv4 prefix lists, shows how to clear the counters for list3, then shows how to display the IPv4 prefix lists again, showing that counters are cleared for list3:

```
RP/0/RP0/CPU0:router# show prefix-list ipv4

ipv4 prefix-list list1
 10 permit 172.18.30.154/16 (8 matches)
ipv4 prefix-list list2
 20 deny 172.24.30.164/16 (12 matches)
ipv4 prefix-list list3
 30 permit 172.19.31.154/16 (32 matches)

RP/0/RP0/CPU0:router# clear prefix-list ipv4 list3

RP/0/RP0/CPU0:router# show prefix-list ipv4

ipv4 prefix-list list1
 10 permit 172.18.30.154/16 (8 matches)
ipv4 prefix-list list2
 20 deny 172.24.30.164/16 (12 matches)
ipv4 prefix-list list3
 30 permit 172.19.31.154/16
```

clear prefix-list ipv6

To reset the hit count on an IP Version 6 (IPv6) prefix list, use the **clear prefix-list ipv6** command in XR EXEC mode.

clear prefix-list ipv6 *name* [*sequence-number*]

Syntax Description

name	Name of the prefix list from which the hit count is to be cleared.
sequence-number	(Optional) Clears counters for a prefix list with a specific sequence number. Range is 1 to 2147483646.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The hit count is a value indicating the number of matches to a specific prefix list entry. Use the **clear prefix-list ipv6** command to clear counters for a specified configured prefix list.

Use the *sequence-number* argument to clear counters for a prefix list with a specific sequence number.

Task ID

Task ID	Operations
acl	read, write

Examples

The following example shows IPv6 prefix lists, clears the counters for sequence number 60 on prefix list list3, then displays the IPv6 prefix lists again, showing that counters are cleared for sequence number 60:

```
RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list1
 40 permit 2000:1::/64 (5 matches)
 60 deny 3000:1::/64 (7 matches)

RP/0/RP0/CPU0:router# clear prefix-list ipv6 list1 60
RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list1
 40 permit 2000:1::/64 (5 matches)
 60 deny 3000:1::/64
```

copy prefix-list ipv4

To create a copy of an existing IP Version 4 (IPv4) prefix list, use the **copy prefix-list ipv4** command in XR EXEC mode.

copy prefix-list ipv4 *source-name destination-name*

Syntax Description

source-name	Name of the prefix list to be copied.
destination-name	Destination prefix list where the contents of the *source-name* will be copied.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **copy prefix-list ipv4** command to copy a configured prefix list. Use the *source-name* argument to specify the prefix list to be copied and the *destination-name* argument to specify where to copy the contents of the source prefix list. The *destination-name* argument must be a unique name; if the *destination-name* argument name exists for a prefix list or access list, the prefix list is not copied. The **copy prefix-list ipv4** command checks that the source prefix list exists, then checks the existing list names to prevent overwriting existing prefix lists.

Task ID

Task ID	Operations
acl	read, write
filesystem	execute

Examples

The following example displays IPv4 prefix lists, shows how to copy prefix-list1 to list4, then displays the IPv4 prefix lists again, showing prefix list4:

```
RP/0/RP0/CPU0:router# show prefix-list ipv4

ipv4 prefix-list list1
 10 permit 172.24.20.164/16
ipv4 prefix-list list2
 20 deny 172.18.30.154/16
ipv4 prefix-list list3
 30 permit 172.29.30.154/16

RP/0/RP0/CPU0:router# copy prefix-list ipv4 list1 list4

RP/0/RP0/CPU0:router# show prefix-list ipv4
ipv4 prefix-list list1
 10 permit 172.24.20.164/16
ipv4 prefix-list list2
 20 deny 172.18.30.154/16
ipv4 prefix-list list3
 30 permit 172.29.30.154/16
ipv4 prefix-list list4
 10 permit 172.24.20.164/16
```

copy prefix-list ipv6

To create a copy of an existing IP Version 6 (IPv6) prefix list, use the **copy prefix-list ipv6** command in XR EXEC mode.

copy prefix-list ipv6 *source-name destination-name*

Syntax Description

source-name	Name of the prefix list to be copied.
destination-name	Destination prefix list where the contents of the *source-name* will be copied.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **copy prefix-list ipv6** command to copy a configured prefix list. Use the *source-name* argument to specify the prefix list to be copied and the *destination-name* argument to specify where to copy the contents of the source prefix list. The *destination-name* argument must be a unique name; if the *destination-name*

argument name exists for a prefix list or access list, the prefix list is not copied. The **copy prefix-list ipv6** command checks that the source prefix list exists then checks the existing list names to prevent overwriting existing prefix lists.

Task ID

Task ID	Operations
acl	read, write
filesystem	execute

Examples

The following example shows IPv6 prefix lists, shows how to copy prefix-list1 to list4, then displays the IPv6 prefix lists again, showing prefix list4:

```
RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list1
 40 permit 2000:1::/64
 60 deny 3000:1::/64
ipv6 prefix-list list2
 10 permit 5555::/24

RP/0/RP0/CPU0:router# copy prefix-list ipv6 list1 list3

RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list1
 40 permit 2000:1::/64
 60 deny 3000:1::/64
ipv6 prefix-list list2
 10 permit 5555::/24
ipv6 prefix-list list3
 40 permit 2000:1::/64
 60 deny 3000:1::/6
```

deny (prefix-list)

To set deny conditions for an IP Version 4 (IPv4) prefix list, use the **deny** command in IPv4 prefix list configuration modes. To remove a condition from a prefix list, use the **no** form of this command.

[*sequence-number*] **deny** *network*/*length* [**ge** *value*] [**le** *value*] [**eq** *value*]
no *sequence-number* **deny**

Syntax Description

sequence-number	(Optional) Sets deny conditions for a prefix list with a specific sequence number. If you do not use a sequence number, the condition defaults to the next available sequence number in the prefix list. Range is 1 to 2147483646. By default, the first statement is number 10, and the subsequent statements are incremented by 10. The **sequence-number** argument must be used with the **no** form of the command.
network / *length*	Network number and length (in bits) of the network mask.

ge *value*	(Optional) Specifies a prefix length greater than or equal to the value. It is the lowest value of a range of the *length* (the "from" portion of the length range).
le *value*	(Optional) Specifies a prefix length less than or equal to the value. It is the highest value of a range of the *length* (the "to" portion of the length range).
eq *value*	(Optional) Exact value of the *length* .

Command Default

There is no specific condition under which a packet is denied passing the IPv4 prefix list.

Command Modes

IPv4 prefix list configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **deny** command to specify conditions under which a packet cannot pass the prefix list.

The **ge**, **le** and **eq** keywords can be used to specify the range of the prefix length to be matched, for prefixes that are more specific than the *network/length* argument. Exact match is assumed when neither **ge** nor **le** is specified. The range is assumed to be from the **ge** *value* to 32 if only the **ge** keyword is specified. The range is assumed to be from the *length* to the **le** *value argument* if only the **le** attribute is specified.

A specified **ge** *value* or **le** *value* must satisfy the following condition:

length < **ge** *value* < **le** *value* <= 32 (for IPv4)

length < **ge** *value* < **le** *value* <= 128 (for IPv6)

Task ID

Task ID	Operations
acl	read, write

Examples

The following example shows how to deny the route 10.0.0.0/0:

```
RP/0/RP0/CPU0:router(config)# ipv4 prefix-list list1
RP/0/RP0/CPU0:router(config-ipv4_pfx)# 50 deny 10.0.0.0/0
```

The following example shows how to deny all routes with a prefix of 10.3.32.154:

```
RP/0/RP0/CPU0:router(config)# ipv4 prefix-list list1
RP/0/RP0/CPU0:router(config-ipv4_pfx)#80 deny 10.3.32.154 le 32
```

The following example shows how to deny all masks with a length greater than 25 bits routes with a prefix of 172.18.30.154/16:

```
RP/0/RP0/CPU0:router(config)# ipv4 prefix-list list1
```

```
RP/0/RP0/CPU0:router(config-ipv4_pfx)#100 deny 172.18.30.154/16 ge 25
```

The following example shows how to deny mask lengths greater than 25 bits in all address space:

```
RP/0/RP0/CPU0:router(config)# ipv6 prefix-list list2
RP/0/RP0/CPU0:router(config-ipv6_pfx)# 70 deny  2000:1::/64 ge 25
```

The following example shows how to add deny conditions to list3, then use the **no** form of the command to remove the condition with the sequence number 30:

```
RP/0/RP0/CPU0:router(config)# ipv6 prefix-list list3

RP/0/RP0/CPU0:router(config-ipv6_pfx)# deny 2000:1::/64 ge 25
RP/0/RP0/CPU0:router(config-ipv6_pfx)# deny 3000:1::/64 le 32
RP/0/RP0/CPU0:router(config-ipv6_pfx)# deny 4000:1::/64 ge 25
Uncommitted changes found, commit them? [yes]: y

RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list3
 10 deny 2000:1::/64 ge 25
 20 deny 3000:1::/64 le 32
 30 deny 4000:1::/64 ge 25

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ipv6 prefix-list list3
RP/0/RP0/CPU0:router(config-ipv6_pfx)# no 30
Uncommitted changes found, commit them? [yes]: y
RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list3
 10 deny 2000:1::/64 ge 25
 20 deny 3000:1::/64 le 32
```

ipv4 prefix-list

To define an IP Version (IPv4) prefix list by name, use the **ipv4 prefix-list** command in XR Config mode. To remove the prefix list, use the **no** form of this command.

ipv4 prefix-list *name*
no ipv4 prefix-list *name*

Syntax Description

name	Name of the prefix list. Names cannot contain a space or quotation marks.

Command Default

No IPv4 prefix list is defined.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **ipv4 prefix-list** command to configure an IPv4 prefix list. This command places the router in prefix-list configuration mode, in which the denied or permitted access conditions must be defined with the **deny** or **permit** command. You must add a condition to create the prefix list.

Use the **resequence prefix-list ipv4** command to renumber existing statements and increment subsequent statements to allow a new IPv4 prefix list statement (**permit**, **deny**, or **remark**) to be added. Specify the first entry number (the *base*) and the increment by which to separate the entry numbers of the statements. The software will renumber the existing statements, thereby making room to add new statements with the unused entry numbers.

Task ID

Task ID	Operations
acl	read, write
ipv4	read, write

Examples

The following example shows the prefix lists, then configures list2, then shows the conditions in both prefix lists:

```
RP/0/RP0/CPU0:router# show prefix-list ipv4

ipv4 prefix-list list1
 10 permit 172.20.10.171/16 le 24
 20 permit 172.18.0.0/16
 30 deny 172.24.20.164/16 ge 25

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ipv4 prefix-list list2

RP/0/RP0/CPU0:router(config-ipv4_pfx)#deny 172.18.30.154/16 ge 25
RP/0/RP0/CPU0:router(config-ipv4_pfx)#
Uncommitted changes found, commit them? [yes]: Y

RP/0/RP0/CPU0:router# show prefix-list ipv4

ipv4 prefix-list list1
 10 permit 172.20.10.171/16 le 24
 20 permit 172.18.0.0/16
 30 deny 172.24.20.164/16 ge 25
ipv4 prefix-list list2
 10 deny 172.18.30.154/16 ge 25
```

ipv6 prefix-list

To define an IP Version (IPv6) prefix list by name, use the **ipv6 prefix-list** command in XR Config mode. To remove the prefix list, use the **no** form of this command.

ipv6 prefix-list *name*
no ipv6 prefix-list *name*

Syntax Description

name	Name of the prefix list. Names cannot contain a space or quotation marks.

Command Default

No IPv6 prefix list is defined.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
acl	read, write
ipv6	read, write

Examples

The following example shows how to create a prefix list named list-1:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ipv6 prefix-list list-1
RP/0/RP0/CPU0:router(config-ipv6-pfx)# 40 permit 2000:1::/64
RP/0/RP0/CPU0:router(config-ipv6-pfx)# 60 deny 3000:1::/64
RP/0/RP0/CPU0:router(config-ipv6-pfx)#
Uncommitted changes found, commit them? [yes]: y

RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list1
 40 permit 2000:1::/64
 60 deny 3000:1::/64
RP/0/RP0/CPU0:router#
```

permit (prefix-list)

To set permit conditions for an IP Version 4 (IPv4) prefix list, use the **permit** command in IPv4 prefix list configuration modes. To remove a condition from a prefix list, use the **no** form of this command.

[*sequence-number*] **permit** *network/length* [**ge** *value*] [**le** *value*] [**eq** *value*]
no *sequence-number* **permit**

Syntax Description

sequence-number	(Optional) Number of the **permit** statement in the prefix list. This number determines the order of the statements in the prefix list. Range is 1 to 2147483646. By default, the first statement is number 10, and the subsequent statements are incremented by 10.
network / length	Network number and length (in bits) of the network mask.
ge *value*	(Optional) Specifies a prefix length greater than or equal to the value. It is the lowest value of a range of the *length* (the "from" portion of the length range). Range is 1 to 128.
le *value*	(Optional) Specifies a prefix length less than or equal to the value. It is the highest value of a range of the *length* (the "to" portion of the length range). Range is 1 to 128.
eq *value*	(Optional) Exact value of the *length* . Range is 1 to 128.

Command Default

No default behavior or value

Command Modes

IPv4 prefix list configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **permit** command to specify conditions under which a packet can pass the prefix list.

The **ge**, **le** and **eq** keywords can be used to specify the range of the prefix length to be matched, for prefixes that are more specific than the *network/length* argument. Exact match is assumed when neither **ge** nor **le** is specified. The range is assumed to be from the **ge** *value* to 32 if only the **ge** keyword is specified. The range is assumed to be from the *length* to the **le** *value* argument if only the **le** attribute is specified.

A specified **ge** *value* or **le** *value* must satisfy the following condition:

length < **ge** *value* < **le** *value* <= 32 (for IPv4)

length < **ge** *value* < **le** *value* <= 128 (for IPv6)

Task ID

Task ID	Operations
acl	read, write

Examples

The following example shows how to permit the prefix 172.18.0.0/16:

```
RP/0/RP0/CPU0:router(config)# ipv4 prefix-list list1
RP/0/RP0/CPU0:router(config-ipv4_pfx)# permit 172.18.0.0/16
```

The following example shows how to accept a mask length of up to 24 bits in routes with the prefix 172.20.10.171/16:

```
RP/0/RP0/CPU0:router(config)# ipv4 prefix-list list1
RP/0/RP0/CPU0:router(config-ipv4_pfx)# permit 172.20.10.171/16 le 24
```

The following example shows how to permit mask lengths from 8 to 24 bits in all address space:

```
RP/0/RP0/CPU0:router(config)# ipv6 prefix-list list1
RP/0/RP0/CPU0:router(config-ipv6_pfx)# permit 2000:1::/64 ge 8 le 24
```

The following example shows how to add permit conditions to list3, then remove the condition with the sequence number 30:

```
RP/0/RP0/CPU0:router(config)# ipv6 prefix-list list3
RP/0/RP0/CPU0:router(config-ipv6_pfx)# permit 2000:1::/64 ge 25
RP/0/RP0/CPU0:router(config-ipv6_pfx)# permit 3000:1::/64 le 32
RP/0/RP0/CPU0:router(config-ipv6_pfx)# permit 3000:1::/64 ge 25
Uncommitted changes found, commit them? [yes]: y
RP/0/RP0/CPU0:router#show ipv6 prefix-list

ipv6 prefix-list list3
 10 permit 2000:1::/64 ge 25
 20 permit 3000:1::/64 le 32
 30 permit 4000:1::/64 ge 25

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ipv6 prefix-list list3
RP/0/RP0/CPU0:router(config-ipv6_pfx)# no 30
Uncommitted changes found, commit them? [yes]: y
RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list3
 10 permit 2000:1::/64 ge 25
 20 permit 3000:1::/64 le 32

10 deny 2000:1::/64 ge 25
 20 deny 3000:1::/64 le 32
 30 deny 4000:1::/64 ge 25
```

remark (prefix-list)

To write a helpful comment (remark) for an entry in either an IP Version 4 (IPv4) prefix list, use the **remark** command in IPv4 prefix-list configuration mode. To remove the remark, use the **no** form of this command.

[*sequence-number*] **remark** *remark*
no *sequence-number*

Syntax Description

sequence-number	(Optional) Number of the **remark** statement in the prefix list. This number determines the order of the statements in the prefix list. The number can be from 1 to 2147483646. (By default, the first statement is number 10, and the subsequent statements are incremented by 10).
remark	Comment that describes the entry in the prefix list, up to 255 characters long.

Command Default

The prefix list entries have no remarks.

Command Modes

IPv4 prefix-list configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **remark** command to write a helpful comment for an entry in a prefix list. The remark can be up to 255 characters in length; anything longer is truncated.

If you know the sequence number of the remark you want to delete, you can remove it by entering the **no** *sequence-number* command.

Use the **resequence prefix-list ipv4** command if you want to add statements to an existing IPv4 prefix list.

Task ID

Task ID	Operations
acl	read, write

Examples

In the following example, a remark is made to explain a prefix list entry:

```
RP/0/RP0/CPU0:router(config)# ipv4 prefix-list deny-ten
RP/0/RP0/CPU0:router(config-ipv4_pfx)# 10 remark Deny all routes with a prefix of 10/8
RP/0/RP0/CPU0:router(config-ipv4_pfx)# 20 deny 10.0.0.0/8 le 32
RP/0/RP0/CPU0:router(config-ipv4_pfx)# end
```

In the following example, a remark is made to explain usage:

```
RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list1
 40 permit 2000:1::/64
 60 deny 3000:1::/64

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ipv6 prefix-list list1
RP/0/RP0/CPU0:router(config-ipv6-pfx)# 10 remark use from july23 forward
RP/0/RP0/CPU0:router(config-ipv6-pfx)#
Uncommitted changes found, commit them? [yes]: y

RP/0/0/CPU0:Apr  4 02:20:34.851 : config[65700]: %LIBTARCFG-6-COMMIT : Configura
tion committed by user 'UNKNOWN'.   Use 'show commit changes 1000000023' to view
```

