Interface and Hardware Component Command Reference for Cisco 8000 Series Routers

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CONTENTS

Preface

This command reference describes the Cisco IOS XR Interfaces commands. The preface for the *Interface and Hardware Component Command Reference for Cisco 8000 Series Routers* contains the following sections:

Changes to This Document

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

Table 1: Changes to This Document

Date	Summary
March 2020	Initial release of this document.
August 2020	Republished for Release 7.0.14
October 2020	Republished for Release 7.2.12
February 2021	Republished for Release 7.3.1
July 2021	Republished for Release 7.3.15
October 2021	Republished for Release 7.3.2
November 2021	Republished for Release 7.5.1
September 2022	Republished for Release 7.5.3
November 2022	Republished for Release 7.8.1
March 2023	Republished for Release 7.5.4
April 2023	Republished for Release 7.9.1
August 2023	Republished for Release 7.3.5
August 2023	Republished for Release 7.10.1

Date	Summary
March 2024	Republished for Release 24.1.1
April 2024	Republished for Release 7.3.6
June 2024	Republished for Release 24.2.11
September 2024	Republished for Release 24.3.1

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Optics Commands

This module describes the command line interface (CLI) commands for configuring Optics on the Cisco 8000 Series Routers.

Not all commands are supported on both coherent and non-coherent optical modules. Also, the supported keywords of a command vary based on the type of the optical module (coherent or non-coherent).

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

controller coherentDSP

To configure the coherent DSP controller, use the **controller coherentDSP** command in the Coherent DSP controller configuration mode.

controller coherentDSP *R/S/I/P* [**description** *description* | **perf-mon** { **enable** | **disable** } | **pm** { **30-sec** |**15-min** |**24-hour** } { **fec** } { **report** | **threshold** } *value* | **secondary-admin-state** { **maintenance** | **normal** } **loopback** { **internal** | **line** }]

Syntax Description

R/S/I/P	Rack/Slot/Instance/Port of the coherent DSP controller.
description *description*	Description of the coherent DSP controller.
perf-mon {**enable** | **disable**}	Enables or disables performance monitoring.
pm {**30-sec** |**15-min** |**24-hour**} {**fec**} {**report** | **threshold**} *value*	Configures performance monitoring parameters for 30-second,15-minute, or 24-hour intervals. The **fec** keyword configures FEC PM data in 30-second, 15-minute, or 24-hour intervals. The **report** keyword configures threshold crossing alerts (TCA) reporting status for the PM parameters. The **threshold** keyword configures threshold values for the PM parameters. The PM parameters that can be configured are: • Inst-Q-margin (Instantaneous Q margin) • Q threshold • Q-margin • ec-bits (error corrected bits) • post-FEC BER • pre-FEC BER • uc-words (uncorrected words)
secondary-admin-state	Configures the administrative state of the controller. The states are maintenance or normal.
loopback {**internal** | **line**}	Configures the internal or line loopback mode on the controller.

Command Default

None.

Command Modes

Coherent DSP controller configuration

Command History

Release	Modification
Release 7.3.1.5	This command was introduced.

Usage Guidelines

Line loopback mode is supported only on Cisco 8000 series line cards and fixed-port routers based on Q100 and Q200 silicon.

Example

The following example shows how to enable line loopback configuration on coherent DSP controllers:

```
Router#config
Router(config)#controller coherentDSP 0/0/0/4
Router(config-CoDSP)#secondary-admin-state maintenance
Router(config-CoDSP)#loopback line
Router(config-CoDSP)#commit
```

controller optics

To configure the optics controller, use the **controller optics** command in the optics controller configuration mode.

controller optics *R/S/I/P* [**DAC-Rate** *rate* | **[no] breakout** *muxponder-mode* | **cd-max** *cd-max* | **cd-min** *cd-min* | **cd-low-threshold** *cd-low* | **cd-high-threshold** *cd-high* | **dgd-high-threshold** *dgd-value* | **dwdm-carrier** *channel-grid* | **lbc-high-threshold** *lbc-value* | **modulation** *modulation-type* | **osnr-low-threshold** *osnr-value* **description** *description* | **fec** *fec-mode* | **sec-admin-state {maintenance | normal}** | **shutdown** | **transmit-power** *transmit-power* | **[no] transceiver disable** | **perf-mon** { **enable** | **disable** } | **host** { **auto-squelch** } { **disable** } | **pm** { **30-sec |15-min | 24-hour** } { **optics** } { **report | threshold** } *pm-parameter value* | **loopback line** | **loopback internal** | **host loopback line** | **host loopback internal** | **host fec-threshold** { **excess-degrade** { **raise** | **clear** } *threshold-value* | **detected-degrade** { **raise** | **clear** } *threshold-value* } | **media fec-threshold** { **excess-degrade** { **raise** | **clear** } *threshold-value* | **detected-degrade** { **raise** | **clear** } *threshold-value* } | **media link-down prefec-degrade**]