```
 the changes.
RP/0/0/CPU0:Apr  4 02:20:34.984 : config[65700]: %SYS-5-CONFIG_I : Configured fr
om console by console
RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list1
 10 remark use from july23 forward
 40 permit 2000:1::/64
 60 deny 3000:1::/64
```

resequence prefix-list ipv4

To renumber existing statements and increment subsequent statements to allow a new prefix list statement (**permit**, **deny**, or **remark**) to be added, use the **resequence prefix-list ipv4** command in Admin Configuration modeSystem Admin Config mode XR Config mode.

resequence prefix-list ipv4 *name* [*base* [*increment*]]

Syntax Description

name	Name of a prefix list.
base	(Optional) Number of the first statement in the specified prefix list, which determines its order in the prefix list. Maximum value is 2147483646.
increment	(Optional) Number by which the base sequence number is incremented for subsequent statements. Maximum value is 2147483646.

Command Default

base: 10

increment: 10

Command Modes

Admin Configuration modeSystem Admin Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The sequence number of a prefix list entry determines the order of the entries in the list. The router compares network addresses to the prefix list entries. The router begins the comparison at the top of the prefix list, with the entry having the lowest sequence number.

If multiple entries of a prefix list match a prefix, the entry with the lowest sequence number is considered the real match. When a match or deny occurs, the router does not go through the rest of the prefix list.

By default, the first statement in a prefix list is sequence number 10, and the subsequent statements are incremented by 10.

Use the **resequence prefix-list ipv4** command to add a **permit**, **deny**, or **remark** statement between consecutive entries in an existing IPv4 prefix list. Specify the first entry number (the *base*) and the increment by which to separate the entry numbers of the statements. The software renumbers the existing statements, thereby making room to add new statements with the unused entry numbers.

Task ID

Task ID	Operations
acl	read, write

Examples

The following example shows how to display the sequence number intervals for prefix list list1, resequence list1 from 10 to 30, and displays the resulting sequence numbers:

```
RP/0/RP0/CPU0:router# show prefix-list ipv4


ipv4 prefix-list ldp_filter
 10 permit 120.0.0.0/8 ge 8 le 32 (2000 matches)
 30 permit 130.3.0.0/24 ge 8 le 32


RP/0/RP0/CPU0:router

RP/0/RP0/CPU0:router#  resequence prefix-list ipv4 ldp_filter 30 10

RP/0/RP0/CPU0:router# show prefix-list ipv4


ipv4 prefix-list ldp_filter
 30 permit 120.0.0.0/8 ge 8 le 32 (6000 matches)
 40 permit 130.3.0.0/24 ge 8 le 32
```

resequence prefix-list ipv6

To renumber existing statements and increment subsequent statements to allow a new prefix list statement (**permit**, **deny**, or **remark**) to be added, use the **resequence prefix-list ipv6** command in XR EXEC mode.

resequence prefix-list ipv6 *name* [*base* [*increment*]]

Syntax Description

name	Name of a prefix list.
base	(Optional) Number of the first statement in the specified prefix list, which determines its order in the prefix list. Maximum value is 2147483644.
increment	(Optional) Number by which the base sequence number is incremented for subsequent statements. Maximum value is 2147483644.

Command Default

base: 10

increment: 10

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The sequence number of a prefix list entry determines the order of the entries in the list. The router compares network addresses to the prefix list entries. The router begins the comparison at the top of the prefix list, with the entry having the lowest sequence number.

If multiple entries of a prefix list match a prefix, the entry with the lowest sequence number is considered the real match. Once a match or deny occurs, the router does not go through the rest of the prefix list.

By default, the first statement in a prefix list is sequence number 10, and the subsequent statements are incremented by 10.

Use the **resequence prefix-list ipv6** command to add a **permit**, **deny**, or **remark** statement between consecutive entries in an existing IPv6 prefix list. Specify the first entry number (the *base*) and the increment by which to separate the entry numbers of the statements. The software renumbers the existing statements, thereby making room to add new statements with the unused entry numbers.

Task ID

Task ID	Operations
acl	read, write

Examples

The following example shows how to display the sequence number intervals for prefix list 1, resequence list1 from 10 to 30, and displays the resulting sequence numbers:

```
RP/0/RP0/CPU0:router# show prefix-list ipv6
ipv6 prefix-list list1
 10 permit 2000:1::
/16 le 24
 20 permit 3000:1::/16 le 32
 20 permit 172.18.0.0/16
 30 deny 3000:1::
/16 ge 25
ipv6
prefix-list list2
 10 deny 4000:1::
/16 ge 25

RP/0/RP0/CPU0:router# resequence prefix-list ipv4 list1 10 30

RP/0//CPU0:
Apr  4 02:29:39.513 : ipv6_acl_action_edm
[183]: %LIBTARCFG-6-COMMIT
: Configuration committed by user 'UNKNOWN'.   Use 'show commit changes 10000000
24' to view the changes.
```

show prefix-list afi-all

To display the contents of the prefix list for all the address families, use the **show prefix-list afi-all** command in XR EXEC mode.

show prefix-list afi-all

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
acl	read

Examples The following sample output is from the **show prefix-list afi-all** command:

```
RP/0/RP0/CPU0:router# show prefix-list afi-all

ipv4 prefix-list ldp_filter
 10 permit 120.0.0.0/8 ge 8 le 32 (2000 matches)
 30 permit 130.3.0.0/24 ge 8 le 32
```

show prefix-list

To display information about a prefix list or prefix list entries, use the **show prefix-list** command in XR EXEC mode.

show prefix-list [*list-name*] [*sequence-number*]

Syntax Description

list-name	(Optional) Name of a prefix list.
sequence-number	(Optional) Sequence number of the prefix list entry. Range is 1 to 2147483646.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
acl	read

Examples

The following sample output is from the **show prefix-list** command:

```
RP/0/RP0/CPU0:router#  show prefix-list ipv4 summary

Prefix List Summary:
  Total Prefix Lists configured:         0
  Total Prefix List entries configured : 0
```

show prefix-list ipv4

To display the contents of current IP Version 4 (IPv4) prefix list, use the **show prefix-list ipv4** command in XR EXEC mode.

show prefix-list ipv4 [*list-name*] [*sequence-number*] [**summary**]

Syntax Description

list-name	(Optional) Name of a prefix list.
sequence-number	(Optional) Sequence number of the prefix list entry. Range is 1 to 2147483646.
summary	(Optional) Displays summary output of prefix list contents.

Command Default

All IPv4 prefix lists are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show prefix-list ipv4** command to display the contents of all IPv4 prefix lists. To display the contents of a specific IPv4 prefix list, use the *name* argument. Use the *sequence-number* argument to specify a given prefix list entry. Use the **summary** keyword to display a summary of prefix list contents.

Task ID

Task ID	Operations
acl	read

Examples

The following example displays all configured prefix lists:

```
RP/0/RP0/CPU0:router# show prefix-list ipv4


ipv4 prefix-list ldp_filter
 10 permit 120.0.0.0/8 ge 8 le 32 (2000 matches)
 30 permit 130.3.0.0/24 ge 8 le 32
```

The following example uses the *list-name* argument to display the prefix list named list1:

```
RP/0/RP0/CPU0:router# show prefix-list ipv4 list1

ipv4 prefix-list list1
 10 permit 172.20.10.171/16 le 24
 20 permit 172.18.0.0/16
 30 deny 172.24.20.164/16 ge 25
```

The following example uses the *list-name* and *sequence-number* argument to display a prefix list named list1 with a sequence number of 10:

```
RP/0/RP0/CPU0:router# show prefix-list ipv4 list1 30

ipv4 prefix-list list1
 30 deny 172.24.20.164/16 ge 25
```

show prefix-list ipv4 standby

To display the contents of current IPv4 standby access lists, use the **show access-lists ipv4 standby** command in XR EXEC mode.

show prefix-list ipv4 standby [*prefix-list name*] [**summary**]

Syntax Description

prefix-list name	(Optional) Name of a particular IPv4 prefix list. The value of the prefix-list-name argument is a string of alphanumeric characters that cannot include spaces or quotation marks.
summary	(Optional) Displays a summary of all current IPv4 standby prefix lists.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show prefix-list ipv4 standby** command to display the contents of current IPv4 standby prefix lists. To display the contents of a specific IPv4 prefix list, use the *name* argument.

Use the **show prefix-list ipv4 standby summary** command to display a summary of all standby IPv4 prefix lists.

Task ID

Task ID	Operations
acl	read

Examples

In the following example, the contents of all IPv4 access lists are displayed:

```
RP/0/RP0/CPU0:router# show prefix-list ipv4 standby summary
Prefix List Summary:
  Total Prefix Lists configured:         2
  Total Prefix List entries configured : 6
```

show prefix-list ipv6

To display the contents of the current IP Version 6 (IPv6) prefix list, use the **show prefix-list ipv6** command in XR EXEC mode.

show prefix-list ipv6 [**summary**][*list-name*] [*sequence-number*] [**summary**]

Syntax Description

list-name	(Optional) Name of a prefix list.
sequence-number	(Optional) Sequence number of the prefix list entry. Range is 1 to 2147483646.
summary	(Optional) Displays summary output of prefix list contents.

Command Default

All IPv6 prefix lists are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **show prefix-list ipv6** command to display the contents of all IPv4 prefix lists.

To display the contents of a specific IPv6 prefix list, use the *name* argument. Use the *sequence-number* argument to specify a given prefix list entry. Use the **summary** keyword to display a summary of prefix list contents.

Task ID

Task ID	Operations
acl	read

Examples

The following example shows how to display all configured prefix lists:

```
RP/0/RP0/CPU0:router# show prefix-list ipv6

ipv6 prefix-list list1
 10 permit 5555::/24
 20 deny 3000::/24
 30 permit 2000::/24
ipv6 prefix-list list2
 10 permit 2000::/24
```

The following example uses the *list-name* argument to display the prefix list named list1:

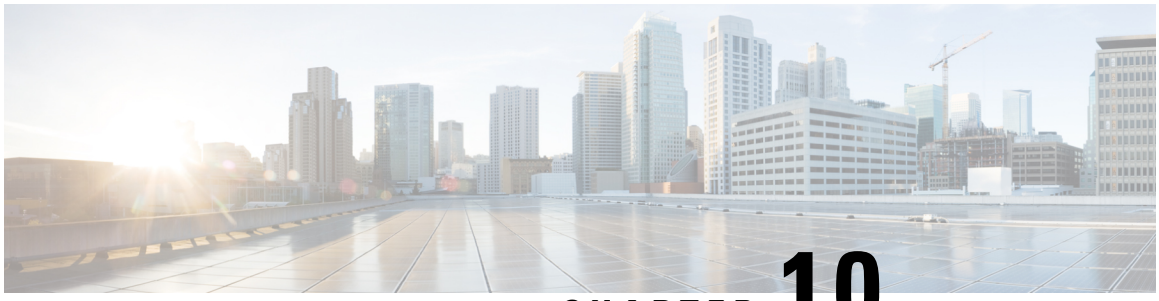
```
RP/0/RP0/CPU0:router# show prefix-list ipv6 list1

ipv6 prefix-list list1
 10 permit 5555::/24
 20 deny 3000::/24
 30 permit 2000::/24
```

The following example uses the *list-name* and *sequence-number* argument to display a prefix list named list1 with a sequence number of 10:

```
RP/0/RP0/CPU0:router# show prefix-list ipv6 list1 10

ipv6 prefix-list abc
 10 permit 5555::/24
```

The following example displays a summary of prefix list contents:

```
RP/0/RP0/CPU0:router# show prefix-list ipv6 summary

Prefix List Summary:
  Total Prefix Lists configured:        2
  Total Prefix List entries configured: 2
```



CHAPTER 10

Transport Stack Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This chapter describes the Cisco IOS XR softwarecommands used to configure and monitor features related to the transport stack (Nonstop Routing, Stream Control Transmission Protocol (SCTP), NSR, TCP, User Datagram Protocol (UDP), and RAW. Any IP protocol other than TCP or UDP is known as a *RAW* protocol.

For detailed information about transport stack concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

clear nsr ncd client

To clear the counters of a specified client or all the clients of nonstop routing (NSR) Consumer Demuxer (NCD), use the **clear nsr ncd client** command in XR EXEC mode.

clear nsr ncd client {*PID value* | **all**} [**location** *node-id*]

Syntax Description

PID value	Process ID value of the client in which counters need to be cleared. The range is from 0 to 4294967295.
all	Clears the counters for all NCD clients.
location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

The default value for the *node-id* argument is the current node in which the command is being executed. The *PID value* argument does not have a default value.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

The active and standby instances of some NSR-capable applications communicate through two queues, and these applications are multiplexed onto these queues. NSR consumer demuxer (NCD) is a process that provides the demuxing services on the receiver side.

You can use the **clear nsr ncd client** command to troubleshoot traffic issues. If you clear the existing counters, it can help you to monitor the delta changes.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows how to clear all the counters for all NCD clients:

```
RP/0/RP0/CPU0:router# clear nsr ncd client all
RP/0/RP0/CPU0:router# show nsr ncd client all

Client PID                          : 3874979
Client Protocol                     : TCP
Client Instance                     : 1
Total packets received              : 0
Total acks received                 : 0
Total packets/acks accepted         : 0
Errors in changing packet ownership  : 0
Errors in setting application offset : 0
Errors in enqueuing to client       : 0
Time of last clear                  : Sun Jun 10 14:43:44 20

RP/0/RP0/CPU0:router# show nsr ncd client brief

                            Total    Total   Accepted
Pid   Protocol   Instance    Packets Acks    Packets/Acks
3874979   TCP          1          0   0         0
```

clear nsr ncd queue

To clear the counters for the nonstop routing (NSR) Consumer Demuxer (NCD) queue, use the **clear nsr ncd queue** command in XR EXEC mode.

clear nsr ncd queue {**all** | **high** | **low**} [**location** *node-id*]

Syntax Description

all	Clears the counters for all the NCD queues.
high	Clears the counters for the high-priority NCD queue.
low	Clears the counters the low-priority NCD queue.
location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows how to clear the counters for all the NCD queues:

```
RP/0/RP0/CPU0:router# clear nsr ncd queue all
RP/0/RP0/CPU0:router# show nsr ncd queue all

Queue Name                           : NSR_LOW
Total packets received               : 0
Total packets accepted               : 0
Errors in getting datagram offset    : 0
Errors in getting packet length      : 0
Errors in calculating checksum       : 0
Errors due to bad checksum           : 0
Errors in reading packet data        : 0
Errors due to bad NCD header         : 0
Drops due to a non-existent client   : 0
Errors in changing packet ownership  : 0
Errors in setting application offset : 0
Errors in enqueuing to client        : 0
Time of last clear                   : Sun Jun 10 14:44:38 2007


Queue Name                           : NSR_HIGH
Total packets received               : 0
Total packets accepted               : 0
Errors in getting datagram offset    : 0
Errors in getting packet length      : 0
Errors in calculating checksum       : 0
Errors due to bad checksum           : 0
Errors in reading packet data        : 0
Errors due to bad NCD header         : 0
Drops due to a non-existent client   : 0
Errors in changing packet ownership  : 0
Errors in setting application offset : 0
Errors in enqueuing to client        : 0
Time of last clear                   : Sun Jun 10 14:44:38 2007

RP/0/RP0/CPU0:router# show nsr ncd queue brief

                        Total        Accepted
          Queue       Packets         Packets
       NSR_LOW              0               0
      NSR_HIGH              0               0
```

clear raw statistics pcb

To clear statistics for a single RAW connection or for all RAW connections, use the **clear raw statistics pcb** command in XR EXEC mode.

clear raw statistics pcb {**all***pcb-address*} [**location***node-id*]

Syntax Description

all	Clears statistics for all RAW connections.
pcb-address	Clears statistics for a specific RAW connection.
location *node-id*	(Optional) Clears statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines Use the **all** keyword to clear all RAW connections. To clear a specific RAW connection, enter the protocol control block (PCB) address of the RAW connection. **Use the show raw brief** command to obtain the PCB address.

Use the **location** keyword and *node-id* argument to clear RAW statistics for a designated node.

Task ID

Task ID	Operations
transport	execute

Examples The following example shows how to clear statistics for a RAW connection with PCB address 0x80553b0:

```
RP/0/RP0/CPU0:router# clear raw statistics pcb 0x80553b0
RP/0/RP0/CPU0:router# show raw statistics pcb 0x80553b0

Statistics for PCB 0x80553b0
Send: 0 packets received from application
0 xipc pulse received from application
0 packets sent to network
0 packets failed getting queued to network
Rcvd: 0 packets received from network
0 packets queued to application
0 packets failed queued to application
```

The following example shows how to clear statistics for all RAW connections:

```
RP/0/RP0/CPU0:router# clear raw statistics pcb all
RP/0/RP0/CPU0:router# show raw statistics pcb all

Statistics for PCB 0x805484c
Send: 0 packets received from application
0 xipc pulse received from application
0 packets sent to network
0 packets failed getting queued to network
Rcvd: 0 packets received from network
0 packets queued to application
0 packets failed queued to application

Statistics for PCB 0x8054f80
Send: 0 packets received from application
0 xipc pulse received from application
0 packets sent to network
0 packets failed getting queued to network
Rcvd: 0 packets received from network
0 packets queued to application
```

```
0 packets failed queued to application

Statistics for PCB 0x80553b0
Send: 0 packets received from application
0 xipc pulse received from application
0 packets sent to network
0 packets failed getting queued to network
Rcvd: 0 packets received from network
0 packets queued to application
0 packets failed queued to application
```

clear tcp nsr client

To bring the nonstop routing (NSR) down on all the sessions that are owned by the specified client, use the **clear tcp nsr client** command in XR EXEC mode.

clear tcp nsr client {*ccb-address* | **all**} [**location** *node-id*]

Syntax Description

ccb-address	Client Control Block (CCB) of the NSR client.
all	Specifies all the clients.
location *node-id*	(Optional) Displays client information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

The location defaults to the current node in which the command is executing.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

The output of the **show tcp nsr client** command is used to locate the CCB of the desired client.

Use the **clear tcp nsr client** command to gracefully bring down NSR session that are owned by one client or all clients. In addition, the **clear tcp nsr client** command is used as a work around if the activity on the sessions freezes.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows that the nonstop routing (NSR) client is cleared for 0x482afacc The two sessions had NSR already up before executing the **clear tcp nsr client** command. NSR is no longer up after executing the **clear tcp nsr client** command.