Syntax Description

R/S/I/P	Rack/Slot/Instance/Port of the optics controller.
DAC-Rate *rate*	Sets the DAC (digital to analog conversion) sampling rate for this controller. The sampling rate options available are: • 1x1 • 1x1.25
breakout *muxponder mode*	Configures the muxponder mode for this controller. Muxponder mode options available are: • 4x100 • 3x100 • 2x100 • 1x100 Release 7.3.15 supports only 4x100 muxponder mode. The **no** form of this command switches the optics controller from the muxponder mode to the transponder mode.
cd-max *cd-max*	(Only for trunk optics controllers) Maximum chromatic dispersion. For QDD-400G-ZR-S optical module, the range is 0 to +2400. For QDD-400G-ZRP-S optical module: (Release 7.3.1) The range is 0 to +80000 ps/nm. (Release 7.3.2 onwards) The range is 0 to +160000 ps/nm.

cd-min *cd-min*	(Only for trunk optics controllers) Minimum chromatic dispersion. For QDD-400G-ZR-S optical module, the range is -2400 to 0. For QDD-400G-ZRP-S optical module: (Release 7.3.1) The range is -80000 to 0 ps/nm. (Release 7.3.2 onwards) The range is -160000 to 0 ps/nm.
cd-low-threshold *cd-low*	(Only for trunk optics controllers) Minimum acceptable chromatic dispersion value. The CD alarm is raised if the chromatic dispersion goes below this value. This is an alarm threshold parameter. For QDD-400G-ZR-S optical module, the range is -2400 to 0. For QDD-400G-ZRP-S optical module: (Release 7.3.1) The range is -80000 to 0 ps/nm. (Release 7.3.2 onwards) The range is 0 to +160000 ps/nm.
cd-high-threshold *cd-high*	(Only for trunk optics controllers) Maximum acceptable chromatic dispersion value. The CD alarm is raised if the chromatic dispersion exceeds this value. This is an alarm threshold parameter. For QDD-400G-ZR-S optical module, the range is 0 to +2400. For QDD-400G-ZRP-S optical module: (Release 7.3.1) The range is 0 to +80000 ps/nm. (Release 7.3.2 onwards) The range is -160000 to 0 ps/nm.
dgd-high-threshold *dgd-value*	(Only for trunk optics controllers) Configures the maximum acceptable Differential Group Delay (DGD) value. The DGD alarm is raised if DGD exceeds this value. This is an alarm threshold parameter. The range is 0 to 18000 (in the units of 0.01 ps).
dwdm-carrier *channel-grid*	Configures the DWDM carrier channel. Options are: • 100MHz-grid • 50GHz-grid
lbc-high-threshold *lbc-value*	Configures the high laser bias current threshold. This is an alarm threshold parameter. The range is 0 to 100%
modulation *modulation-type*	Configures the modulation type. Options are: • 16Qam • 8Qam • Qpsk Release 7.3.15 supports only 16QAM.

osnr-low-threshold *osnr-value*	(Only for trunk optics controllers) Configures the minimum acceptable Optical Signal-to-Noise ratio (OSNR) value. The OSNR alarm is raised if OSNR goes below this value. This is an alarm threshold parameter. The range is 0 to 4000 (in units of 0.01db).
description *description*	Description of the optics controller.
[no] transceiver disable	Enables or disables the transceiver module. The transceiver is enabled by default.
fec *fec-mode*	Configures Forward Error Correction (FEC) modes.
sec-admin-state	Configures the administrative state of the controller. The values are maintenance or normal.
shutdown	Disables the configuration of the controller.
host { **auto-squelch** } { **disable** }	Disable squelch for host.
pm { **30-sec |15-min |24-hour** } { **optics** } { **report | threshold** } *pm-parameter value*	Configures performance monitoring parameters for 30-second, 15-minute, and 24-hour intervals. The **report** keyword configures threshold crossing alerts (TCA) reporting status for the PM parameters. The **threshold** keyword configures threshold values for the PM parameters. The PM parameters that can be configured are: • cd (chromatic dispersion) • dgd (differential group delay) • low-freq-off (low signal frequency offset) • opr (optical power RX) • osnr (optical signal-to-noise ratio) • pcr (polarization change rate) • pdl (polarization dependent loss) • rx-sig (receiving signal power) • snr (signal-to-noise ratio) • sopmd (second order polarization mode dispersion)
transmit-power *transmit-power*	(Only for trunk optics controllers) Configures the transmit power. The range is -190 to 50 dBm (in the units of 0.1 dBm).
perf-mon { **enable** | **disable** }	Enables or disables performance monitoring.
loopback line	Configures line loopback on the optical module.

loopback internal	Configures internal loopback on the optical module.
host loopback line	Configures host line loopback on the optical module.
host loopback internal	Configures host internal loopback on the optical module.
host fec-threshold excess-degrade raise *threshold-value*	Configures the raise threshold value for FEC excessive degrade (FED) alarm on the host-side of the optical module. Range is 1 to 2046000000000000000.
media fec-threshold excess-degrade raise *threshold-value*	Configures the raise threshold value for FED alarm on the media-side of the optical module. Range is 1 to 2046000000000000000.
host fec-threshold excess-degrade clear *threshold-value*	Configures the clear threshold value for FED alarm on the host-side of the optical module. Range is 1 to 2046000000000000000.
media fec-threshold excess-degrade clear *threshold-value*	Configures the clear threshold value for FED alarm on the media-side of the optical module. Range is 1 to 2046000000000000000.
host fec-threshold detected-degrade raise *threshold-value*	Configures the raise threshold value for FEC detected-degrade (FDD) alarm on the host-side of the optical module. Range is 1 to 2046000000000000000.
media fec-threshold detected-degrade raise *threshold-value*	Configures the raise threshold value for FDD alarm on the media-side of the optical module. Range is 1 to 2046000000000000000.
host fec-threshold detected-degrade clear *threshold-value*	Configures the clear threshold value for FDD alarm on the host-side of the optical module. Range is 1 to 2046000000000000000.
media fec-threshold detected-degrade clear *threshold-value*	Configures the clear threshold value for FDD alarm on the media-side of the optical module. Range is 1 to 2046000000000000000.
media link-down prefec-degrade	Enables link-down and prefec degrade mode when the BER counter crosses the threshold value.

Command Default

Table 2: Default Traffic Configuration Values for supported Optical Modules

	QDD-400G-ZR-S	QDD-400G-ZRP-S	DP04QSDD-HE0	DP04QSDD-ER1	DP01QSDD-ZF1
Client Speed	400G (400GAUI-8)	400G (400GAUI-8)	400G GAUI8	400G GAUI-8	100G GAUI2
Trunk Speed	400G	400G	400G	400G	100G

	QDD-400G-ZR-S	QDD-400G-ZRP-S	DP04QSDD-HE0	DP04QSDD-ER1	DP01QSDD-ZF1
Frequency	193.10THz	193.10THz	193.10THz	193.10THz	193.10THz
FEC	cFEC	oFEC	oFEC	oFEC	oFEC
Modulation	16QAM	16QAM	16QAM	16QAM	QPSK
DAC-Rate	1x1	1x1.25	1x1.25	1x1	1x1.25
Chromatic Dispersion (CD)	+/-2400	+/-26000	+/-26000	+/-2400	+/-2400
Transmitted (Tx) Power	-10.00 dBm	-10.00 dBm	+1dBm	-9dBm	-5dBm

For FDD and FED alarms, the default **raise** and **clear threshold value** for both media and host side of the optics controller is as follows:

Table 3: Default Raise and Clear Threshold Value for FDD and FED Alarms

Threshold	FDD	FED
Raise	**9,00E-05**	**2,40E-04**
Clear	**9,00E-06**	**2,40E-05**

Command History

Release	Modification
Release 7.3.1.5	This command was introduced.
Release 7.11.1	The **loopback line**, **loopback internal**, **host loopback line**, and **host loopback internal** keywords were introduced.
Release 7.11.1	The **host auto-squelch disable** keyword was introduced.
Release 24.1.1	The following keywords were introduced: • **host fec-threshold excess-degrade raise** • **media fec-threshold excess-degrade raise** • **host fec-threshold excess-degrade clear** • **media fec-threshold excess-degrade clear** • **host fec-threshold detected-degrade raise** • **media fec-threshold detected-degrade raise** • **host fec-threshold detected-degrade clear** • **media fec-threshold detected-degrade clear**

Release	Modification
Release 24.1.1	Extended Support for DP04QSDD-HE0 optical module.
Release 24.3.1	• The **media link-down prefec-degrade** keyword was introduced. • Added support for DP04QSDD-ER1 and DP01QSDD-ZF1 optical modules.

Command Modes

Optics controller configuration

Usage Guidelines

The configurations for chromatic dispersion , cd-low-threshold, and cd-high-threshold) must be performed only after the **hw-module** configuration. These configurations must be removed before the **no hw-module** configuration. Default values are set to optimize the power consumption by Cisco 400G Digital Coherent QSFP-DD optical modules.

For FDD and FED alarms, the **raise threshold value** must always be greater than the **clear threshold value**. Also, the **raise** or **clear threshold value** of FED alarm must always be greater than the **raise or clear threshold value** of the FDD alarm. While the router configuration permits a range of 1 to 18446744073709551615, the router only supports a range of 1 to 2046000000000000000.