```
RP/0/RP0/CPU0:router# show tcp nsr client brief

CCB          Proc Name    Instance     Sets       Sessions/NSR Up Sessions
0x482c10e0   mpls_ldp          1            2          3/1
0x482afacc   mpls_ldp          2            1          2/2

RP/0/RP0/CPU0:router# clear tcp nsr client 0x482afacc
RP/0/RP0/CPU0:router# show tcp nsr client brief

CCB          Proc Name    Instance     Sets       Sessions/NSR Up Sessions
0x482c10e0   mpls_ldp          1            2          3/1
0x482afacc   mpls_ldp          2            1          2/0
```

clear tcp nsr pcb

To bring the nonstop routing (NSR) down on a specified connection or all connections, use the **clear tcp nsr pcb** command in XR EXEC mode.

clear tcp nsr pcb {*pcb-address* | **all**} [**location** *node-id*]

Syntax Description

pcb-address	PCB address range for the specific connection information. 0 to ffffffff. For example, the address range can be 0x482a4e20.
all	Specifies all the connections.
location *node-id*	(Optional) Displays connection information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

The output of the **show tcp nsr brief** command is used to locate the Protocol Control Block (PCB) of a desired connection.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows that the information for TCP connections is cleared:

```
RP/0/RP0/CPU0:router# show tcp nsr brief
```

```
Wed Dec 2 20:35:47.467 PST
------------------------------------------------------------------
Node: 0/RP0/CPU0
------------------------------------------------------------------
PCB                VRF-ID   Local Address   Foreign Address NSR(US/DS)
0x00007f9e3c028538 0x60000000 3.3.3.3:646     5.5.5.5:17931    NA/Up
0x00007f9e3c021fb8 0x60000000 3.3.3.3:646     4.4.4.4:29301    NA/Up
0x00007f9e3c007248 0x60000000 3.3.3.3:646     12.1.105.2:32877 NA/Up
0x00007f9e3c010c78 0x60000000 3.3.3.3:646     6.6.6.6:56296    NA/Up
0x00007f9de4001798 0x60000000 3.3.3.3:12888   2.2.2.2:646      NA/Up
0x00007f9e3c04a338 0x60000000 3.3.3.13:179    2.2.2.13:13021   NA/Up
0x00007f9e3c026c78 0x60000000 3.3.3.3:179     4.4.4.4:15180    NA/Up
0x00007f9e3c019b38 0x60000000 3.3.3.3:179     8.8.8.8:21378    NA/Up
0x00007f9e3c029df8 0x60000000 3.3.3.22:179    2.2.2.22:24482   NA/Up
0x00007f9e3c064538 0x60000000 3.3.3.14:179    2.2.2.14:27569   NA/Up
0x00007f9e3c041008 0x60000000 3.3.3.25:179    2.2.2.25:29654   NA/Up

RP/0/RP0/CPU0:router# clear tcp nsr pcb 0x00007f9e3c028538
RP/0/RP0/CPU0:router# clear tcp nsr pcb 0x00007f9e3c021fb8
RP/0/RP0/CPU0:router# show tcp nsr brief

Wed Dec 2 20:35:47.467 PST
------------------------------------------------------------------
Node: 0/RP0/CPU0
------------------------------------------------------------------
PCB                VRF-ID   Local Address   Foreign Address NSR(US/DS)
0x00007f9e3c028538 0x60000000 3.3.3.3:646     5.5.5.5:17931    NA/Down
0x00007f9e3c021fb8 0x60000000 3.3.3.3:646     4.4.4.4:29301    NA/Down
0x00007f9e3c007248 0x60000000 3.3.3.3:646     12.1.105.2:32877 NA/Up
0x00007f9e3c010c78 0x60000000 3.3.3.3:646     6.6.6.6:56296    NA/Up
0x00007f9de4001798 0x60000000 3.3.3.3:12888   2.2.2.2:646      NA/Up
0x00007f9e3c04a338 0x60000000 3.3.3.13:179    2.2.2.13:13021   NA/Up
0x00007f9e3c026c78 0x60000000 3.3.3.3:179     4.4.4.4:15180    NA/Up
0x00007f9e3c019b38 0x60000000 3.3.3.3:179     8.8.8.8:21378    NA/Up
0x00007f9e3c029df8 0x60000000 3.3.3.22:179    2.2.2.22:24482   NA/Up
0x00007f9e3c064538 0x60000000 3.3.3.14:179    2.2.2.14:27569   NA/Up
0x00007f9e3c041008 0x60000000 3.3.3.25:179    2.2.2.25:29654   NA/Up
```

clear tcp nsr session-set

To clear the nonstop routing (NSR) on all the sessions in the specified session-set or all session sets, use the **clear tcp nsr session-set** command in XR EXEC mode.

clear tcp nsr session-set { *sscb-address* | **all**} [**location** *node-id*]

Syntax Description

sscb-address	Session-Set Control Block (SSCB) address range for the specific session set information. 0 to ffffffff. For example, the address range can be 0x482a4e20.
all	Specifies all the session sets.
location *node-id*	(Optional) Displays session set information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

The output of the **show tcp nsr session-set brief** command is used to locate the SSCB of the desired session-set.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows that the information for the session sets is cleared:

```
RP/0/RP0/CPU0:router# show tcp nsr client brief

CCB               Proc Name         Instance  Sets       Sessions/NSR Up Sessions
0x482b5ee0        mpls_ldp             1        1          10/10

RP/0/RP0/CPU0:router# clear tcp nsr client 0x482b5ee0
RP/0/RP0/CPU0:router# show tcp nsr client brief

CCB               Proc Name         Instance  Sets       Sessions/NSR Up Sessions
0x482b5ee0        mpls_ldp             1        1          10/0
```

clear tcp nsr statistics client

To clear the nonstop routing (NSR) statistics of the client, use the **clear tcp nsr statistics client** command in XR EXEC mode.

clear tcp nsr statistics client {*ccb-address* | **all**} [**location** *node-id*]

Syntax Description

ccb-address	Client Control Block (CCB) of the desired client. For example, the address range can be 0x482a4e20.
all	Specifies all the clients.
location *node-id*	(Optional) Displays client information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows that the statistics for the NSR clients is cleared:

```
RP/0/RP0/CPU0:router# show tcp nsr statistics client all

==============================================================
CCB: 0x482b5ee0
Name: mpls_ldp, Job ID: 365
Connected at: Thu Aug 16 18:20:32 2007

Notification Statistics :   Queued    Failed    Delivered Dropped
Init-Sync Done          :         2          0          2          0
Replicated Session Ready:         0          0          0          0
Operational Down        :        12          0         12          0
Last clear at: Never Cleared

RP/0/RP0/CPU0:router# clear tcp nsr statistics client all

RP/0/RP0/CPU0:router# show tcp nsr statistics client all

==============================================================
CCB: 0x482b5ee0
Name: mpls_ldp, Job ID: 365
Connected at: Thu Aug 16 18:20:32 2007

Notification Statistics :   Queued    Failed    Delivered Dropped
Init-Sync Done          :         0          0          0          0
Replicated Session Ready:         0          0          0          0
Operational Down        :         0          0          0          0
Last clear at: Thu Aug 16 18:28:38 2007
```

clear tcp nsr statistics pcb

To clear the nonstop routing (NSR) statistics for TCP connections, use the **clear tcp nsr statistics pcb** command in XR EXEC mode.

clear tcp nsr statistics pcb {*pcb-address* | **all**} [**location** *node-id*]

Syntax Description

pcb-address	PCB address range for the specific connection information. 0 to ffffffff. For example, the address range can be 0x482a4e20.
all	Specifies all the connections.
location *node-id*	(Optional) Displays connection information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows that the NSR statistics for TCP connections is cleared:

```
RP/0/RP0/CPU0:router# show tcp nsr statistics pcb 0x482d14c8

==============================================================
PCB 0x482d14c8
Number of times NSR went up: 1
Number of times NSR went down: 0
Number of times NSR was disabled: 0
Number of times switch-over occured : 0
IACK RX Message Statistics:
        Number of iACKs dropped because SSO is not up              : 0
        Number of stale iACKs dropped                              : 1070
        Number of iACKs not held because of an immediate match     : 98
TX Messsage Statistics:
        Data transfer messages:
            Sent 317, Dropped 0, Data (Total/Avg.) 2282700/7200
            Rcvd 0
                Success           : 0
                Dropped (Trim)    : 0
        Segmentation instructions:
            Sent 1163, Dropped 0, Units (Total/Avg.) 4978/4
            Rcvd 0
                Success           : 0
                Dropped (Trim)    : 0
                Dropped (TCP)     : 0
        NACK messages:
            Sent 0, Dropped 0
            Rcvd 0
                Success           : 0
                Dropped (Data snd): 0
        Cleanup instructions      :
            Sent 8, Dropped 0
            Rcvd 0
                Success           : 0
                Dropped (Trim)    : 0
Last clear at: Never cleared

RP/0/RP0/CPU0:router# clear tcp nsr statistics pcb 0x482d14c8
RP/0/RP0/CPU0:router# show tcp nsr statistics pcb 0x482d14c8

==============================================================
PCB 0x482d14c8
```

```
Number of times NSR went up: 0
Number of times NSR went down: 0
Number of times NSR was disabled: 0
Number of times switch-over occured : 0
IACK RX Message Statistics:
        Number of iACKs dropped because SSO is not up               : 0
        Number of stale iACKs dropped                               : 0
        Number of iACKs not held because of an immediate match      : 0
TX Messsage Statistics:
        Data transfer messages:
            Sent 0, Dropped 0, Data (Total/Avg.) 0/0
            Rcvd 0
                Success           : 0
                Dropped (Trim)    : 0
        Segmentation instructions:
            Sent 0, Dropped 0, Units (Total/Avg.) 0/0
            Rcvd 0
                Success           : 0
                Dropped (Trim)    : 0
                Dropped (TCP)     : 0
        NACK messages:
            Sent 0, Dropped 0
            Rcvd 0
                Success           : 0
                Dropped (Data snd): 0
        Cleanup instructions      :
            Sent 0, Dropped 0
            Rcvd 0
                Success           : 0
                Dropped (Trim)    : 0
Last clear at: Thu Aug 16 18:32:12 2007
```

clear tcp nsr statistics session-set

To clear the nonstop routing (NSR) statistics for session sets, use the **clear tcp nsr statistics session-set** command in XR EXEC mode mode.

clear tcp nsr statistics session-set {*sscb-address* | **all**} [**location** *node-id*]

Syntax Description

sscb-address	Session-Set Control Block (SSCB) address range for the specific session set information. 0 to ffffffff. For example, the address range can be 0x482a4e20.
all	Specifies all the session sets.
location *node-id*	(Optional) Displays session set information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes the proper task IDs. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows that the NSR statistics for session sets is cleared:

```
RP/0/RP0/CPU0:router# show tcp nsr statistics session-set all

==================Session Set Stats ============================
SSCB 0x482b6684, Set ID: 1
Number of times init-sync was attempted  :3
Number of times init-sync was successful :3
Number of times init-sync failed         :0
Number of times switch-over occured      :0
Last clear at: Never Cleared

RP/0/RP0/CPU0:router# clear tcp nsr statistics session-set all
RP/0/RP0/CPU0:router# show tcp nsr statistics session-set all

==================Session Set Stats ============================
SSCB 0x482b6684, Set ID: 1
Number of times init-sync was attempted  :0
Number of times init-sync was successful :0
Number of times init-sync failed         :0
Number of times switch-over occured      :0
Last clear at: Thu Aug 16 18:37:00 2007
```

clear tcp nsr statistics summary

To clear the nonstop routing (NSR) statistics summary, use the **clear tcp nsr statistics summary** command in XR EXEC mode.

clear tcp nsr statistics summary [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays statistics summary information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows how to clear the summary statistics:

```
RP/0/RP0/CPU0:router# clear tcp nsr statistics summary
```

clear tcp pcb

To clear TCP protocol control block (PCB) connections, use the **clear tcp pcb** command in XR EXEC mode.

clear tcp pcb {*pcb-address* | **all**} [**location** *node-id*]

Syntax Description

pcb-address	Clears the TCP connection at the specified PCB address.
all	Clears all open TCP connections.
location *node-id*	(Optional) Clears the TCP connection for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **clear tcp pcb** command is useful for clearing hung TCP connections. Use the show tcp brief, on page 510 command to find the PCB address of the connection you want to clear.

If the **clear tcp pcb all** command is used, the software does not clear a TCP connection that is in the listen state. If a specific PCB address is specified, then a connection in listen state is cleared.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows that the TCP connection at PCB address 60B75E48 is cleared:

```
RP/0/RP0/CPU0:router# clear tcp pcb 60B75E48
```

clear tcp statistics

To clear TCP statistics, use the **clear tcp statistics** command in

XR EXEC mode.

clear tcp statistics {**pcb** {**all** *pcb-address*} | **summary**} [**location** *node-id*]

Syntax Description

pcb all	(Optional) Clears statistics for all TCP connections.
pcb *pcb-address*	(Optional) Clears statistics for a specific TCP connection.
summary	(Optional) Clears summary statistic for a specific node or connection.
location *node-id*	(Optional) Clears TCP statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **clear tcp statistics** command to clear TCP statistics. Use the show tcp statistics, on page 513 command to display TCP statistics. You might display TCP statistics and then clear them before you start debugging TCP.

The optional **location** keyword and *node-id* argument can be used to clear TCP statistics for a designated node.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows how to clear TCP statistics:

RP/0/RP0/CPU0:router

```
# clear tcp statistics
```

clear udp statistics

To clear User Datagram Protocol (UDP) statistics, use the **clear udp statistics** command in

XR EXEC mode.

clear udp statistics {**pcb** {**all** *pcb-address*} | **summary**} [**location** *node-id*]

Syntax Description

pcb all	Clears statistics for all UDP connections.
pcb *pcb-address*	Clears statistics for a specific UDP connection.
summary	Clears UDP summary statistics.
location *node-id*	(Optional) Clears UDP statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **clear udp statistics** command to clear UDP statistics. Use the show udp statistics, on page 534 command to display UDP statistics. You might display UDP statistics and then clear them before you start debugging UDP.

The optional **location** keyword and *node-id* argument can be used to clear UDP statistics for a designated node.

Task ID

Task ID	Operations
transport	execute

Examples

The following example shows how to clear UDP summary statistics:

RP/0/RP0/CPU0:router

```
# clear udp statistics summary
```

forward-protocol udp

To configure the system to forward any User Datagram Protocol (UDP) datagrams that are received as broadcast packets to a specified helper address, use the **forward-protocol udp** command in

XR Config mode.

To restore the system to its default condition with respect to this command, use the **no** form of this command.

forward-protocol udp {*port-number* | **disable** | **domain** | **nameserver** | **netbios-dgm** | **netbios-ns** | **tacacs** | **tftp**}
no forward-protocol udp {*port-number* | **disable** | **domain** | **nameserver** | **netbios-dgm** | **netbios-ns** | **tacacs** | **tftp**}

Syntax Description

port-number	Forwards UDP broadcast packets to a specified port number. Range is 1 to 65535.
disable	Disables IP Forward Protocol UDP.
domain	Forwards UDP broadcast packets to Domain Name Service (DNS, 53).
nameserver	Forwards UDP broadcast packets to IEN116 name service (obsolete, 42).
netbios-dgm	Forwards UDP broadcast packets to NetBIOS datagram service (138).
netbios-ns	Forwards UDP broadcast packets to NetBIOS name service (137).
tacacs	Forwards UDP broadcast packets to TACACS (49).
tftp	Forwards UDP broadcast packets to TFTP (69).

Command Default

forward-protocol udp is enabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **forward-protocol udp** command to specify that UDP broadcast packets received on the incoming interface are forwarded to a specified helper address.

When you configure the **forward-protocol udp** command, you must also configure the **helper-address** command to specify a helper address on an interface. The helper address is the IP address to which the UDP datagram is forwarded. Configure the **helper-address** command with IP addresses of hosts or networking devices that can handle the service. Because the helper address is configured per interface, you must configure a helper address for each incoming interface that will be receiving broadcasts that you want to forward.

You must configure one **forward-protocol udp** command per UDP port you want to forward. The port on the packet is either port 53 (**domain**), port 69 (**tftp**), or a port number you specify.

Task ID

Task ID	Operations
transport	read, write

Examples

The following example shows how to specify that all UDP broadcast packets with port 53 or port 69 received on incoming HundredGigE interface 0/RP0/CPU0 are forwarded to 172.16.0.1. HundredGigE interface 0/RP0/CPU0 receiving the UDP broadcasts is configured with a helper address of 172.16.0.1, the destination address to which the UDP datagrams are forwarded.

```
RP/0/RP0/CPU0:router(config)# forward-protocol udp domain disable
RP/0/RP0/CPU0:router(config)# forward-protocol udp tftp disable
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/RP0/CPU0
RP/0/RP0/CPU0:router(config-if)# ipv4 helper-address 172.16.0.1
```

nsr process-failures switchover

To configure failover as a recovery action for active instances to switch over to a standby route processor (RP) or a standby distributed route processor (DRP) to maintain nonstop routing (NSR), use the **nsr process-failures switchover** command in XR Config mode. To disable this feature, use the **no** form of this command.

nsr process-failures switchover
no nsr process-failures switchover

Syntax Description

This command has no keywords or arguments.

Command Default

If not configured, a process failure of the active TCP or its applications (for example LDP, BGP, and so forth) can cause sessions to go down, and NSR is not provided.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read, write

Examples

The following example shows how to use the **nsr process-failures switchover** command:

```
RP/0/RP0/CPU0:router(config)# nsr process-failures switchover
```

service tcp-small-servers

To enable small TCP servers such as the ECHO, use the **service tcp-small-servers** command in XR Config mode. To disable the TCP server, use the **no** form of this command.

service {**ipv4** | **ipv6**} **tcp-small-servers** [{**max-servers** *number* | **no-limit**}] [*access-list-name*]
no service {**ipv4** | **ipv6**} **tcp-small-servers** [{**max-servers** *number* | **no-limit**}] [*access-list-name*]

Syntax Description

ip4	Specifies IPv4 small servers.
ipv6	Specifies IPv6 small servers.
max-servers	(Optional) Sets the number of allowable TCP small servers.

number	(Optional) Number value. Range is 1 to 2147483647.
no-limit	(Optional) Sets no limit to the number of allowable TCP small servers.
access-list-name	(Optional) The name of an access list.

Command Default

TCP small servers are disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The TCP small servers currently consist of three services: Discard (port 9), Echo (port 7), and Chargen (port 19). These services are used to test the TCP transport functionality. The Discard server receives data and discards it. The Echo server receives data and echoes the same data to the sending host. The Chargen server generates a sequence of data and sends it to the remote host.

Task ID

Task ID	Operations
ipv4	read, write
ip-services	read, write

Examples

In the following example, small IPv4 TCP servers are enabled:

```
RP/0/RP0/CPU0:router(config)# service ipv4 tcp-small-servers max-servers 5 acl100
```

service udp-small-servers

To enable small User Datagram Protocol (UDP) servers such as the ECHO, use the **service udp-small-servers** command in XR Config mode. To disable the UDP server, use the **no** form of this command.

service {**ipv4** | **ipv6**} **udp-small-servers** [{**max-servers** *number* | **no-limit**}] [*access-list-name*]
no service {**ipv4** | **ipv6**} **udp-small-servers** [{**max-servers** *number* | **no-limit**}] [*access-list-name*]

Syntax Description

ip4	Specifies IPv4 small servers.
ipv6	Specifies IPv6 small servers.
max-servers	(Optional) Sets the number of allowable UDP small servers.
number	(Optional) Number value. Range is 1 to 2147483647.

no-limit	(Optional) Sets no limit to the number of allowable UDP small servers.
access-list-name	(Optional) Name of an access list.

Command Default

UDP small servers are disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The UDP small servers currently consist of three services: Discard (port 9), Echo (port 7), and Chargen (port 19). These services are used to test the UDP transport functionality. The discard server receives data and discards it. The echo server receives data and echoes the same data to the sending host. The chargen server generates a sequence of data and sends it to the remote host.

Task ID

Task ID	Operations
ipv6	read, write
ip-services	read, write

Examples

The following example shows how to enable small IPv6 UDP servers and set the maximum number of allowable small servers to 10:

```
RP/0/RP0/CPU0:router(config)# service ipv6 udp-small-servers max-servers 10
```

show nsr ncd client

To display information about the clients for nonstop routing (NSR) Consumer Demuxer (NCD), use the **show nsr ncd client** command in XR EXEC mode.

show nsr ncd client {*PID value* | **all** | **brief**} [**location** *node-id*]

Syntax Description

PID v alue	Process ID (PID) information for a specific client. The range is from 0 to 4294967295.
all	Displays detailed information about all the clients.
brief	Displays brief information about all the clients.
location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows detailed information about all the clients:

```
RP/0/RP0/CPU0:router# show nsr ncd client all

Client PID                          : 3874979
Client Protocol                     : TCP
Client Instance                     : 1
Total packets received              : 28
Total acks received                 : 0
Total packets/acks accepted         : 28
Errors in changing packet ownership  : 0
Errors in setting application offset : 0
Errors in enqueuing to client        : 0
Time of last clear                  : Never cleared
```

The following sample output shows brief information about all the clients:

```
RP/0/RP0/CPU0:router# show nsr ncd client brief

                            Total   Total   Accepted
Pid   Protocol   Instance    Packets Acks    Packets/Acks
3874979   TCP          1         28  0              28
```

This table describes the significant fields shown in the display.

Table 68: show nsr ncd client Command Field Descriptions

Field	Description
Client PID	Process ID of the client process.
Client Protocol	Protocol of the client process. The protocol can be either TCP, OSPF, or BGP.
Client Instance	Instance number of the client process. There can be more than one instance of a routing protocol, such as OSPF.
Total packets received	Total packets received from the partner stack on the partner route processor (RP).

Field	Description
Total acks received	Total acknowledgements received from the partner stack on the partner RP for the packets sent to the partner stack.
Total packets/acks accepted	Total packets and acknowledgements received from the partner stack on the partner RP.
Errors in changing packet ownership	NCD changes the ownership of the packet to that of the client before queueing the packet to the client. This counter tracks the errors, if any, in changing the ownership.
Errors in setting application offset	NCD sets the offset of the application data in the packet before queueing the packet to the client. This counter tracks the errors, if any, in setting this offset.
Errors in enqueuing to client	Counter tracks any queueing errors.
Time of last clear	Statistics last cleared by the user.

show nsr ncd queue

To display information about the queues that are used by the nonstop routing (NSR) applications to communicate with their partner stacks on the partner route processors (RPs), use the **show nsr ncd queue** command in XR EXEC mode.

show nsr ncd queue {**all** | **brief** | **high** | **low**} [**location** *node-id*]

Syntax Description

all	Displays detailed information about all the consumer queues.
brief	Displays brief information about all the consumer queues.
high	Displays information about high-priority Queue and Dispatch (QAD) queues.
low	Displays information about low-priority QAD queues.
location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows brief information about all the consumer queues:

```
RP/0/RP0/CPU0:router# show nsr ncd queue brief

                          Total        Accepted
          Queue         Packets         Packets
       NSR_LOW              992             992
      NSR_HIGH                0               0
```

This table describes the significant fields shown in the display.

Table 69: show nsr ncd queue Command Field Descriptions

Field	Description
Total Packets	Total number of packets that are received from the partner stack.
Accepted Packets	Number of received packets that were accepted after performing some validation tasks.
Queue	Name of queue. NSR_HIGH and NSR_LOW are the two queues. High priority packets flow on the NSR_HIGH queue. Low priority packets flow on the NSR_LOW queue.

show raw brief

To display information about active RAW IP sockets, use the **show raw brief** command in XR EXEC mode.

show raw brief [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Protocols such as Open Shortest Path First (OSPF) and Protocol Independent Multicast (PIM) use long-lived RAW IP sockets. The **ping** and **traceroute** commands use short-lived RAW IP sockets. Use the **show raw brief** command if you suspect a problem with one of these protocols.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show raw brief** command:

```
RP/0/RP0/CPU0:router# show raw brief

PCB      Recv-Q Send-Q Local Address         Foreign Address Protocol
0x805188c        0      0 0.0.0.0               0.0.0.0            2
0x8051dc8        0      0 0.0.0.0               0.0.0.0          103
0x8052250        0      0 0.0.0.0               0.0.0.0          255
```

This table describes the significant fields shown in the display.

Table 70: show raw brief Command Field Descriptions

Field	Description
PCB	Protocol control block address. This is the address to a structure that contains connection information such as local address, foreign address, local port, foreign port, and so on.
Recv-Q	Number of bytes in the receive queue.
Send-Q	Number of bytes in the send queue.
Local Address	Local address and local port.
Foreign Address	Foreign address and foreign port.
Protocol	Protocol that is using the RAW IP socket. For example, the number 2 is IGMP, 103 is PIM, and 89 is OSPF.

show raw detail pcb

To display detailed information about active RAW IP sockets, use the **show raw detail pcb** command in XR EXEC mode.

show raw detail pcb {*pcb-address* | **all**} **location** *node-id*

Syntax Description

pcb-address	Displays statistics for a specified RAW connection.
all	Displays statistics for all RAW connections.
location *node-id*	Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show raw detail pcb** command displays detailed information for all connections that use the RAW transport. Information that is displayed includes family type (for example, 2 for AF_INET also known as IPv4), PCB address, Layer 4 (also known as transport) protocol, local address, foreign address, and any filter that is being used.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show raw detail pcb** command:

```
RP/0/RP0/CPU0:router# show raw detail pcb 0x807e89c

==============================================================
PCB is 0x807e89c, Family: 2, PROTO: 89
 Local host: 0.0.0.0
 Foreign host: 0.0.0.0

Current send queue size: 0
Current receive queue size: 0
Paw socket: Yes
```

This table describes the significant fields shown in the display.

Table 71: show raw detail pcb Command Field Descriptions

Field	Description
JID	Job ID of the process that created the socket.
Family	Network protocol. IPv4 is 2; IPv6 is 26.
PCB	Protocol control block address.
L4-proto	Layer 4 (also known as transport) protocol.
Laddr	Local address.
Faddr	Foreign address.
ICMP error filter mask	If an ICMP filter is being set, output in this field has a nonzero value.
LPTS socket options	If an LPTS option is being set, output in this field has a nonzero value.
Packet Type Filters	Packet filters that are being set for a particular RAW socket, including the number of packets for that filter type. Multiple filters can be set.

show raw extended-filters

To display information about active RAW IP sockets, use the **show raw extended-filters** command in XR EXEC mode.

show raw extended-filters {**interface-filter location** *node-id* | **location** *node-id* | **paktype-filter location** *node-id*}

Syntax Description

interface-filter	Displays the protocol control blocks (PCBs) with configured interface filters.
location *node-id*	Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
paktype-filter	Displays the PCBs with configured packet type filters.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show raw extended-filters** command displays detailed information for all connections that use the RAW transport. Information that is displayed includes family type (for example, 2 for AF_INET also known as IPv4), PCB address, Layer 4 (also known as transport) protocol, local address, foreign address, and any filter that is being used.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show raw extended-filters** command:

```
RP/0/RP0/CPU0:router# show raw extended-filters location 0/RP0/CPU0

Wed Dec 2 20:50:58.389 PST
----------------------------------
JID: 1102
Family: 10
VRF: 0x60000000
PCB: 0x7fc4c4001f18
L4-proto: 255
Lport: 0
Fport: 0
```

This table describes the significant fields shown in the display.

Table 72: show raw extended-filters Output Command Field Descriptions

Field	Description
JID	Job ID of the process that created the socket.
Family	Network protocol. IPv4 is 2; IPv6 is 26.
PCB	Protocol control block address.
L4-proto	Layer 4 (also known as transport) protocol.
Laddr	Local address.
Faddr	Foreign address.
ICMP error filter mask	If an ICMP filter is being set, output in this field has a nonzero value.
LPTS socket options	If an LPTS option is being set, output in this field has a nonzero value.
Packet Type Filters	Packet filters that are being set for a particular RAW socket, including the number of packets for that filter type. Multiple filters can be set.

show raw statistics pcb

To display statistics for a single RAW connection or for all RAW connections, use the **show raw statistics pcb** command in XR EXEC mode.

show raw statistics pcb {**all** | **pcb-address**} **location** *node-id*

Syntax Description

all	Displays statistics for all RAW connections.
pcb-address	Displays statistics for a specified RAW connection.
location *node-id*	(Optional) Displays RAW statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **all** keyword to display all RAW connections. If a specific RAW connection is desired, then enter the protocol control block (PCB) address of that RAW connection. Use the **show raw brief** command to obtain the PCB address.

Use the **location** keyword and *node-id* argument to display RAW statistics for a designated node.

Task ID

Task ID	Operations
transport	read

Examples

In the following example, statistics for a RAW connection with PCB address 0x80553b0 are displayed:

```
RP/0/RP0/CPU0:router# show raw statistics pcb 0x80553b0

Statistics for PCB 0x80553b0
Send: 0 packets received from application
0 xipc pulse received from application
0 packets sent to network
0 packets failed getting queued to network
Rcvd: 0 packets received from network
0 packets queued to application
0 packets failed queued to application
```

In this example, statistics for all RAW connections are displayed:

```
RP/0/RP0/CPU0:router# show raw statistics pcb all

Statistics for PCB 0x805484c
Send: 0 packets received from application
0 xipc pulse received from application
0 packets sent to network
0 packets failed getting queued to network
Rcvd: 0 packets received from network
0 packets queued to application
0 packets failed queued to application
```

This table describes the significant fields shown in the display.

Table 73: show raw statistics pcb Command Field Descriptions

Field	Description
Send:	Statistics in this section refer to packets sent from an application to RAW.
Vrfid	VPN routing and forwarding (VRF) identification (vrfid) number.
xipc pulse received from application	Number of notifications sent from applications to RAW.
packets sent to network	Number of packets sent to the network.
packets failed getting queued to network	Number of packets that failed to get queued to the network.
Rcvd:	Statistics in this section refer to packets received from the network.
packets queued to application	Number of packets queued to an application.
packets failed queued to application	Number of packets that failed to get queued to an application.

show tcp brief

To display a summary of the TCP connection table, use the **show tcp brief** command in XR EXEC mode.

show tcp brief [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Release 6.0

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show tcp brief** command:

```
RP/0/RP0/CPU0:router# show tcp brief

TCPCB     Recv-Q Send-Q  Local Address          Foreign Address        State
0x80572a8      0      0  0.0.0.0:513            0.0.0.0:0              LISTEN
0x8056948      0      0  0.0.0.0:23             0.0.0.0:0              LISTEN
0x8057b60      0      3  10.8.8.2:23            10.8.8.1:1025          ESTAB
```

This table describes the significant fields shown in the display.

Table 74: show tcp brief Command Field Descriptions

Field	Description
TCPCB	Memory address of the TCP control block.
Recv-Q	Number of bytes waiting to be read.
Send-Q	Number of bytes waiting to be sent.
Local Address	Source address and port number of the packet.

Field	Description
Foreign Address	Destination address and port number of the packet.
State	State of the TCP connection.

show tcp detail

To display the details of the TCP connection table, use the **show tcp detail** command in XR EXEC mode.

show tcp detail pcb [{*value* | **all**}]

Syntax Description

pcb	Displays TCP connection information.
value	Displays a specific connection information. Range is from 0 to ffffffff.
all	Displays all connections information.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show tcp detail pcb all** command:

```
RP/0/RP0/CPU0:router# show tcp detail pcb all location 0/RP0/CPU0

Wed Dec 2 20:52:40.256 PST

------------------------------------------------------------
Connection state is ESTAB, I/O status: 0, socket status: 0
Established at Wed Dec 2 20:25:42 2015

PCB 0x7f9dec013cc8, SO 0x7f9dec013858, TCPCB 0x7f9dec013f28, vrfid 0x60000000,
Pak Prio: Medium, TOS: 192, TTL: 1, Hash index: 506
Local host: 2011:1:120::1, Local port: 25093 (Local App PID: 5714)
Foreign host: 2011:1:120::2, Foreign port: 179

Current send queue size in bytes: 0 (max 24576)
```

```
Current receive queue size in bytes: 0 (max 32768) mis-ordered: 0 bytes
Current receive queue size in packets: 0 (max 0)

Timer     Starts   Wakeups   Next(msec)
Retrans    193       60        0
Sendwind    0        0         0
```

show tcp extended-filters

To display the details of the TCP extended-filters, use the **show tcp extended-filters** command in XR EXEC mode.

show tcp extended-filters [**location** *node-id*]
peer-filter [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
peer-filter	(Optional) Displays connections with peer filter configured.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show tcp extended-filters** command for a specific location (0/RP0/CPU0):

```
RP/0/RP0/CPU0:router# show tcp extended-filters location 0/RP0/CPU0

Total Number of matching PCB's in database: 3
-------------------------------------
JID: 135
Family: 2
PCB: 0x4826c5dc
L4-proto: 6
Lport: 23
Fport: 0
Laddr: 0.0.0.0
Faddr: 0.0.0.0
ICMP error filter mask: 0x12
```

```
Flow Type: n/s
-----------------------------------

-----------------------------------
JID: 135
Family: 2

PCB: 0x4826dd8c
L4-proto: 6
Lport: 23
Fport: 59162
Laddr: 12.31.22.10
Faddr: 223.255.254.254
ICMP error filter mask: 0x12

Flow Type: n/s
-----------------------------------

-----------------------------------
JID: 135
Family: 2
PCB: 0x4826cac0
L4-proto: 6
Lport: 23
Fport: 59307
Laddr: 12.31.22.10
Faddr: 223.255.254.254
ICMP error filter mask: 0x12

Flow Type: n/s
-----------------------------------
```

show tcp statistics

To display TCP statistics, use the **show tcp statistics** command in XR EXEC mode.

show tcp statistics {**client** | **pcb** {**all** *pcb-address*} | **summary** } [**location** *node-id*]

Syntax Description

client	Displays statistics of TCP clients.
pcb *pcb-address*	(Optional) Displays detailed statistics for a specified connection.
pcb all	(Optional) Displays detailed statistics for all connections.
summary	(Optional) Clears summary statistic for a specific node or connection.
location *node-id*	(Optional) Displays statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read

Examples The following is sample output from the **show tcp statistics** command:

```
RP/0/RP0/CPU0:router# show tcp statistics pcb 0x08091bc8

Statistics for PCB 0x8091bc8 VRF Id 0x60000000
Send:   0 bytes received from application
        0 xipc pulse received from application
        0 bytes sent to network
        0 packets failed getting queued to network
Rcvd:   0 packets received from network
        0 packets queued to application
        0 packets failed queued to application
```

This table describes the significant fields shown in the display.

Table 75: show tcp statistics Command Field Descriptions

Field	Description
vrfid	VPN routing and forwarding (VRF) identification (vrfid) number.
Send	Statistics in this section refer to packets sent by the router.
Rcvd:	Statistics in this section refer to packets received by the router.

show tcp nsr brief

To display the key nonstop routing (NSR) state of TCP connections on different nodes, use the **show tcp nsr brief** command in XR EXEC mode.

show tcp nsr brief [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays information for all TCP sessions for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples The following sample output shows the administrative and operational NSR state of each TCP session in the NSR column:

```
RP/0/RP0/CPU0:router# show tcp nsr brief

Wed Dec 2 20:35:47.467 PST
------------------------------------------------------------
Node: 0/RP0/CPU0
------------------------------------------------------------
PCB                VRF-ID   Local Address   Foreign Address NSR(US/DS)
0x00007f9e3c028538 0x60000000 3.3.3.3:646     5.5.5.5:17931    NA/Up
0x00007f9e3c021fb8 0x60000000 3.3.3.3:646     4.4.4.4:29301    NA/Up
0x00007f9e3c007248 0x60000000 3.3.3.3:646     12.1.105.2:32877 NA/Up
0x00007f9e3c010c78 0x60000000 3.3.3.3:646     6.6.6.6:56296    NA/Up
0x00007f9de4001798 0x60000000 3.3.3.3:12888   2.2.2.2:646      NA/Up
0x00007f9e3c04a338 0x60000000 3.3.3.13:179    2.2.2.13:13021   NA/Up
0x00007f9e3c026c78 0x60000000 3.3.3.3:179     4.4.4.4:15180    NA/Up
0x00007f9e3c019b38 0x60000000 3.3.3.3:179     8.8.8.8:21378    NA/Up
0x00007f9e3c029df8 0x60000000 3.3.3.22:179    2.2.2.22:24482   NA/Up
0x00007f9e3c064538 0x60000000 3.3.3.14:179    2.2.2.14:27569   NA/Up
0x00007f9e3c041008 0x60000000 3.3.3.25:179    2.2.2.25:29654   NA/Up
```

This table describes the significant fields shown in the display.

Table 76: show tcp nsr brief Command Field Descriptions

Field	Description
PCB	Protocol Control Block (PCB).
Local Address	Local address and port of the TCP connection.
Foreign Address	Foreign address and port of the TCP connection.
NSR	Current operational NSR state of this TCP connection.
RevOnly	If yes, the TCP connection is replicated only in the receive direction. Some applications may need to replicate a TCP connection that is only in the receive direction.

show tcp nsr client brief

To display brief information about the state of nonstop routing (NSR) for TCP clients on different nodes, use the **show tcp nsr client brief** command in XR EXEC mode.

show tcp nsr client brief [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays brief client information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output is from the **show tcp nsr client brief** command:

```
RP/0/RP0/CPU0:router# show tcp nsr client brief location 0/1/CPU0


CCB          Proc Name     Instance Sets Sessions/NSR Up Sessions
0x482bf378   mpls_ldp  1        1             1/1
0x482bd32c   mpls_ldp  2        1             0/0
```

This table describes the significant fields shown in the display.

Table 77: show tcp nsr client brief Command Field Descriptions

Field	Description
CCB	Client Control Block (CCB). Unique ID to identify the client.
Proc Name	Name of the client process.
Instance	Instance is identified as the instance number of the client process because there can be more than one instance for a routing application.
Sets	Set number is identified as the ID of the session-set.
Sessions/NSR Up Sessions	Total sessions in the set versus the number of the sessions in which NSR is up.

show tcp nsr detail client

To display detailed information about the nonstop routing (NSR) clients, use the **show tcp nsr detail client** command in XR EXEC mode.

show tcp nsr detail client {*ccb-address* | **all**} [**location** *node-id*]

Syntax Description

ccb-address	Client Control Block (CCB) address range for the specific client information. 0 to ffffffff. For example, the address range can be 0x482a4e20.
all	Specifies all the clients.
location *node-id*	(Optional) Displays client information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows detailed information for all clients:

```
RP/0/RP0/CPU0:router# show tcp nsr detail client all


============================================================
CCB 0x482b25d8, Proc Name mpls_ldp
Instance ID 1, Job ID 360
Number of session-sets 2
Number of sessions 3
Number of NSR Synced sessions 1
Connected at: Sun Jun 10 07:05:31 2007
Registered for notifications: Yes

============================================================
CCB 0x4827fd30, Proc Name mpls_ldp
Instance ID 2, Job ID 361
Number of session-sets 1
Number of sessions 2
Number of NSR Synced sessions 2
Connected at: Sun Jun 10 07:05:54 2007
Registered for notifications: Yes
```

```
============================================================

RP/0/RP0/CPU0:router# show tcp nsr detail client all location 1
RP/0/RP0/CPU0:router# show tcp nsr detail client all location 0/1/CPU0

============================================================
CCB 0x482bf378, Proc Name mpls_ldp
Instance ID 1, Job ID 360
Number of session-sets 1
Number of sessions 1
Number of NSR Synced sessions 1
Connected at: Sun Jun 10 07:05:41 2007
Registered for notifications: Yes

============================================================
CCB 0x482bd32c, Proc Name mpls_ldp
Instance ID 2, Job ID 361
Number of session-sets 1
Number of sessions 2
Number of NSR Synced sessions 2
Connected at: Sun Jun 10 07:06:01 2007
Registered for notifications: Yes
```

show tcp nsr detail pcb

To display detailed information about the nonstop routing (NSR) state of TCP connections, use the **show tcp nsr detail pcb** command in XR EXEC mode.

show tcp nsr detail pcb {*pcb-address* | **all**} [**location** *node-id*]

Syntax Description

pcb-address	PCB address range for the specific connection information. 0 to ffffffff. For example, the address range can be 0x482c6b8c.
all	Specifies all the connections.
location *node-id*	(Optional) Displays connection information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows the complete details for NSR for all locations:

```
RP/0/RP0/CPU0:router# show tcp nsr detail pcb all location 0/0/cpu0


==============================================================
PCB 0x482b6b0c, Client PID: 2810078
Local host: 5.1.1.1, Local port: 646
Foreign host: 5.1.1.2, Foreign port: 31466
SSCB 0x482bc80c, Client PID 2810078
Node Role: Active, Protected by: 0/1/CPU0, Cookie: 0x00001000

NSR State: Up, Rcv Path Replication only: No
Replicated to standby: Yes
Synchronized with standby: Yes
FSSN: 3005097735, FSSN Offset: 0

Sequence number of last or current initial sync: 1181461961
Initial sync started at: Sun Jun 10 07:52:41 2007
Initial sync ended   at: Sun Jun 10 07:52:41 2007

Number of incoming packets currently held: 1
         Pak#    SeqNum     Len     AckNum
        -----  ----------  -----  ----------
            1  3005097735      0  1172387202

Number of iACKS currently held: 0

==============================================================
PCB 0x482c2920, Client PID: 2810078
Local host: 5.1.1.1, Local port: 646
Foreign host: 5.1.1.2, Foreign port: 11229
SSCB 0x482bb3bc, Client PID 2810078
Node Role: Active, Protected by: 0/1/CPU0, Cookie: 0x00001000

NSR State: Down, Rcv Path Replication only: No
Replicated to standby: No
Synchronized with standby: No
NSR-Down Reason: Initial sync was aborted
NSR went down at: Sun Jun 10 11:55:38 2007

Initial sync in progress: No
Sequence number of last or current initial sync: 1181476338
Initial sync error, if any: 'ip-tcp' detected the 'warning' condition 'Initial sync operation
 timed out'
Source of initial sync error: Local TCP
Initial sync started at: Sun Jun 10 11:52:18 2007
Initial sync ended   at: Sun Jun 10 11:55:38 2007

Number of incoming packets currently held: 0

Number of iACKS currently held: 0

==============================================================
PCB 0x482baea0, Client PID: 2810078
Local host: 5.1.1.1, Local port: 646
Foreign host: 5.1.1.2, Foreign port: 41149
SSCB 0x482bb3bc, Client PID 2810078
Node Role: Active, Protected by: 0/1/CPU0, Cookie: 0x00001000

NSR State: Down, Rcv Path Replication only: No
Replicated to standby: No
Synchronized with standby: No
```

```
NSR-Down Reason: Initial sync was aborted
NSR went down at: Sun Jun 10 11:55:38 2007

Initial sync in progress: No
Sequence number of last or current initial sync: 1181476338
Initial sync error, if any: 'ip-tcp' detected the 'warning' condition 'Initial sync operation
 timed out'
Source of initial sync error: Local TCP
Initial sync started at: Sun Jun 10 11:52:18 2007
Initial sync ended   at: Sun Jun 10 11:55:38 2007

Number of incoming packets currently held: 0

Number of iACKS currently held: 0

============================================================
PCB 0x482c35ac,  Client PID: 2859233
Local host: 5:1::1, Local port: 8889
Foreign host: 5:1::2, Foreign port: 14008
SSCB 0x4827fea8, Client PID 2859233
Node Role: Active, Protected by: 0/1/CPU0, Cookie: 0x0000001c

NSR State: Up, Rcv Path Replication only: No
Replicated to standby: Yes
Synchronized with standby: Yes
FSSN: 2962722865, FSSN Offset: 0

Sequence number of last or current initial sync: 1181474373
Initial sync started at: Sun Jun 10 11:19:33 2007
Initial sync ended   at: Sun Jun 10 11:19:33 2007

Number of incoming packets currently held: 0

Number of iACKS currently held: 0

============================================================
PCB 0x482c2f10,  Client PID: 2859233
Local host: 5:1::1, Local port: 8889
Foreign host: 5:1::2, Foreign port: 40522
SSCB 0x4827fea8, Client PID 2859233
Node Role: Active, Protected by: 0/1/CPU0, Cookie: 0x0000001b

NSR State: Up, Rcv Path Replication only: No
Replicated to standby: Yes
Synchronized with standby: Yes
FSSN: 3477316401, FSSN Offset: 0

Sequence number of last or current initial sync: 1181474373
Initial sync started at: Sun Jun 10 11:19:33 2007
Initial sync ended   at: Sun Jun 10 11:19:33 2007

Number of incoming packets currently held: 0

Number of iACKS currently held: 0
```

show tcp nsr detail session-set

To display the detailed information about the nonstop routing (NSR) state of the session sets on different nodes, use the **show tcp nsr detail session-set** command in XR EXEC mode.

show tcp nsr detail session-set {*sscb-address* | **all**} [**location** *node-id*]

Syntax Description

sscb-address	Session-Set Control Block (SSCB) address range for the specific session set information. 0 to ffffffff. For example, the address range can be 0x482c6b8c.
all	Specifies all the session sets.
location *node-id*	(Optional) Displays information for session sets for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows all the session sets:

```
RP/0/RP0/CPU0:router# show tcp nsr detail session-set all


============================================================
SSCB 0x482bc80c, Client PID: 2810078
Set Id: 1, Addr Family: IPv4
Role: Active, Protected by: 0/1/CPU0, Well known port: 646
Sessions: total 1, synchronized 1
Initial sync in progress: No
        Sequence number of last or current initial sync: 1181461961
        Number of sessions in the initial sync: 1
        Number of sessions already synced: 1
        Number of sessions that failed to sync: 0
        Initial sync started at: Sun Jun 10 07:52:41 2007
        Initial sync ended   at: Sun Jun 10 07:52:41 2007

============================================================
SSCB 0x482bb3bc, Client PID: 2810078
Set Id: 2, Addr Family: IPv4
Role: Active, Protected by: 0/1/CPU0, Well known port: 646
Sessions: total 2, synchronized 0
Initial sync in progress: Yes
        Sequence number of last or current initial sync: 1181476338
        Initial sync timer expires in 438517602 msec
        Number of sessions in the initial sync: 2
        Number of sessions already synced: 0
        Number of sessions that failed to sync: 0
        Initial sync started at: Sun Jun 10 11:52:18 2007
```

```
============================================================
SSCB 0x4827fea8, Client PID: 2859233
Set Id: 1, Addr Family: IPv6
Role: Active, Protected by: 0/1/CPU0, Well known port: 8889
Sessions: total 2, synchronized 2
Initial sync in progress: No
        Sequence number of last or current initial sync: 1181474373
        Number of sessions in the initial sync: 2
        Number of sessions already synced: 2
        Number of sessions that failed to sync: 0
        Initial sync started at: Sun Jun 10 11:19:33 2007
        Initial sync ended   at: Sun Jun 10 11:19:33 2007
```

show tcp nsr session-set brief

To display brief information about the session sets for the nonstop routing (NSR) state on different nodes, use the **show tcp nsr session-set brief** command in XR EXEC mode.

show tcp nsr session-set brief [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays information for session sets for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

A session set consists of a subset of the application's session in which the subset is protected by only one standby node. The TCP NSR state machine operates with respect to these session sets.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows all the session sets that are known to the TCP instance:

```
RP/0/RP0/CPU0:router# show tcp nsr session-set brief

------------------------------------------------------------
Node: 0/RP0/CPU0
------------------------------------------------------------
SSCB               Client    LocalAPP    Set-Id Family  State  Protect-Node Total/US/DS
0x00007f9e14022508  4776    mpls_ldp#1     646   IPv4   SAYN   0/RP1/CPU0   5/0/5
```

```
0x00007f9e14022778  4776    mpls_ldp#1     647   IPv6   SAYN   0/RP1/CPU0   0/0/0
0x00007f9e14025018  5714         bgp#1       1   IPv4   SAYN   0/RP1/CPU0  58/0/58
0x00007f9e140257a8  5714         bgp#1       2   IPv6   SAYN   0/RP1/CPU0   2/0/2
```

The following sample output shows brief information about the session sets for location 0/RP0/CPU0:

```
RP/0/RP0/CPU0:router# show tcp nsr session-set brief location 0/RP0/CPU0

------------------------------------------------------------
Node: 0/RP0/CPU0
------------------------------------------------------------
SSCB               Client    LocalAPP    Set-Id Family  State  Protect-Node Total/US/DS
0x00007f9e14022508  4776    mpls_ldp#1     646   IPv4   SAYN   0/RP1/CPU0   5/0/5
0x00007f9e14022778  4776    mpls_ldp#1     647   IPv6   SAYN   0/RP1/CPU0   0/0/0
0x00007f9e14025018  5714         bgp#1       1   IPv4   SAYN   0/RP1/CPU0  58/0/58
0x00007f9e140257a8  5714         bgp#1       2   IPv6   SAYN   0/RP1/CPU0   2/0/2
```

This table describes the significant fields shown in the display.

Table 78: show tcp nsr session-set brief Command Field Descriptions

Field	Description
SSCB	Unique ID for Session-Set Control Block (SSCB) to identify a session-set of a client.
Client	PID of the client process.
LocalAPP	Name and instance number of the client process.
Set-Id	ID of the session-set.
Family	Address family of the sessions added to the session set for IPv4 or IPv6.
Role	Role of the TCP stack for active or standby.
Protect-Node	Node that is offering the protection, for example, partner node.
Total/Synced	Total number of sessions in the set versus the sessions that have been synchronized.

show tcp nsr statistics client

To display the nonstop routing (NSR) statistics for the clients, use the **show tcp nsr statistics client** command in XR EXEC mode.

show tcp nsr statistics client {*ccb-address* | **all**} [**location** *node-id*]

Syntax Description

ccb-address	Client Control Block (CCB) address range for the specific statistics information for the client. 0 to ffffffff. For example, the address range can be 0x482c6b8c.
all	Specifies all the statistics for the clients.

location *node-id*	(Optional) Displays statistics for the client for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows all the statistics for the client:

```
RP/0/RP0/CPU0:router# show tcp nsr statistics client all


============================================================
CCB: 0x482b25d8
Name: mpls_ldp, Job ID: 360
Connected at: Thu Jan  1 00:00:00 1970

Notification Stats      : Queued  Failed  Delivered  Dropped
Init-Sync Done          :      0       0          0       0
Replicated Session Ready:      0       0          0       0
Operational Down        :      0       0          0       0
Last clear at: Sun Jun 10 12:19:12 2007


============================================================
CCB: 0x4827fd30
Name: mpls_ldp, Job ID: 361
Connected at: Sun Jun 10 07:05:54 2007

Notification Stats      : Queued  Failed  Delivered  Dropped
Init-Sync Done          :      1       0          1       0
Replicated Session Ready:      0       0          0       0
Operational Down        :      0       0          0       0
Last clear at: Never Cleared
```

show tcp nsr statistics pcb

To display the nonstop routing (NSR) statistics for a given Protocol Control Block (PCB), use the **show tcp nsr statistics pcb** command in XR EXEC mode.

show tcp nsr statistics pcb {*pcb-address* | **all**} [**location** *node-id*]

Syntax Description

pcb-address	PCB address range for the specific connection information. 0 to ffffffff. For example, the address range can be 0x482c6b8c.
all	Specifies all the connection statistics.
location *node-id*	(Optional) Displays connection statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows all NSR statistics:

```
RP/0/RP0/CPU0:router# show tcp nsr statistics pcb all

------------------------------------------------------------
Node: 0/RP0/CPU0
------------------------------------------------------------

============================================================
PCB 0x7f9e3c028538
Number of times NSR went up: 1
Number of times NSR went down: 0
Number of times NSR was disabled: 0
Number of times switch-over occured : 0
IACK RX Message Statistics:
Number of iACKs dropped because session is not replicated : 0
Number of iACKs dropped because init-sync is in 1st phase : 1
Number of stale iACKs dropped : 0
Number of iACKs not held because of an immediate match : 0
TX Messsage Statistics:
Data transfer messages:
Sent 47, Dropped 0, Data (Total/Avg.) 23021748224/489824430
IOVAllocs : 0
Rcvd 0
Success : 0
Dropped (Trim) : 0
Dropped (Buf. OOS): 0
Segmentation instructions:
Sent 105, Dropped 0, Units (Total/Avg.) 1862270976/17735914
Rcvd 0
```

```
Success : 0
Dropped (Trim) : 0
Dropped (TCP) : 0
NACK messages:
Sent 0, Dropped 0
Rcvd 0
Success : 0
Dropped (Data snd): 0
Cleanup instructions :
Sent 46, Dropped 0
Rcvd 0
Success : 0
Dropped (Trim) : 0
Last clear at: Never Cleared
```

show tcp nsr statistics session-set

To display the nonstop routing (NSR) statistics for a session set, use the **show tcp nsr statistics session-set** command in XR EXEC mode.

show tcp nsr statistics session-set {*sscb-address* | **all**} [**location** *node-id*]

Syntax Description

sscb-address	Session-Set Control Block (SSCB) address range for the specific session set information for the statistics. 0 to ffffffff. For example, the address range can be 0x482b3444.
all	Specifies all the session sets for the statistics.
location *node-id*	(Optional) Displays session set information for the statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows all session set information for the statistics:

```
RP/0/RP0/CPU0:router# show tcp nsr statistics session-set all

------------------------------------------------------------
```

```
Node: 0/RP0/CPU0
----------------------------------------------------------------

==================Session Set Stats ============================
SSCB 0x7f9e14022508, Set ID: 646
Number of times init-sync was attempted :0
Number of times init-sync was successful :0
Number of times init-sync failed :0
Number of times switch-over occured :0
Number of times NSR has been reset :0
Last clear at: Wed Dec 2 20:44:48 2015


==================Session Set Stats ============================
SSCB 0x7f9e14022778, Set ID: 647
Number of times init-sync was attempted :0
Number of times init-sync was successful :0
Number of times init-sync failed :0
Number of times switch-over occured :0
Number of times NSR has been reset :0
Last clear at: Wed Dec 2 20:44:48 2015


==================Session Set Stats ============================
SSCB 0x7f9e14025018, Set ID: 1
Number of times init-sync was attempted :0
Number of times init-sync was successful :0
Number of times init-sync failed :0
Number of times switch-over occured :0
Number of times NSR has been reset :0
Last clear at: Wed Dec 2 20:44:48 2015


==================Session Set Stats ============================
SSCB 0x7f9e140257a8, Set ID: 2
Number of times init-sync was attempted :0
Number of times init-sync was successful :0
Number of times init-sync failed :0
Number of times switch-over occured :0
Number of times NSR has been reset :0
Last clear at: Wed Dec 2 20:44:48 2015
```

show tcp nsr statistics summary

To display the nonstop routing (NSR) summary statistics across all TCP sessions, use the **show tcp nsr statistics summary** command in XR EXEC mode.

show tcp nsr statistics summary [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays information for the summary statistics for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

If a value is not specified, the current RP in which the command is being executed is taken as the location.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **location** keyword is used so that active and standby TCP instances are independently queried.

Task ID

Task ID	Operations
transport	read

Examples

The following sample output shows the summary statistics for all TCP sessions:

```
RP/0/RP0/CPU0:router# show tcp nsr statistics summary

====================Summary Stats=======================
Last clear at: Never Cleared
Notif Statistics:
Queued Failed Delivered Dropped
Init-sync Done : 7 0 7 0
Replicated Session Ready: 0 0 0 0
Operational Down : 0 0 0 0
Init-sync Stop Reading : 7 0 7 0
Clients Statistics:
Number of Connected Clients :2
Number of Disconnected Clients :0
Number of Current Clients :2
Session Sets Statistics:
Number of Created Session Sets :4
Number of Destroyed Session Sets:0
Number of Current Session Sets :4
Sessions Statistics:
Number of Added Sessions :65
Number of Deleted Sessions :0
Number of Current Sessions :65
InitSync Statistics:
Number of times init-sync was attempted :7
Number of times init-sync was successful :7
Number of times init-sync failed :0
Held packets and iacks Statistics:
Number of packets held by Active TCP :67
Number of held packets dropped by Active TCP :0
Number of iacks held by Active TCP :0
Number of held iacks dropped by Active TCP :0
Number of iacks sent by Standby TCP :0
Number of iacks received by Active TCP :0
QAD Msg Statistics:
Number of dropped messages from partner TCP stack(s) : 0
Number of unknown messages from partner TCP stack(s) : 0
Number of messages accepted from partner TCP stack(s) : 1341
Number of stale dropped messages from partner TCP stack(s) : 0
Number of messages sent to partner TCP stack(s) : 22480
Number of messages failed to be sent to partner TCP stack(s): 0
RX Msg Statistics:
Number of iACKs dropped because there is no PCB : 0
Number of iACKs dropped because there is no datapath SCB : 0
Number of iACKs dropped because session is not replicated : 0
Number of iACKs dropped because init-sync is in 1st phase : 1056
Number of stale iACKs dropped : 17
Number of iACKs not held because of an immediate match : 0
```