Example

The following example shows how to configure the optics controller and set the ranges for chromatic dispersion:

```
Router#configure
Router(config)#controller optics 0/0/1/1
Router(config-optics)#cd-max 2000
Router(config-optics)#cd-min -2000
Router(config)#commit
```

The following is a sample in which the performance monitoring parameters of optics controller are configured in 24-hour intervals:

```
Router#configure
Router(config)#controller optics 0/0/1/1
Router(config-optics)#perf-mon enable
Router(config-optics)#pm 24-hour optics threshold osnr max 345
Router(config)#commit
```

The following is a sample in which line loopback is configured on the optical module :

```
Router#configure
Router(config)#controller optics 0/0/0/9
Router(config-Optics)#sec-admin-state maintenance
Router(config-Optics)#loopback line
Loopback is a traffic-affecting operation
Router(config-Optics)#commit
Router(config)#end
```

This example shows how to configure FDD clear and raise alarm threshold on the host side of the optics controller:

```
Router#config
Router(config)#controller optics 0/0/0/10
Router(config-Optics)#host fec-threshold detected-degrade clear 12000
Router(config-Optics)#host fec-threshold detected-degrade raise 22000
```

```
Router(config-Optics)#commit
Router(config-Optics)#end
```

This example shows how to enable Media Link-down PreFEC Degrade support on the media side of the optics controller:

```
Router#config
Router(config)#controller optics 0/0/0/10
Router(config-Optics)#media link-down prefec-degrade
Router(config-Optics)#commit
Router(config-Optics)#end
```

interface CEM (PLE)

To specify or create a CEM interface and enter interface configuration mode, use the **interface CEM** command in XR Config mode.

interface CEM *interface-path-id* { **l2transport** | **service-policy** [**input** | **output**] *policy-map-name* | **cem** [**class-attach** | **clock** | **dummy pattern** *pattern-id* | **endpoint** | **idle pattern** *pattern-id* | **payload** *bytes* [**dejitter** *microseconds* | **best-match**]] }

no interface CEM *interface-path-id* { **l2transport** | **service-policy** [**input** | **output**] *policy-map-name* | **cem** [**class-attach** | **clock** | **dummy pattern** *pattern-id* | **endpoint** | **idle pattern** *pattern-id* | **payload** *bytes* [**dejitter** *microseconds* | **best-match**]] }

Syntax Description

CEM	Specifies or creates a CEM interface.
l2transport	Specifies Layer 2 transport for the CEM interface.
service-policy [**input** | **output**] *policy-map-name*	Enables a service policy on the CEM interface
interface-path-id	Physical 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.
class-attach	Specifies to attach a CEM class to the interface.
clock	Specifies clocks on this CEM interface
dummy	Specifies dummy frame parameters.
endpoint	Specifies endpoint parameters.
idle	Specifies idle frame parameters.
pattern	Specifies bit pattern for idle frames.
payload	Specifies payload size of CEM frames.
bytes	Specifies payload size in bytes. The value range is from 32 to1472.
dejitter	Specifies dejitter buffer length of CEM frames.
microseconds	Specifies dejitter buffer length. The value is from 1 to 500000 microseconds.
best-match	Specifies payload to best suitable value for given dejitter buffer length.
endpoint	Specifies endpoint parameters.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.11.1	This command was introduced.

Usage Guidelines

To specify a physical interface, the notation for the *interface-path-id* is *rack*/*slot*/*instance*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the line card.
- *instance*: Instance number. Always 0.
- *port*: Physical port number of the CEM interface. The supported port is 0 or 1.

The *interface-path-id* is *rack*/*slot*/*instance*/*port*. The slash between values is required as part of the notation.

This example shows how to enter interface configuration mode for a CEM interface:

```
RP/0/RP0/CPU0:ios(config)#interface CEM0/0/0/0
RP/0/RP0/CPU0:ios(config-if)#l2transport
RP/0/RP0/CPU0:ios(config-if-l2)#service-policy input pm-ingress-cem
RP/0/RP0/CPU0:ios(config-if-l2)#commit
```

show controllers coherentdsp

To display the status and configuration information about the interfaces configured as coherent DSP controllers on a specific node, use the **show controllers coherentDSP** command in XR EXEC mode.

show controller coherentDSP *R/S/I/P* [**pm** { **current | history** } { **30-sec | 15-min | 24-hour** } { **fec** }]

Syntax Description

R/S/I/P	Rack/Slot/Instance/Port of the coherent DSP controller.
pm	Displays performance monitoring parameters for the controller.
current	Displays the current performance monitoring data in 30-second, 15- minute, and 24-hour intervals.
history	Displays the historical performance monitoring data in 30-second, 15-minute, and 24-hour intervals.
fec	The **fec** keyword displays FEC PM data in 30-second, 15-minute, or 24-hour intervals.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.1.5	This command was introduced.