```
Number of held packets dropped because of errors : 0
TX Messsage Statistics:
Data transfer messages:
Sent 4533, Dropped 0
IOVAllocs : 0
Rcvd 0
Success : 0
Dropped (PCB) : 0
Dropped (SCB-DP) : 0
Dropped (Trim) : 0
Dropped (Buf. OOS): 0
Segmentation instructions:
Sent 14124, Dropped 0
Rcvd 0
Success : 0
Dropped (PCB) : 0
Dropped (SCB-DP) : 0
Dropped (Trim) : 0
Dropped (TCP) : 0
NACK messages:
Sent 0, Dropped 0
Rcvd 0
Success : 0
Dropped (PCB) : 0
Dropped (SCB-DP) : 0
Dropped (Data snd): 0
Cleanup instructions :
Sent 3608, Dropped 0
Rcvd 0
Success : 0
Dropped (PCB) : 0
Dropped (SCB-DP) : 0
Dropped (Trim) : 0
Audit Messsage Statistics:
Mark Session set messages:
Sent 0, Dropped 0
Rcvd 0
Dropped : 0
Audit Session messages:
Sent 0, Dropped 0
Rcvd 0
Dropped : 0
Sweep Session set messages:
Sent 0, Dropped 0
Rcvd 0
Dropped : 0
Session set audit response messages:
Sent 0, Dropped 0
Rcvd 0
Dropped : 0
Mark Session set ack messages:
Sent 0, Dropped 0
Rcvd 0
Dropped : 0
Mark Session set nack messages:
Sent 0, Dropped 0
Rcvd 0
Dropped : 0
Number of audit operations aborted: 0
```

show udp brief

To display a summary of the User Datagram Protocol (UDP) connection table, use the **show udp brief** command in XR EXEC mode.

show udp brief [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show udp brief** command:

```
RP/0/RP0/CPU0:router# show udp brief


PCB        VRF-ID Recv-Q Send-Q Local Address Foreign Address
0x7fb44c029678 0x60000000 0       0 :::35333       :::0
0x7fb44c028fa8 0x00000000 0       0 :::35333       :::0
0x7fb43000b708 0x60000000 0       0 :::49270       :::0
0x7fb43000b038 0x00000000 0       0 :::49270       :::0
0x7fb43001fbb8 0x60000000 0       0 :::123         :::0
0x7fb430010f28 0x00000000 0       0 :::123         :::0
0x7fb430009ea8 0x60000000 0       0 :::41092       :::0
0x7fb4300096b8 0x00000000 0       0 :::41092       :::0
0x7fb44c025008 0x60000000 0       0 :::161         :::0
0x7fb43000cda8 0x60000001 0       0 :::161         :::0
0x7fb43000d2d8 0x60000002 0       0 :::161         :::0
0x7fb43000d938 0x60000003 0       0 :::161         :::0
0x7fb43000df98 0x60000004 0       0 :::161         :::0
0x7fb43000e5f8 0x60000005 0       0 :::161         :::0
0x7fb43000ec58 0x60000006 0       0 :::161         :::0
0x7fb43000f2b8 0x60000007 0       0 :::161         :::0
0x7fb43000f918 0x60000008 0       0 :::161         :::0
0x7fb43000ff78 0x60000009 0       0 :::161         :::0
0x7fb4300046c8 0x00000000 0       0 :::161         :::0
0x7fb44c025f78 0x60000000 0       0 :::162         :::0
0x7fb44c02b1f8 0x60000001 0       0 :::162         :::0
```

```
0x7fb44c02b848 0x60000002 0       0 :::162         :::0
0x7fb44c02bea8 0x60000003 0       0 :::162         :::0
0x7fb44c02c508 0x60000004 0       0 :::162         :::0
0x7fb44c02cb68 0x60000005 0       0 :::162         :::0
0x7fb44c02d1c8 0x60000006 0       0 :::162         :::0
0x7fb44c02d828 0x60000007 0       0 :::162         :::0
0x7fb44c02de88 0x60000008 0       0 :::162         :::0
0x7fb44c02e4e8 0x60000009 0       0 :::162         :::0
0x7fb44c0258e8 0x00000000 0       0 :::162         :::0
0x7fb4300024d8 0x60000000 0       0 :::3503        :::0
0x7fb44c028628 0x60000000 0       0 :::32958       :::0
0x7fb44c028018 0x00000000 0       0 :::32958       :::0
0x7fb44c02a9e8 0x60000000 0       0 :::3799        :::0
0x7fb44c02a258 0x00000000 0       0 :::3799        :::0
0x7fb4300012e8 0x00000000 0       0 :::0           :::0
0x7fb44c023258 0x60000000 0       0 0.0.0.0:514   0.0.0.0:0
0x7fb44c027848 0x60000000 0       0 0.0.0.0:27202 0.0.0.0:0
0x7fb4300077e8 0x00000000 0       0 0.0.0.0:27202 0.0.0.0:0
0x7fb44c03cf48 0x60000000 0       0 0.0.0.0:123   0.0.0.0:0
0x7fb4300107e8 0x00000000 0       0 0.0.0.0:123   0.0.0.0:0
0x7fb430000c18 0x60000000 0       0 0.0.0.0:646   0.0.0.0:0
0x7fb44c022158 0x00000000 0       0 0.0.0.0:646   0.0.0.0:0
0x7fb44c0274e8 0x60000000 0       0 0.0.0.0:30613 0.0.0.0:0
0x7fb430006bf8 0x00000000 0       0 0.0.0.0:30613 0.0.0.0:0
0x7fb44c0270f8 0x60000000 0       0 0.0.0.0:50589 0.0.0.0:0
0x7fb430006008 0x00000000 0       0 0.0.0.0:50589 0.0.0.0:0
```

This table describes the significant fields shown in the display.

Table 79: show udp brief Command Field Descriptions

Field	Description
PCB	Protocol control block address. This is the address to a structure that contains connection information such as local address, foreign address, local port, foreign port, and so on.
Recv-Q	Number of bytes in the receive queue.
Send-Q	Number of bytes in the send queue.
Local Address	Local address and local port.
Foreign Address	Foreign address and foreign port.

show udp detail pcb

To display detailed information of the User Datagram Protocol (UDP) connection table, use the **show udp detail pcb** command in XR EXEC mode.

show udp detail pcb {*pcb-address* | **all**} [**location** *node-id*]

Syntax Description

pcb-address	Address of a specified UDP connection.
all	Provides statistics for all UDP connections.

location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show udp detail pcb all** command:

```
RP/0/RP0/CPU0:router# show udp detail pcb all location 0/RP0/CPU0

==============================================
PCB is 0x4822fea0, Family: 2, VRF: 0x60000000
 Local host: 0.0.0.0:3784
 Foreign host: 0.0.0.0:0

Current send queue size: 0
Current receive queue size: 0
==============================================
PCB is 0x4822d0e0, Family: 2, VRF: 0x60000000
 Local host: 0.0.0.0:3785
 Foreign host: 0.0.0.0:0

Current send queue size: 0
Current receive queue size: 0
```

This table describes the significant fields shown in the display.

Table 80: show raw pcb Command Field Descriptions

Field	Description
PCB	Protocol control block address.
Family	Network protocol. IPv4 is 2; IPv6 is 26.
VRF	VPN routing and forwarding (VRF) instance name.
Local host	Local host address.
Foreign host	Foreign host address.
Current send queue size	Size of the send queue (in bytes).

Field	Description
Current receive queue size	Size of the receive queue (in bytes).

show udp extended-filters

To display the details of the UDP extended-filters, use the **show udp extended-filters** command in XR EXEC mode.

show udp extended-filters {**location** *node-id* | **peer-filter** {**location** *node-id}*}

Syntax Description

location *node-id*	Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.
peer-filter	Displays connections with peer filter configured.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show udp extended-filters** command for a specific location (0/RP0/CPU0):

```
RP/0/RP0/CPU0:router# show udp extended-filters location 0/RP0/CPU0


JID: 1111
Family: 10
VRF: 0x60000000
PCB: 0x7fb44c029678
L4-proto: 17
Lport: 35333
Fport: 0
Laddr: 70:8653:f7f:0:303d:40ba:3200:0
Faddr: e297:ba:3200:0:3208::
ICMP error filter mask: 0x0
LPTS options: 0x0 / 0x5 / 0x0 / BOUND /
Flow Type: RADIUS
```

show udp statistics

To display User Datagram Protocol (UDP) statistics, use the **show udp statistics** command in XR EXEC mode.

show udp statistics {**summary** | **pcb** {*pcb-addressall*}} [**location** *node-id*]

Syntax Description

summary	Displays summary statistics.
pcb *pcb-address*	Displays detailed statistics for each connection.
pcb *all*	Displays detailed statistics for all connections.
location *node-id*	(Optional) Displays information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

UDP clones the received packets if there are multiple multicast applications that are interested in receiving those packets.

Task ID

Task ID	Operations
transport	read

Examples

The following is sample output from the **show udp statistics summary** command:

```
RP/0/RP0/CPU0:router# show udp statistics summary

UDP statistics:
Rcvd: 0 Total, 0 drop, 0 no port
      0 checksum error, 0 too short
Sent: 0 Total, 0 error
0 Total forwarding broadcast packets
0 Cloned packets, 0 failed cloningication
```

This table describes the significant fields shown in the display.

Table 81: show udp Command Field Descriptions

Field	Description
Rcvd: Total	Total number of packets received.

Field	Description
Rcvd: drop	Total number of packets received that were dropped.
Rcvd: no port	Total number of packets received that have no port.
Rcvd: checksum error	Total number of packets received that have a checksum error.
Rcvd: too short	Total number of packets received that are too short for UDP packets.
Sent: Total	Total number of packets sent successfully.
Sent: error	Total number of packets that cannot be sent due to errors.
Total forwarding broadcast packets	Total number of packets forwarded to the helper address.
Cloned packets	Total number of packets cloned successfully.
failed cloning	Total number of packets that failed cloning.

tcp mss

To configure the TCP maximum segment size that determines the size of the packet that TCP uses for sending data, use the **tcp mss** command in XR Config mode.

tcp mss *segment-size*

Syntax Description

segment-size	Size, in bytes, of the packet that TCP uses to send data. Range is 68 to 10000 bytes.

Command Default

If this configuration does not exist, TCP determines the maximum segment size based on the settings specified by the application process, interface maximum transfer unit (MTU), or MTU received from Path MTU Discovery.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read, write

Examples

This example shows how to configure the TCP maximum segment size:

```
RP/0/RSP0/CPU0:router(config)# tcp mss 1460
RP/0/RSP0/CPU0:router(config)# exit

Uncommitted changes found, commit them? [yes]:
RP/0/RSP0/CPU0:router:Sep  8 18:29:51.084 : config[65700]: %LIBTARCFG-6-COMMIT :

Configuration committed by user 'lab'.   Use 'show commit changes 1000000596' to view the
changes.
Sep  8 18:29:51.209 : config[65700]: %SYS-5-CONFIG_I : Configured from console by lab
```

tcp path-mtu-discovery

To allow TCP to automatically detect the highest common maximum transfer unit (MTU) for a connection, use the **tcp path-mtu-discovery** in XR Config mode. To reset the default, use the **no** form of this command.

tcp path-mtu-discovery [{**age-timer** *minutes* | **infinite**}]
no tcp path-mtu-discovery

Syntax Description

age-timer *minutes*	(Optional) Specifies a value in minutes. Range is 10 to 30.
infinite	(Optional) Turns off the age timer.

Command Default

tcp path-mtu-discovery is disabled

age-timer default is 10 minutes

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Use the **tcp path-mtu-discovery** command to allow TCP to automatically detect the highest common MTU for a connection, such that when a packet traverses between the originating host and the destination host the packet is not fragmented and then reassembled.

The age timer value is in minutes, with a default value of 10 minutes. The age timer is used by TCP to automatically detect if there is an increase in MTU for a particular connection. If the **infinite** keyword is specified, the age timer is turned off.

Task ID

Task ID	Operations
transport	read, write

Examples

The following example shows how to set the age timer to 20 minutes:

```
RP/0/RP0/CPU0:router(config)# tcp path-mtu-discovery age-timer 20
```

tcp selective-ack

To enable TCP selective acknowledgment (ACK) and identify which segments in a TCP packet have been received by the remote TCP, use the **tcp selective-ack** command in XR Config mode. To reset the default, use the **no** form of this command.

tcp selective-ack
no tcp selective-ack

Syntax Description

XR Config mode

This command has no keywords or arguments.

Command Default

TCP selective ACK is disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was supported.

Usage Guidelines

If TCP Selective ACK is enabled, each packet contains information about which segments have been received by the remote TCP. The sender can then resend only those segments that are lost. If selective ACK is disabled, the sender receives no information about missing segments and automatically sends the first packet that is not acknowledged and then waits for the other TCP to respond with what is missing from the data stream. This method is inefficient in Long Fat Networks (LFN), such as high-speed satellite links in which the bandwidth * delay product is large and valuable bandwidth is wasted waiting for retransmission.

Task ID

Task ID	Operations
transport	read, write

Examples

In the following example, the selective ACK is enabled:

```
RP/0/RP0/CPU0:router(config)# tcp selective-ack
```

tcp synwait-time

To set a period of time the software waits while attempting to establish a TCP connection before it times out, use the **tcp synwait-time** command in XR Config mode. To restore the default time, use the **no** form of this command.

tcp synwait-time *seconds*
no tcp synwait-time *seconds*

Syntax Description

seconds	Time (in seconds) the software waits while attempting to establish a TCP connection. Range is 5 to 30 seconds.

Command Default

The default value for the synwait-time is 30 seconds.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was supported.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
transport	read, write

Examples

The following example shows how to configure the software to continue attempting to establish a TCP connection for 18 seconds:

```
RP/0/RP0/CPU0:router(config)# tcp synwait-time 18
```

tcp timestamp

To more accurately measure the round-trip time of a packet, use the **tcp timestamp** command in XR Config mode. To reset the default, use the **no** form of this command.

tcp timestamp
no tcp timestamp

Syntax Description

This command has no keywords or arguments.

Command Default

A TCP time stamp is not used.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was supported.

Usage Guidelines

Use the **tcp timestamp** command to more accurately measure the round-trip time of a packet. If a time stamp is not used, a TCP sender deduces the round-trip time when an acknowledgment of its packet is received, which is not a very accurate method because the acknowledgment can be delayed, duplicated, or lost. If a time stamp is used, each packet contains a time stamp to identify packets when acknowledgments are received and the round-trip time of that packet.

This feature is most useful in Long Fat Network (LFN) where the bandwidth * delay product is long.

Task ID

Task ID	Operations
transport	read, write

Examples

The following example shows how to enable the timestamp option:

```
RP/0/RP0/CPU0:router(config)# tcp timestamp
```

tcp window-size

To alter the TCP window size, use the **tcp window-size** command in XR Config mode. To restore the default value, use the **no** form of this command.

tcp window-size *bytes*
no tcp window-size

Syntax Description

bytes	Window size in bytes. Range is 2048 to 65535 bytes.

Command Default

The default value for the window size is 16k.

Command Modes

XR Config mode

Command History

Release	Modification
Release 6.0	This command was supported.

Usage Guidelines

Do not use this command unless you clearly understand why you want to change the default value.

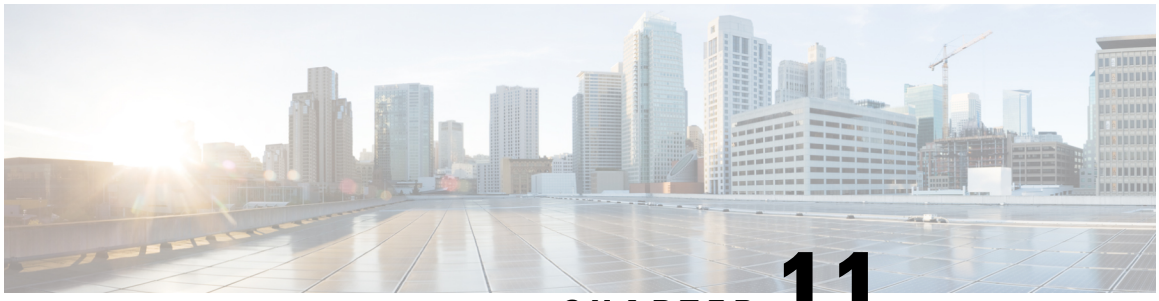
Task ID

Task ID	Operations
transport	read, write

Examples

The following example shows how to set the TCP window size to 3000 bytes:

```
RP/0/RP0/CPU0:router(config)# tcp window-size 3000
```



CHAPTER 11

VRRP Commands

Note All commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router that is introduced from Cisco IOS XR Release 6.3.2. References to earlier releases in Command History tables apply to only the Cisco NCS 5500 Series Router.

Note

- Starting with Cisco IOS XR Release 6.6.25, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 560 Series Routers.
- Starting with Cisco IOS XR Release 6.3.2, all commands applicable for the Cisco NCS 5500 Series Router are also supported on the Cisco NCS 540 Series Router.
- References to releases before Cisco IOS XR Release 6.3.2 apply to only the Cisco NCS 5500 Series Router.
- Cisco IOS XR Software Release 7.0.1 specific updates are not applicable for the following variants of Cisco NCS 540 Series Routers:
  - N540-28Z4C-SYS-A
  - N540-28Z4C-SYS-D
  - N540X-16Z4G8Q2C-A
  - N540X-16Z4G8Q2C-D
  - N540X-16Z8Q2C-D
  - N540-12Z20G-SYS-A
  - N540-12Z20G-SYS-D
  - N540X-12Z16G-SYS-A
  - N540X-12Z16G-SYS-D

This document describes the Cisco IOS XR software commands used to configure and monitor the Virtual Router Redundancy Protocol (VRRP) features.

For detailed information about VRRP concepts, configuration tasks, and examples, refer to the *IP Addresses and Services Configuration Guide for Cisco NCS 5500 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 540 Series RoutersIP Addresses and Services Configuration Guide for Cisco NCS 560 Series Routers*.

accept-mode

To disable the installation of routes for the Virtual Router Redundancy Protocol (VRRP) virtual addresses, use the **accept-mode** command in the VRRP virtual router submode. To enable the installation of routes for the VRRP virtual addresses, use the **no** form of this command.

accept-mode disable

no accept-mode disable

Syntax Description

disable	Disables the accept mode.

Command Default By default, the accept mode is enabled.

Command Modes VRRP virtual router configuration

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to disable the installation of routes for the VRRP virtual addresses:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-vrrp-address-family)# vrrp 3 version 2
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)# accept-mode disable
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
address (VRRP), on page 545	Sets the primary virtual IPv4 address for a virtual router.
address global, on page 546	Configures the global virtual IPv6 address for a virtual router.
address linklocal, on page 547	Sets the virtual link-local IPv6 address for a virtual router.
address secondary, on page 548	Sets the secondary virtual IPv4 address for a virtual router.
message state disable, on page 556	Disables the task of logging the VRRP state change events.

accept-mode (subordinate)

To disable the installation of routes for the Virtual Router Redundancy Protocol (VRRP) virtual addresses, use the **accept-mode** command in the VRRP slave submode. To enable the installation of routes for the VRRP virtual addresses, use the **no** form of this command.

accept-mode disable

no accept-mode disable

Syntax Description

disable	Disables the accept mode.

Command Default By default, the accept mode is enabled.

Command Modes VRRP slave submode configuration

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to disable the installation of routes for the VRRP virtual addresses:

```
Router# configure
Router(config)# router vrrp
Router(config-vrrp)# interface tenGigE 0/4/0/4
Router(config-vrrp-if)# address-family ipv4
Router(config-vrrp-address-family)# vrrp 3 slave
Router(config-vrrp-virtual-router)# accept-mode disable
Router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
accept-mode, on page 542	Disable the installation of routes for the Virtual Router Redundancy Protocol (VRRP) virtual addresses.

address-family

To enable address-family mode, use the **address-family** command in interface configuration mode. To terminate address-family mode, use the **no** form of this command.

address-family {**ipv4** | **ipv6**}
no address-family {**ipv4** | **ipv6**}

Syntax Description

ipv4	IPv4 address-family.
ipv6	IPv6 address-family.