Usage Guidelines

The following table lists the details of the following host PM parameters:

- **Host-Intf-{n}-FEC-BER**
- **Host-Intf-{n}-FEC-FERC**

The following table lists the details of the host PM parameters:

PM Parameter	Mode Type	Number of Host Interfaces	Description
Host-Intf-{n}-FEC-BER	Transponder	1	*n*=0 For example, Host-Intf-0-FEC-BER
	Muxponder	4	*n* = 0, 1, 2, and 3. For example: • Host-Intf-0-FEC-BER • Host-Intf-1-FEC-BER • Host-Intf-2-FEC-BER • Host-Intf-3-FEC-BER

PM Parameter	Mode Type	Number of Host Interfaces	Description
Host-Intf-{n}-FEC-FERC	Transponder	1	*n*=0 For example, Host-Intf-0-FEC-FERC
	Muxponder	4	*n* = 0, 1, 2, and 3 For example: • Host-Intf-0-FEC-FERC • Host-Intf-1-FEC-FERC • Host-Intf-2-FEC-FERC • Host-Intf-3-FEC-FERC

Example

The following is a sample to view the status and configuration information about the coherent DSP controller.

```
Router#show controllers coherentDSP 0/0/0/13
Thu May 27 06:56:37.505 UTC

Port                                          : CoherentDSP 0/0/0/13
Controller State                              : Up
Inherited Secondary State                     : Normal
Configured Secondary State                    : Normal
Derived State                                 : In Service
Loopback mode                                 : None
BER Thresholds                                : SF = 1.0E-5  SD = 1.0E-7
Performance Monitoring                        : Enable
Bandwidth                                     : 400.0Gb/s

Alarm Information:
LOS = 32        LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0        SF_BER = 0
SD_BER = 0      BDI = 0 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0     FLEXO_GIDM = 0
FLEXO-MM = 0    FLEXO-LOM = 0   FLEXO-RDI = 0
FLEXO-LOF = 43
Detected Alarms                               : None

Bit Error Rate Information
PREFEC  BER                                   : 8.5E-04
POSTFEC BER                                   : 0.0E+00
Q-Factor                                      : 9.90 dB

Q-Margin                                      : 2.70dB

OTU TTI Received
```

The following is a sample to view the current performance monitoring parameters of the coherent DSP controller in 30 second intervals.

```
Router#show controllers coherentDSP 0/0/0/13 pm current 30-sec fec
g709 FEC in the current interval [07:03:00 - 07:03:29 Thu May 27 2021]

FEC current bucket type : Valid
    EC-BITS   : 11885430510            Threshold : 83203400000            TCA(enable)  :
YES
    UC-WORDS  : 0                      Threshold : 5                      TCA(enable)  :
YES

                                       MIN       AVG        MAX      Threshold   TCA
Threshold     TCA
                                                                        (min)    (enable)
  (max)     (enable)
PreFEC BER                     :     8.4E-04   8.6E-04   8.7E-04     0E-15       NO
0E-15        NO
PostFEC BER                    :     0E-15     0E-15     0E-15       0E-15       NO
0E-15        NO
Q[dB]                          :     9.90      9.90      9.90        0.00        NO
 0.00        NO
Q_Margin[dB]                   :     2.70      2.70      2.70        0.00        NO
 0.00        NO

Last clearing of "show controllers OTU" counters never
```

show controllers optics

To display status and configuration information about the interfaces configured as optics controller on a specific node, use the **show controllers optics** command in XR EXEC mode.

show controllers optics *R/S/I/P* [**pm** { **current** | **history** } { **30-sec** | **15-in** | **24-hour** } **optics** *lane-number* | **observable-info** | **information [loopback| all| counters]** | **fec-thresholds**]

Syntax Description

R/S/I/P	Rack/Slot/Instance/Port of the optics controller.
pm	Displays performance monitoring parameters for the controller.
current	Displays the current performance monitoring data in 30 second, 15 minute, and 24 hour intervals.
history	Displays the historical performance monitoring data in 30 second, 15 minute, and 24 hour intervals.
optics	Displays the PM data for optics controller.
lane-number	Displays the performance monitoring data for the applicable lanes in the optical module. The lane number is always 1.
obervable-info	Displays the following details for an optical transceiver (gray optics or non-coherent optics): • Effective Signal to Noise Ratio (eSNR) • Pulse Amplitude Modulation with Four Levels (PAM4) Level Transition Parameter (LTP) • Pre-Forward Error Correction (FEC) and Post-FEC Bit Error Rate (BER) • Frame Error Count (FERC) • Laser age • Thermoelectric Cooler (TEC) current • Laser frequency • Laser temperature **Note** Not all optical modules support the **observable-info** keyword. Also, the parameters that are displayed depend on what the optical module supports, that is, not all optical modules display the same parameters. For additional information on VDM (Versatile Diagnostics Monitoring), see the Common Management Interface Specification.
information loopback	Displays the loopback types that the optical transceiver supports.
information all	Displays all the details related to the optical transceiver.

information counters	Displays counter details related to the optical transceiver.
fec-thresholds	Displays the FEC detected degrade (FDD) and FEC excessive degrade (FED) threshold values of the host and media side of the optical transceiver.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.1.5	This command was introduced.
Release 7.5.5/Release 7.11.1	The **observable-info** and **information loopback** keywords were introduced.
Release 24.1.1	The **fec-thresholds** keyword was introduced. The display of **information counters** and **information counters** keywords was enhanced.