Command Default None.

Command Modes Interface configuration

Usage Guidelines No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

The following example shows how to enable address-family mode:

```
RP/0/RP0/CPU0:router # config
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
```

Related Commands

Command	Description
interface (VRRP), on page 555	Enables VRRP interface configuration mode.

address (VRRP)

To configure the primary virtual IPv4 address for a virtual router, use the **address** command in the Virtual Router Redundancy Protocol (VRRP) virtual router submode. To deconfigure the primary virtual IPv4 address for the virtual router, use the **no** form of this command.

address *address*

no address *address*

Syntax Description

address	VRRP IPv4 address.

Command Default

None

Command Modes

VRRP virtual router

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to set the primary virtual IPv4 address for the virtual router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-vrrp-address-family)# vrrp 3 version 3
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)# address 192.168.18.1
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
accept-mode, on page 542	Disables the installation of routes for the VRRP virtual addresses.
address global, on page 546	Configures the global virtual IPv6 address for a virtual router.
address linklocal, on page 547	Sets the virtual link-local IPv6 address for a virtual router.
address secondary, on page 548	Sets the secondary virtual IPv4 address for a virtual router.
message state disable, on page 556	Disables the task of logging the VRRP state change events.

address global

To configure the global virtual IPv6 address for a virtual router, use the **address global** command in the Virtual Router Redundancy Protocol (VRRP) virtual router submode. To deconfigure the global virtual IPv6 address for a virtual router, use the **no** form of this command.

address global *ipv6-address*

no address global *ipv6-address*

Syntax Description

ipv6-address	Global VRRP IPv6 address.

Command Default

None

Command Modes

VRRP virtual router

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to add a global virtual IPv6 address for the virtual router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv6
RP/0/RP0/CPU0:router(config-vrrp-address-family)# vrrp 3
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)# address global 4000::1000
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
address (VRRP), on page 545	Sets the primary virtual IPv4 address for a virtual router.
accept-mode, on page 542	Disables the installation of routes for the VRRP virtual addresses.
address linklocal, on page 547	Sets the virtual link-local IPv6 address for a virtual router.
address secondary, on page 548	Sets the secondary virtual IPv4 address for a virtual router.
message state disable, on page 556	Disables the task of logging the VRRP state change events.

address linklocal

To either configure the virtual link-local IPv6 address for a virtual router or to specify that the virtual link-local IPv6 address should be enabled and calculated automatically from the virtual router virtual Media Access Control (MAC) address, use the **address linklocal** command in the Virtual Router Redundancy Protocol (VRRP) virtual router submode. To deconfigure the virtual link-local IPv6 address for a virtual router, use the **no** form of this command.

address linklocal [{*ipv6-address* | **autoconfig**}]

no address linklocal [{*ipv6-address* | **autoconfig**}]

Syntax Description

ipv6-address	VRRP IPv6 link-local address.
autoconfig	Autoconfigures the VRRP IPv6 link-local address.

Command Default

None

Command Modes

VRRP virtual router

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to autoconfigure the VRRP IPv6 link-local address:

```
RP/0/RP0/CPU0:router#configure
RP/0/RP0/CPU0:router(config)#router vrrp
RP/0/RP0/CPU0:router(config-vrrp)#interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)#address-family ipv6
RP/0/RP0/CPU0:router(config-vrrp-address-family)#vrrp 3
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#address linklocal autoconfig
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

This example shows how to configure the virtual link-local IPv6 address for the virtual router:

```
RP/0/RP0/CPU0:router#configure
RP/0/RP0/CPU0:router(config)#router vrrp
RP/0/RP0/CPU0:router(config-vrrp)#interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)#address-family ipv6
RP/0/RP0/CPU0:router(config-vrrp-address-family)#vrrp 3
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#address linklocal FE80::260:3EFF:FE11:6770

RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Note The **version** keyword is available only if IPv4 address-family is selected. By default, version is set to 3 for IPv6 address families.

Related Commands

Command	Description
address (VRRP), on page 545	Sets the primary virtual IPv4 address for a virtual router.
address global, on page 546	Configures the global virtual IPv6 address for a virtual router.
accept-mode, on page 542	Disables the installation of routes for the VRRP virtual addresses.
address secondary, on page 548	Sets the secondary virtual IPv4 address for a virtual router.
message state disable, on page 556	Disables the task of logging the VRRP state change events.

address secondary

To configure the secondary virtual IPv4 address for a virtual router, use the **address secondary** command in the Virtual Router Redundancy Protocol (VRRP) virtual router submode. To deconfigure the secondary virtual IPv4 address for a virtual router, use the **no** form of this command.

address *address* **secondary**

no address *address* **secondary**

Syntax Description

secondary	Sets the secondary VRRP IP address.
address	VRRP IPv4 address.

Command Default

None

Command Modes

VRRP virtual router

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to set the secondary virtual IPv4 address for the virtual router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-vrrp-address-family)# vrrp 3 version 2
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)# address 192.168.18.1 secondary
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
address (VRRP), on page 545	Sets the primary virtual IPv4 address for a virtual router.
address global, on page 546	Configures the global virtual IPv6 address for a virtual router.
address linklocal, on page 547	Sets the virtual link-local IPv6 address for a virtual router.
accept-mode, on page 542	Disables the installation of routes for the VRRP virtual addresses.
message state disable, on page 556	Disables the task of logging the VRRP state change events.

vrrp bfd fast-detect

To enable bidirectional forwarding(BFD) fast-detection on a VRRP interface, use the **vrrp bfd fast-detect** command in the interface configuration mode. This creates a BFD session between the Virtual Router Redundancy Protocol (VRRP) router and its peer, and if the session goes down while the VRRP is in the backup state, a VRRP failover is initiated. To disable BFD fast-detection, use the **no** form of this command.

vrrp *vrid* **bfd fast-detect peer** { **ipv4** | **ipv6** } *address*

no vrrp *vrid* **bfd fast-detect peer** { **ipv4** | **ipv6** } *address*

Syntax Description

vrid	Virtual Router Identifier.
peer	VRRP peer for BFD monitoring.
ipv4 *address*	IPv4 address of the BFD peer interface.
ipv6 *address*	IPv6 address of the BFD peer interface.

Command Default

BFD is disabled.

Command Modes

VRRP interface configuration
VRRP virtual router

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

BFD is supported only on systems with exactly two redundant VRRP routers.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to enable **bfd fast-detect** for an IPv4 address:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-hsrp)# interface gig 0/1/1/0
RP/0/RP0/CPU0:router(config-hsrp-if)# vrrp 1 bfd fast-detect peer ipv4 10.1.1.1
```

bfd minimum-interval (VRRP)

To configure the BFD minimum interval to be used for all VRRP BFD sessions on a given interface, use the **bfd minimum-interval** command in the interface configuration mode. To remove the configured minimum-interval period and set the minimum-interval period to the default period, use the **no** form of this command.

bfd minimum-interval *interval*
no bfd minimum-interval *interval*

Syntax Description

interval	Specify the minimum-interval in milliseconds. Range is 15 to 30000.

Command Default

Default minimum interval is 15 ms.

Command Modes

VRRP interface configuration

Usage Guidelines

Minimum interval determines the frequency of sending BFD packets to BFD peers. It is the time between successive BFD packets sent for the session. Minimum interval is defined in milliseconds. The configured minimum interval applies to all BFD sessions on the interface.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to configure a minimum interval of 100 milliseconds:

```
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface gig 0/1/1/0
RP/0/RP0/CPU0:router(config-vrrp-if)# bfd minimum-interval 100
```

bfd multiplier (VRRP)

To set the BFD multiplier value, use the **bfd multiplier** command in the interface configuration mode. To remove the configured multiplier value and set the multiplier to the default value, use the **no** form of this command.

bfd multiplier *multiplier*
no bfd multiplier *multiplier*

Syntax Description

multiplier	Specifies the BFD multiplier value. Range is 2 to 50.

Command Default

Default value is 3.

Command Modes

VRRP interface configuration

Usage Guidelines

The multiplier value specifies the number of consecutive BFD packets that, if not received as expected, cause a BFD session to go down. The BFD multiplier applies to all configured BFD sessions on the interface.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to configure a BFD multiplier with multiplier value of 10:

```
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface gig 0/1/1/0
RP/0/RP0/CPU0:router(config-vrrp-if)# bfd multiplier 10
```

clear vrrp statistics

To reset the Virtual Router Redundancy Protocol (VRRP) statistics (to zero or default value), use the **clear vrrp statistics** command in XR EXEC mode.

clear vrrp statistics {**ipv4** | **ipv6**}[**interface** *type* *interface-path-id* [*vrid*]]

Syntax Description

ipv4	(Optional) Resets the IPv4 information.
ipv6	(Optional) Resets the IPv6 information.
interface *type*	(Optional) Interface type. For more information, use the question mark (?) online help function.

interface-path-id	(Optional) Either a physical interface instance or a virtual interface instance as follows:
	• Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation.
	  • *rack*: Chassis number of the rack.
	  • *slot*: Physical slot number of the modular services card or line card.
	  • *module*: Module number. A physical layer interface module (PLIM) is always 0.
	  • *port*: Physical port number of the interface.
	• Virtual interface instance. Number range varies depending on interface type.
	For more information about the syntax for the router, use the question mark (?) online help function.

vrid	(Optional) Virtual router identifier, which is the number identifying the virtual router for which status is displayed.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Usage Guidelines

If no **interface** is specified, the statistics for all virtual routers on all interfaces are cleared.

If no value for *vrid* is specified, the statistics for all virtual routers on the specified interface are cleared.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to clear vrrp statistics:

```
RP/0/RP0/CPU0:router# clear vrrp statistics
```

Related Commands

Command	Description
show vrrp	Displays a brief or detailed status of one or all Virtual Router Redundancy Protocol (VRRP) virtual routers.

delay (VRRP)

To configure the activation delay for a VRRP router, use the **delay** command in interface configuration mode. To delete the activation delay, use the **no** form of this command.

delay minimum *value* **reload** *value*
no delay

Syntax Description

minimum *value*	Sets the minimum delay in seconds for every interface up event. Range is 0 to 10000.
reload *value*	Sets the reload delay in seconds for first interface up event. Range is 0 to 10000.

Command Default

minimum *value:* 1

reload *value:* 5

Command Modes

VRRP interface configuration

Usage Guidelines

The **vrrp delay** command delays the start of the VRRP finite state machine (FSM) on an interface up event to ensure that the interface is ready to pass traffic. This ensures that there are no mistaken state changes due to loss of hello packets. The minimum delay is applied on all interface up events and the reload delay is applied on the first interface up event.

The values of zero must be explicitly configured to turn this feature off.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to configure a minimum delay of 10 seconds with a reload delay of 100 seconds:

```
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface /CPU0/0
RP/0/RP0/CPU0:router(config-vrrp-if)# delay minimum 10 reload 100
```

Related Commands

Command	Description
show vrrp	Displays a brief or detailed status of one or all Virtual Router Redundancy Protocol (VRRP) virtual routers.

hw-module vrrpscale enable

To increase the scale limit of VRRP sessions to 255, use the **hw-module vrrpscale enable** command in the global confiuration mode. You can use the **no** form of this command to disable this command.

hw-module vrrpscale enable
no hw-module vrrpscale enable

Table 82: Syntax Description

hw-module	Configures the hardware module.
vrrpscale	Configures scaling for VRRP sessions.
enable	Enables scaling of VRRP sessions.

Command Default

None.

Command Mode

Global configuration mode.

Command History

Release	Modification
Release 6.6.1	This command was introduced.

Usage Guidelines

Reload the router completely (power-cycle) after you enable or disable this command.

By default, the VRRP session scale limit is 255 each for IPv4 and IPv6 traffic in the Cisco NCS 5700 Fixed Port Routers and Cisco NCS 5500 Routers that have the Cisco NC57 Line Cards operating in native mode.

Note Reload for XR VM only does not fully apply the configuration so whole router reload is required.

Task ID	Operations
VRRP	read, write

Example

This example shows you how to increase the scale of VRRP sessions to up to 255 on a node:

```
Router# config
Router(config)# hw-module vrrpscale enable
Router(config)# commit
Router(config)# exit
Router# admin
sysadmin-vm:0_RP0# hw-module location all reload
```

interface (VRRP)

To enable VRRP interface configuration mode, use the **interface (VRRP)** command in VRRP configuration mode. To terminate VRRP interface configuration mode, use the **no** form of this command.

interface *type interface-path-id*
no interface *type interface-path-id*

Syntax Description

type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

VRRP is disabled.

Command Modes

VRRP configuration

Usage Guidelines

Use the **interface (VRRP)** command to enter VRRP interface configuration mode.

You must configure all VRRP configuration commands in VRRP interface configuration mode.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to configure VRRP and a virtual router 1 on 10-Gigabit Ethernet interface 0/3/0/0:

```
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface TenGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-vrrp-if)# vrrp 1 ipv4 192.168.18.1
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-vrrp-address-family)# vrrp 3 version 2
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
router vrrp, on page 557	Configures a VRRP redundancy process.

message state disable

To disable the task of logging the Virtual Router Redundancy Protocol (VRRP) state change events via syslog, use the **message state disable** command in the VRRP virtual router submode. To re-enable the task of logging the VRRP state change events , use the **no** form of this command.

message state disable

no message state disable

Syntax Description

This command has no keywords or arguments.

Command Default

By default, the task of logging the VRRP state change events is enabled.

Command Modes

VRRP global

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to disable the logging of VRRP state change events:

```
RP/0/RP0/CPU0:router#configure
RP/0/RP0/CPU0:router(config)#router vrrp
RP/0/RP0/CPU0:router(config-vrrp)#message state disable
RP/0/RP0/CPU0:router(config-vrrp)#
```

Related Commands

Command	Description
address (VRRP), on page 545	Sets the primary virtual IPv4 address for a virtual router.
address global, on page 546	Configures the global virtual IPv6 address for a virtual router.
accept-mode, on page 542	Disables the installation of routes for the VRRP virtual addresses.
address secondary, on page 548	Sets the secondary virtual IPv4 address for a virtual router.
address linklocal, on page 547	Sets the virtual link-local IPv6 address for a virtual router.

router vrrp

To configure Virtual Router Redundancy Protocol (VRRP), use the **router vrrp** command in XR Config mode. To remove the VRRP configuration, use the **no** form of this command.

router vrrp
no router vrrp

Command Default

This command has no keywords or arguments.

VRRP is disabled.

Command Modes

XR Config mode

Usage Guidelines

Use the **router vrrp** command to enter VRRP configuration mode.

You must configure all VRRP configuration commands in VRRP interface configuration mode.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to configure a VRRP with virtual router 1 on an interface:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-vrrp-address-family)# vrrp 3 version 2
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
interface (VRRP), on page 555	Enables VRRP interface configuration mode.

session name(vrrp)

To configure a VRRP session name, use the **session name** command in the VRRP virtual router submode. To deconfigure a VRRP session name, use the **no** form of this command.

name *name*
no name *name*

Syntax Description

name	MGO session name

Command Default

None

Command Modes

VRRP virtual router configuration

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read

Example

This example shows how to configure a VRRP session name.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface tenGigE 0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-vrrp-ipv4)# vrrp 1
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)# name s1
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
accept-mode, on page 542	Disable the installation of routes for the Virtual Router Redundancy Protocol (VRRP) virtual addresses.

show vrrp

To display a brief or detailed status of one or all Virtual Router Redundancy Protocol (VRRP) virtual routers, use the **show vrrp** command in XR EXEC mode.

show vrrp [{**ipv4** | **ipv6**}] [**interface** *type interface-path-id*] [{**brief** | **detail** | **statistics** [**all**]}]

Syntax Description

ipv4	(Optional) Displays the IPv4 information.
ipv6	(Optional) Displays the IPv6 information.
interface	(Optional) Displays the status of the virtual router interface.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
brief	(Optional) Provides a summary view of the virtual router information.
detail	(Optional) Displays detailed running state information.
statistics	(Optional) Displays total statistics.
all	(Optional) Displays statistics for each virtual router.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 7.11.1	This command was modified. The fields **Mcast packet in Ucast mode**, **IPv4 Unicast Peer**, and **IPv4 Unicast Peer** were added.

Usage Guidelines

If no interface is specified, all virtual routers on all interfaces are displayed. If no vrid is specified, all vrids on the given interface are displayed.

Task ID

Task ID	Operations
vrrp	read

Examples

The following sample output is from the **show vrrp** command:

```
Router# show vrrp

                    A indicates IP address owner
                    | P indicates configured to preempt
                    | |
Interface   vrID Prio A P State    Master addr     VRouter addr
Te0/3/0/0      1  100   P Init     unknown         192.168.18.10
Te0/3/0/2      7  100   P Init     unknown         192.168.19.1
```

This table describes the significant fields shown in the display.

Table 83: show vrrp Command Field Descriptions

Field	Description
Interface	Interface of the virtual router.
vrID	ID of the virtual router.
Prio	Priority of the virtual router.
A	Indicates whether the VRRP router is the IP address owner.
P	Indicates whether the VRRP router is configured to preempt (default).
State	State of the virtual router.
Master addr	IP address of the IP address owner router.
VRouter addr	Virtual router IP address of the virtual router.

The following sample output is from the **show vrrp** command with the **detail** keyword:

```
Router# show vrrp detail
Fri Sep  8 15:02:35.268 IST
GigabitEthernet0/0/0/0 - IPv4 vrID 1
  State is Master
    2 state changes, last state change 04:00:02
    State change history:
    Sep  8 11:02:29.518 IST  Init     -> Backup   Virtual IP configured
    Sep  8 11:02:33.127 IST  Backup   -> Master   Master down timer expired
  Last resign sent:     Never
  Last resign received: Never
  Virtual IP address is 10.0.0.100
  Virtual MAC address is 0000.5E00.0101, state is active
  Master router is local
  Version is 2
  Advertise time 1 secs
    Master Down Timer 3.609 (3 x 1 + (156 x 1/256))
  Minimum delay 1 sec, reload delay 5 sec
  Current priority 100
    Configured priority 100, may preempt
      minimum delay 0 secs
  IPv4 Unicast Peer: 10.0.1.1 --> IPv4 unicast transport is enabled on VRRP.

GigabitEthernet0/0/0/0 - IPv6 vrID 2
  State is Init
    0 state changes, last state change never
    State change history:
  Last resign sent:     Never
  Last resign received: Never
  Virtual IP address is ::
  Virtual MAC address is 0000.5E00.0202, state is stored
  Master router is unknown
  Version is 3
  Advertise time 1 secs
    Master Down Timer 3.609 (3 x 1 + (156 x 1/256))
  Minimum delay 1 sec, reload delay 5 sec
  Current priority 100
    Configured priority 100, may preempt
      minimum delay 0 secs
  IPv6 Unicast Peer: FE80::260:3EFF:FE11:6770 --> IPv6 unicast transport is enabled on VRRP.
```

This table describes the significant fields shown in the displays.

Table 84: show vrrp detail Command Field Descriptions

Field	Description
0/3/0/0 - vrID 1	Interface type and number, and VRRP group number.
State is	Role this interface plays within VRRP (IP address owner router or backup router).
Virtual IP address is	Virtual IP address for this virtual router.
Virtual MAC address is	Virtual MAC address for this virtual router.
Master router is	Location of the IP address owner router.

Field	Description
Advertise time	Interval (in seconds) at which the router sends VRRP advertisements when it is the IP address owner virtual router. This value is configured with the **vrrp timer** command.
Master Down Timer	Time the backup router waits for the IP address owner router advertisements before assuming the role of IP address owner router.
Minimum delay	Time that the state machine start-up is delayed when an interface comes up, giving the network time to settle. The minimum delay is the delay that is applied after any subsequent interface up event (if the interface flaps) and the reload delay is the delay applied after the first interface up event.
Current priority	Priority of the virtual router.
Configured priority	Priority configured on the virtual router.
may preempt	Indication of whether preemption is enabled or disabled.
minimum delay	Delay time before preemption (default) occurs.
Tracked items	Section indicating the items being tracked by the VRRP router.
Interface	Interface being tracked.
State	State of the tracked interface.
Priority Decrement	Priority to decrement from the VRRP priority when the interface is down.
IPv4 Unicast Peer	IPv4 address of the unicast peer.
IPv6 Unicast Peer	IPv6 address of the unicast peer.

The following sample output is from the **show vrrp** command with the **statistics** .

```
show vrrp statistics
Fri Sep  8 15:03:03.521 IST
Invalid packets:
  Invalid checksum:                     0
  Unknown/unsupported versions:         0
  Invalid vrID:                         0
  Too short:                            0
Protocol:
  Transitions to Master                 1
Packets:
  Total received:                       0
  Adverts sent:                     14476
  Bad TTL:                              0
  Short Packets:                        0
  Failed authentication:                0
  Unknown authentication:               0
  Conflicting authentication:           0
  Unknown Type field:                   0
  Conflicting Advertise time:           0
  Conflicting Addresses:                0
  Received with zero priority:          0
  Sent with zero priority:              0
  Mcast packet in Ucast mode:           0
```

This table describes the significant fields shown in the displays.

Table 85: show vrrp statistics Command Field Descriptions

Field	Description
Invalid packets	Number of invalid packets.
Invalid checksum	Number of packets with checksum errors.
Unknown/unsupported versions	Number of packets with unknown/unsupported versions.
Invalid vrID	Number of packets with invalid VRRP ID
Too short	Number of packets that are too short.
Protocol	Role of the VRRP routers.
Transitions to Master	Number of VRRP routers that have taken over the master.
Packets	Number of packets received.
Total received	Cumulative number of packets received.
Adverts sent	Number of times the router has advertised its VRRP status.
Bad TTL	Number of packets with incorrect Time-to-Live values.
Short Packets	Number of packets with a size shorter than expected.
Failed authentication	Number of packets that failed authentication during VRRP operation.
Unknown authentication	Number of packets that failed authentication because the authentication was not recognized.
Conflicting authentication	Number of packets that failed authentication due to conflicts.
Conflicting IP addresses	Number of packets where conflicting IP addresses are detected within the VRRP configuration.
Received with zero priority	Number of packets received with zero priority.
Sent with zero priority	Number of packets sent by a VRRP router with a priority of zero.
Mcast packet in Ucast mode	Number of multicast packets received in a specific VRRP instance when it's configured to function in unicast mode.

The following sample output is from the **show vrrp** command with the **interface** for Ethernet interface 0/3/0/0:

```
Router# show vrrp interface Ethernet0/3/0/0

                     A indicates IP address owner
                     | P indicates configured to preempt
                     | |
Interface   vrID Prio A P State    Master addr     VRouter addr
```

```
Te0/3/0/0       1  100   P Init     unknown         192.168.10.20
Te0/3/0/2       7  100   P Init     unknown         192.168.20.0
```

vrrp slave follow

To instruct the subordinate group to inherit its state from a specified group, use the **vrrp slave follow** command in VRRP slave submode.

follow *mgo-session-name*

Syntax Description

mgo-session-name	Name of the MGO session from which the subordinate group will inherit the state.

Command Default

None

Command Modes

VRRP slave submode configuration

Command History

Release	Modification
Release 6.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to instruct the subordinate group to inherit its state from a specified group.

```
Router# configure
Router(config)# router vrrp
Router(config-vrrp)# interface tenGigE 0/4/0/4
Router(config-vrrp-if)# address-family ipv4
Router(config-vrrp-address-family)# vrrp 2 slave
Router(config-vrrp-slave)# follow m1
```

Note Before configuring a subordinate group to inherit its state from a specified group, the group must be configured with the **session name** command on another vrrp group.

Related Commands

Command	Description
accept-mode, on page 542	Disable the installation of routes for the Virtual Router Redundancy Protocol (VRRP) virtual addresses.

subordinate primary virtual IPv4 address(vrrp)

To configure the primary virtual IPv4 address for the subordinate group, use the **subordinate primary virtual IPv4 address** command in the VRRP slave submode.

address *ip-address*

Syntax Description

ip-address	IP address of the Hot Standby router interface.

Command Default

None

Command Modes

VRRP slave submode configuration

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to configure the primary virtual IPv4 address for the subordinate group.

```
Router# configure
Router(config)# router vrrp
Router(config-vrrp)# interface tenGigE 0/4/0/4
Router(config-vrrp-if)# address-family ipv4
Router(config-vrrp-address-family)# vrrp 2 slave
Router(config-vrrp-slave)# address 192.168.10.4
```

Related Commands

Command	Description
accept-mode, on page 542	Disable the installation of routes for the Virtual Router Redundancy Protocol (VRRP) virtual addresses.

subordinate secondary virtual IPv4 address(vrrp)

To configure the secondary virtual IPv4 address for the subordinate group, use the **subordinate secondary virtual IPv4 address** command in the VRRP slave submode.

address *ip-address* **secondary**

Syntax Description

ip-address	IP address of the Hot Standby router interface.
secondary	Sets the secondary hot standby IP address.

Command Default

None

Command Modes

VRRP slave submode configuration

Usage Guidelines

Before configuring secondary virtual IPv4 address, the primary virtual IPv4 address for the subordinate group must be configured.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to configure the secondary virtual IPv4 address for the subordinate group.

```
Router# configure
Router(config)# router vrrp
Router(config-vrrp)# interface tenGigE 0/4/0/4
Router(config-vrrp-if)# address-family ipv4
Router(config-vrrp-address-family)# vrrp 2 slave
Router(config-vrrp-slave)# address 192.168.10.4 secondary
```

Related Commands

Command	Description
accept-mode, on page 542	Disable the installation of routes for the Virtual Router Redundancy Protocol (VRRP) virtual addresses.

snmp-server traps vrrp events

To enable the Simple Network Management Protocol (SNMP) server notifications (traps) available for VRRP, use the **snmp-server traps vrrp events command** in XR Config mode. To disable all available VRRP SNMP notifications, use the **no** form of this command.

snmp-server traps vrrp events
no snmp-server traps vrrp events

Syntax Description

events	Specifies all VRRP SNMP server traps.

Command Default

None

Command Modes

XR Config mode

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
snmp	read, write

Examples

The following example shows how to enable snmpserver notifications for VRRP:

```
RP/0/RP0/CPU0:routerrouter(config)# snmp-server traps vrrp events
```

track object(vrrp)

To enable tracking of a named object with the specified decrement, use the **track object** command in VRRP virtual router submode. To remove the tracking, use the **no** form of this command.

track object *name*[*priority-decrement*]
no track object *name*[*priority-decrement*]

Syntax Description

object *name*	Object tracking. Name of the object to be tracked.
priority-decrement	(Optional) Amount by which the VRRP priority for the router is decremented when the interface goes down (or comes back up). Range is 1 to 255.

Command Default

The default priority-decrement is 10.

Command Modes

VRRP virtual router configuration

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

This example shows how to configure object tracking under the VRRP virtual router submode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface tenGigE 0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-vrrp-ipv4)# vrrp 1
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)# track object t1 2
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
accept-mode, on page 542	Disable the installation of routes for the Virtual Router Redundancy Protocol (VRRP) virtual addresses.

unicast-peer

To enable IPv4 and IPv6 layer 3 unicast transport on Virtual Router Redundancy Protocol (VRRP), use the command in VRRP virtual router submode. To disable unicast transport, use the **no** form of this command.

unicast-peer { *ipv4-address* | *ipv6-link-local-addres* }

Syntax Description

ipv4-address	IPv4 address
ipv6-link-local-address	IPv6 link-local address

Command Default

VRRP transmits multicast traffic.

Command Modes

VRRP virtual router configuration

Command History

Release	Modification
Release 7.11.1	This command was introduced.

Usage Guidelines

You can configure the unicast-peer command only once, allowing for the participation of only two physical routers in a unicast VRRP session.

When you configure the unicast-peer command, the router neither sends nor receives multicast packets

Task ID

Task ID	Operation
vrrp	read,write

Example

This example shows how to configure IPv4 Layer 3 unicast transport on VRRP.

```
Router(config)# router vrrp
Router(config-vrrp)# interface GigabitEthernet0/0/0/0
Router(config-vrrp-if)# address-family ipv4
Router(config-vrrp-address-family)# vrrp 1

Router(config-vrrp-virtual-router)# address 10.0.1.100

Router(config-vrrp-virtual-router)# unicast-peer 10.0.1.1
```

This example shows how to configure IPv6 Layer 3 unicast transport on VRRP.

```
Router(config)# router vrrp
Router(config-vrrp)# interface GigabitEthernet0/0/0/0
Router(config-vrrp-if)# address-family ipv6
Router(config-vrrp-address-family)# vrrp 2

Router(config-vrrp-virtual-router)# unicast-peer FE80::260:3EFF:FE11:6770
```

vrrp

To enable Virtual Router Redundancy Protocol (VRRP) virtual router mode, use the **vrrp** command in address-family mode. To terminate VRRP virtual router mode, use the **no** form of this command.

vrrp *vrid* **version** *version-no*
novrrp *vrid* **version** *version-no*

Syntax Description

vrid	(Optional) Virtual router identifier, which is the number identifying the virtual router for which status is displayed. The virtual router identifier is configured with the vrrp ipv4 command. Range is 1 to 255.
version *version-no*	The VRRP version number. Range is 2-3. **Note** The **version** keyword is available only for the ipv4 address family. By default, version is set to 3 for IPv6 address families.

Command Default

None.

Command Modes

address-family

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
vrrp	read, write

Example

The following example shows how to enable VRRP virtual router mode:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/4/0/4
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-vrrp-address-family)# vrrp 3 version 2
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)#
```

Related Commands

Command	Description
interface (VRRP), on page 555	Enables VRRP interface configuration mode.

vrrp preempt

VRRP preempt is enabled by default. This means, a VRRP router with higher priority than the current IP address owner router will take over as new IP address owner router. To disable this feature, use the **preempt disable** command. To delay preemption, so that the higher priority router waits for a period of time before taking over, use the **preempt delay** command. To restore the default behavior (preempt enabled with no delay), use the **no** form of the command.

preempt {**delay** *seconds* | **disable**}
no preempt {**delay** *seconds* | **disable**}

Syntax Description

delay *seconds*	Specifies the number of seconds the router delays before issuing an advertisement claiming virtual IP address ownership to be the IP address owner router. Range is 1 to 3600 seconds (1 hour).
disable	Disables preemption

Command Default

VRRP preempt is enabled.

seconds : 0 (no delay)

Command Modes

VRRP virtual router

Usage Guidelines

, can configure a delay, which causes the VRRP router to wait the specified number of seconds before issuing an advertisement claiming virtual IP address ownership to be the IP address owner router.

Note The router that is the virtual IP address owner preempts, regardless of the setting of this command.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to configure the router to preempt the current IP address owner router when its priority of 200 is higher than that of the current IP address owner router. If the router preempts the current IP address owner router, it waits 15 seconds before issuing an advertisement claiming that it is the new IP address owner router.

```
Router(config)# router vrrp
Router(config-vrrp)# interface  0/3/0/0
Router(config-vrrp-if)# address-family ipv4
Router(config-vrrp-address-family)# vrrp 1 version 3
Router(config-vrrp-virtual-router)# preempt delay 15
Router(config-vrrp-virtual-router)# priority 200
```

Related Commands

Command	Description
vrrp priority, on page 571	Sets the priority of the virtual router.

vrrp priority

To set the priority of the virtual router, use the **priority** command in VRRP virtual router submode. To remove the priority of the virtual router, use the **no** form of this command.

priority *priority*
nopriority *priority*

Syntax Description

priority	Priority of the virtual router. Range is 1 to 254.

Command Default

priority : 100

Command Modes

VRRP virtual router

Usage Guidelines

Use this command to control which router becomes the IP address owner router. This command is ignored while the router is the virtual IP address owner.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to configure the router with a priority of 254:

```
Router(config)# router vrrp
Router(config-vrrp)# interface  0/3/0/0
Router(config-vrrp-if)# address-family ipv4
Router(config-vrrp-address-family)# vrrp 1 version 3
Router(config-vrrp-virtual router)# priority 254
```

Related Commands

Command	Description
vrrp preempt, on page 570	

vrrp text-authentication

To configure the simple text authentication used for Virtual Router Redundancy Protocol (VRRP) packets received from other routers running VRRP, use the **text-authentication** command in VRRP virtual router submode. To disable VRRP authentication, use the **no** form of this command.

text-authentication *string*
no text-authentication [*string*]

Syntax Description

string	Authentication string (up to eight alphanumeric characters) used to validate incoming VRRP packets.

Command Default

No authentication of VRRP messages occurs.

Command Modes

VRRP virtual router

Usage Guidelines

When a VRRP packet arrives from another router in the VRRP group, its authentication string is compared to the string configured on the local system. If the strings match, the message is accepted. If they do not match, the packet is discarded.

All routers within the group must be configured with the same authentication string.

Note Plain text authentication is not meant to be used for security. It simply provides a way to prevent a misconfigured router from participating in VRRP.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to configure an authentication string of x30dn78k:

```
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/3/0/0
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
```

```
RP/0/RP0/CPU0:router(config-vrrp-address-family)# vrrp 1 version 2
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)# text-authentication x30dn78k
```

Note Text authentication is only valid for VRRP version 2 routers.

vrrp timer

To configure the interval between successive advertisements by the IP address owner router in a Virtual Router Redundancy Protocol (VRRP) virtual router, use the **timer** command in VRRP virtual router submode. To restore the default value, use the **no** form of this command.

timer [**msec**] *interval* [**force**]
no timer [**msec**] *interval* [**force**]

Syntax Description

msec	(Optional) Changes the unit of the advertisement time from seconds to milliseconds. Without this keyword, the advertisement interval is in seconds. Range is 20 to 3000 milliseconds.
interval	Time interval between successive advertisements by the IP address owner router. The unit of the interval is in seconds, unless the **msec** keyword is specified. Range is 1 to 255 seconds.
force	(Optional) Forces the configured value to be used. This keyword is required if milliseconds is specified.

Command Default

interval:1 second

Command Modes

VRRP virtual router

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
vrrp	read, write

Examples

The following example shows how to configure the IP address owner router to send advertisements every 4 seconds:

```
Router(config)# router vrrp
Router(config-vrrp)# interface  0/3/0/0
Router(config-vrrp-if)# address-family ipv4
Router(config-vrrp-address-family)# vrrp 1 version 3
Router(config-vrrp-virtual-router)# timer 4
```

vrrp track interface

To configure the Virtual Router Redundancy Protocol (VRRP) to track an interface, use the **track interface** command in VRRP virtual router submode. To disable the tracking, use the **no** form of this command.

track interface *type interface-path-id* [*priority-decrement*]
no track interface *type interface-path-id* [*priority-decrement*]

Syntax Description

vrid	Virtual router identifier, which is the number identifying the virtual router to which tracking applies.
type	Interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.
priority-decrement	(Optional) Amount by which the priority for the router is decremented (or incremented) when the tracked interface goes down (or comes back up). Decrements can be set to any value between 1 and 254. Default value is 10.

Command Default

The default decrement value is 10. Range is 1 to 254.

Command Modes

VRRP virtual router

Usage Guidelines

The **vrrp track interface** command ties the priority of the router to the availability of its interfaces. It is useful for tracking interfaces that are not configured for VRRP. Only IP interfaces are tracked. A tracked interface is up if IP on that interface is up. Otherwise, the tracked interface is down.

You can configure VRRP to track an interface that can alter the priority level of a virtual router for a VRRP virtual router. When the IP protocol state of an interface goes down or the interface has been removed from the router, the priority of the backup virtual router is decremented by the value specified in the *priority-decrement* argument. When the IP protocol state on the interface returns to the up state, the priority is restored.

Task ID

Task ID	Operations
vrrp	read, write

Examples

In the following example, 10-Gigabit Ethernet interface 0/3/0/0 tracks interface 0/3/0/3 and 0/3/0/2. If one or both of these two interfaces go down, the priority of the router decreases by 10 (default priority decrement) for each interface. The default priority decrement is changed using the *priority-decrement* argument. In this example, because the default priority of the virtual router is

100, the priority becomes 90 when one of the tracked interfaces goes down and the priority becomes 80 when both go down. See the **priority** command for details on setting the priority of the virtual router.

```
RP/0/RP0/CPU0:router(config)# router vrrp
RP/0/RP0/CPU0:router(config-vrrp)# interface  0/3/0/0
RP/0/RP0/CPU0:router(config-vrrp-if)# address-family ipv4
RP/0/RP0/CPU0:router(config-vrrp-address-family)# vrrp 1 version 3
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)# track interface  0/3/0/3
RP/0/RP0/CPU0:router(config-vrrp-virtual-router)# track interface  0/3/0/2
```

Related Commands

Command	Description
vrrp priority, on page 571	Sets the priority of the virtual router.