Usage Guidelines

The supported keywords in the show controllers optics command vary based on the type of the optical module (coherent or non-coherent). Not all keywords are supported on coherent and non-coherent optical modules.

Example

```
Router#show controllers optics 0/0/0/7
 Controller State: Up
 Transport Admin State: In Service
 Laser State: On
 LED State: Green
 FEC State: FEC ENABLED
 Optics Status
         Optics Type:  QSFPDD 400G ZR
         DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,
         Wavelength=1552.524nm
         Alarm Status:
         -------------
         Detected Alarms: None
         LOS/LOL/Fault Status:
         Alarm Statistics:
         -------------
         HIGH-RX-PWR = 0            LOW-RX-PWR = 0
         HIGH-TX-PWR = 0            LOW-TX-PWR = 0
         HIGH-LBC = 0               HIGH-DGD = 0
         OOR-CD = 0                 OSNR = 55
         WVL-OOL = 0                MEA  = 0
         IMPROPER-REM = 0
         TX-POWER-PROV-MISMATCH = 0
         Laser Bias Current = 0.0
         Actual TX Power = -8.16 dBm
         RX Power = -7.85 dBm
         RX Signal Power = -7.55 dBm
         Frequency Offset = 5 MHz
         Performance Monitoring: Enable
         THRESHOLD VALUES
         ----------------
         Parameter                High Alarm  Low Alarm  High Warning  Low Warning
         -----------------------  ----------  ---------  ------------  -----------
```

```
        Rx Power Threshold(dBm)          1.9      -28.2           0.0        -25.0
        Tx Power Threshold(dBm)          0.0      -15.0          -2.0        -16.0
        LBC Threshold(mA)               0.00       0.00          0.00         0.00
        Temp. Threshold(celsius)       80.00      -5.00         75.00        15.00
        Voltage Threshold(volt)         3.46       3.13          3.43         3.16
        LBC High Threshold = 98 %
        Configured Tx Power = -6.00 dBm
        Configured CD High Threshold = 80000 ps/nm
        Configured CD lower Threshold = -80000 ps/nm
        Configured OSNR lower Threshold = 9.00 dB
        Configured DGD Higher Threshold = 80.00 ps
        Baud Rate =  59.8437500000 GBd
        Modulation Type: 16QAM
        Chromatic Dispersion 2 ps/nm
        Configured CD-MIN -2400 ps/nm  CD-MAX 2400 ps/nm
        Second Order Polarization Mode Dispersion = 87.00 ps^2
        Optical Signal to Noise Ratio = 36.30 dB
        Polarization Dependent Loss = 0.40 dB
        Polarization Change Rate = 0.00 rad/s
        Differential Group Delay = 2.00 ps
        Temperature = 51.00 Celsius
        Voltage = 3.36 V
 Transceiver Vendor Details
        Form Factor            : QSFP-DD
        Optics type            : QSFPDD 400G ZR
        Name                   : CISCO-ACACIA
        OUI Number             : 7c.b2.5c
        Part Number            : DP04QSDD-E20-19E
        Rev Number             : 10
        Serial Number          : ACA2449003P
        PID                    : QDD-400G-ZR-S
        VID                    : ES03
        Firmware Version       : 61.12
        Date Code(yy/mm/dd)    : 20/12/03
```

The following is a sample to view the current performance monitoring parameters of the optics controller in 30 second intervals.

```
Router#show controllers optics 0/0/0/7 pm current 30-sec optics 1
Thu May 27 07:11:33.466 UTC
Optics in the current interval [07:11:30 - 07:11:33 Thu May 27 2021]
Optics current bucket type : Valid
            MIN       AVG       MAX      Operational      Configured      TCA   Operational
      Configured     TCA
                                          Threshold(min)   Threshold(min) (min) Threshold(max)
   Threshold(max) (max)
LBC[mA ]      : 52       52        52        0.0              NA              NO   100.0
          NA               NO
OPT[dBm]      : -8.17    -8.17     -8.17    -15.09           NA              NO   0.00
          NA               NO
OPR[dBm]      : -7.80    -7.80     -7.80    -30.00           NA              NO   8.00
          NA               NO
CD[ps/nm]     : 1        1         1        -2400            -2400           YES  2400
          2400             YES
DGD[ps ]      : 2.00     2.00      2.00     0.00             NA              NO   80.00
          NA               NO
SOPMD[ps^2]   : 53.00    53.00     53.00    0.00             NA              NO   2000.00
          NA               NO
OSNR[dB]      : 36.30    36.30     36.30    9.00             55.00           NO   40.00
          NA               NO
PDL[dB]       : 0.40     0.40      0.40     0.00             NA              NO   7.00
          NA               NO
PCR[rad/s]    : 0.00     0.00      0.00     3.00             3.00            NO   2500000.00
       3000000.00      YES
```

```
RX_SIG[dBm]  : -7.54     -7.54     -7.54    -30.00           NA              NO   1.00
          NA               NO
FREQ_OFF[Mhz]: 33        33        33       -3600            NA              NO   3600
          NA               NO
SNR[dB]      : 17.90     17.90     17.90    7.00             NA              NO   100.00
          NA               NO

Last clearing of "show controllers OPTICS" counters never
```

The following is an example to view the monitoring parameters using the **observable-info** keyword. Based on the requirement, the network administrators can use the displayed values of this command for monitoring and troubleshooting.

```
Router#show controllers optics 0/0/0/9 observable-info

Observable Information

[eSNR Media Input]
 Unit: dB
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                     Low High  Low High
 Lane0    21.30               0.00                0.00                0.00
0.00                 n   n     n   n
 Lane1    22.05               0.00                0.00                0.00
0.00                 n   n     n   n
 Lane2    22.62               0.00                0.00                0.00
0.00                 n   n     n   n
 Lane3    22.05               0.00                0.00                0.00
0.00                 n   n     n   n

[PAM4 Level Transition Parameter Media Input]
 Unit: dB
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                     Low High  Low High
 Lane0    47.79               0.00                0.00                0.00
0.00                 n   n     n   n
 Lane1    54.70               0.00                0.00                0.00
0.00                 n   n     n   n
 Lane2    64.34               0.00                0.00                0.00
0.00                 n   n     n   n
 Lane3    59.64               0.00                0.00                0.00
0.00                 n   n     n   n

[Pre-FEC BER Minimum Media Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                     Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00            n   n     n   n

[Pre-FEC BER Minimum Host Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                     Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
```

```
0.000E+00           n   n     n   n

[Pre-FEC BER Maximum Media Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[Pre-FEC BER Maximum Host Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[Pre-FEC BER Average Media Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[Pre-FEC BER Average Host Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[Pre-FEC BER Current Media Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[Pre-FEC BER Current Host Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[FERC Minimum Media Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n
```

```
[FERC Minimum Host Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[FERC Maximum Media Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[FERC Maximum Host Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[FERC Average Media Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[FERC Average Host Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[FERC Current Media Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n

[FERC Current Host Input]
 Unit: n/a
 Id       Value               LowThreshWarn       HighThresWarn       LowThreshAlarm
HighThreshAlarm     TCAWarn   TCAAlarm

                    Low High  Low High
 Module   0.000E+00           0.000E+00           0.000E+00           0.000E+00
0.000E+00           n   n     n   n
```

The following is an example to view the loopback types supported by the optical transceiver using the **information loopback** keyword.

```
Router#show controllers optics 0/0/0/0 information looopback
Supported Loopback Types :
============================
 [1.] Media Internal
 [2.] Media Line
 [3.] Host Line
 [4.] Host Internal
 [5.] Host Per Lane
 [6.] Media Per Lane
 [7.] Simultaneous Media Host

 Unsupported Loopback Types :
==============================

 Media Configured Loopback : Media Loopback None
 Media Applied Loopback    : Media Loopback None


 Host Configured Loopback : Host Loopback None
 Host Applied Loopback    : Host Loopback None
```

The following is an example to view the FDD and FED threshold values of the host and media side of the optical transceiver using the **fec-thresholds** keyword.

```
Router#show controllers optics 0/0/0/10 fec-thresholds
FEC Threshold Information
                               Raise                Clear
 Media FEC excess degrade   :   2.2222E-02           1.1111E-03
 Media FEC detected degrade :   4.4444E-02           3.3333E-03
 Host FEC excess degrade    :   6.6667E-02           5.5556E-03
 Host FEC detected degrade  :   8.8889E-02           7.7778E-03
```

The following is an example to view the module state and datapath state of the optical transceivers: using the **information counters** keyword:

```
Router#show controllers optics 0/0/0/8 information counters
Fri Feb 16 11:06:31.415 UTC

Module State : Ready

Datapath State [Client-0]: TX Turn On

Acquisition Counter:    INVALID

HOST SIDE ALARM COUNTERS
=======================================
Host-Intf-0-FDD-Alarm-Counter[            0]               Host-Intf-0-FED-Alarm-Counter[
             0]


HOST SIDE FEC-BER FEC-FERC CURRENT VALUES
=======================================
Host-Intf-0-FEC-BER[0.00E+00]                   Host-Intf-0-FEC-FERC[0.00E+00]


 Supported Loopback Types :
============================
 [1.] Media Internal
```

```
 [2.] Media Line
 [3.] Host Line
 [4.] Host Internal
 [5.] Host Per Lane
 [6.] Media Per Lane
 [7.] Simultaneous Media Host

 Unsupported Loopback Types :
==============================

 Media Configured Loopback : Media Loopback None
 Media Applied Loopback    : Media Loopback None


 Host Configured Loopback : Host Loopback None
 Host Applied Loopback    : Host Loopback None



FW Upgrade Capability Mode:
===========================
 Supports Both Warm & Cold boot
 Supports Cold boot only
```

ampli-control-mode

To configure the mode of operation of the OLS pluggable to either gain control or power control mode, use the **ampli-control-mode** command in the controller ots configuration mode.

ampli-control-mode { **powermode** | **manual** }

Syntax Description

powermode	Configures the OLS pluggable to power control mode.
manual	Configures the OLS pluggable to gain control mode.

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

The following example shows how to configure the gain control operational mode and the amplifier gain of the OLS pluggable :

```
Router#config
Router(config)#controller ots 0/0/2/1/0
Router(config-Ots)#ampli-control-mode manual
Router(config-Ots)#egress-ampli-gain +30
Router(config-Ots)#commit
Router(config-Ots)#exit
Router(config)#exit
```

controller ots (QDD OLS)

To configure the QDD OLS pluggable (ots controller), use the **controller ots** command in the global configuration mode.

controller ots *R/S/I/P/SuP*

Syntax Description

R/S/I/P/SuP	Rack/Slot/Instance/Port/Sub-Port of the QDD OLS pluggable. *SuP* is the QDD pluggable subport which can be 0 or 1. Com port is represented as 0 and line port is represented as 1.

Command Default

None.

Command Modes

Global Configuration

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write
sonet-sdh	read, write
interface	read, write

Example

This example shows how to configure the ots controller and set the low- power threshold at the transmit and receive side.

```
Router#config
Router(config)#controller ots 0/0/2/1/0
Router(config-Ots)#rx-low-threshold -200
Router(config-Ots)#tx-low-threshold -200
Router(config-Ots)#commit
Router(config-Ots)#exit
Router(config)#exit
```

egress-ampli-force-apr

To enable or disable Force Automatic Power Reduction (APR) on the OLS pluggable, use the **egress-ampli-force-apr** command in the controller ots configuration mode.

egress-ampli-force-apr {on | off}

Syntax Description

on	Enables Force APR on the OLS pluggable.
off	Disables Force APR on the OLS pluggable.

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

Automatic Power Reduction (APR) is an eye-safe output power level of the OLS pluggable when you restart the pluggable (amplifier).

If the OLS pluggable is in the APR state, then the default value for APR power is 8 dBm and APR timer is 9 seconds. When **Force APR** is configured or enabled, the OLS pluggable continues to remain in the APR state. If force APR is not configured or disabled, then the OLS pluggable remains in the Gain mode or Power mode, based on the **ampli-control-mode** user configuration.

Example

The following example shows how to enable Force APR on the OLS pluggable :

```
Router#config
Router(config)#controller ots 0/0/2/1/0
Router(config-Ots)#egress-ampli-force-apr on
Router(config-Ots)#commit
Router(config-Ots)#exit
Router(config)#exit
```

egress-ampli-gain

To configure the amplifer gain of the OLS pluggable, use the **egress-ampli-gain** command in the controller ots configuration mode.

egress-ampli-gain *gain-value*

Syntax Description

gain-value	Sets the amplifier gain value. The range is <+30, +400> in units of 0.1dB. • For subport 0, the range is from +30 db to + 250 db • For subport 1, the range is from +70 db to +250 db

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

The following example shows how to configure the gain control operational mode and the amplifier gain of the OLS pluggable :

```
Router#config
Router(config)#controller ots 0/0/2/1/0
Router(config-Ots)#ampli-control-mode manual
Router(config-Ots)#egress-ampli-gain +30
Router(config-Ots)#commit
Router(config-Ots)#exit
Router(config)#exit
```

egress-ampli-osri

To shutdown the amplifier (QDD OLS pluggable), use the **egress-ampli-osri** command in the controller ots configuration mode.

egress-ampli-osri { **off** | **on** }

Syntax Description

off	Disables the Optical Safety Remote Interlock (OSRI) configuration.
on	Enables the Optical Safety Remote Interlock (OSRI) configuration.

Command Default

None

Command Modes

controller ots

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

The OSRI configuration is used during the maintenance of the pluggable, debugging scenarios, and when the OLS pluggable is not in use.

Task ID

Task ID	Operation
dwdm	read, write

Example

The following example shows how to configure the Optical Safety Remote Interlock (OSRI) on the OLS pluggable:

```
Router#config
Router(config)#controller ots 0/0/2/1/0
Router(config-Ots)#egress-ampli-osri on
Router(config-Ots)#commit
Router(config-Ots)#exit
Router(config)#exit
```

egress-ampli-power

To configure the amplifier output power of the OLS pluggable, use the **egress-ampli-power** command in the controller ots configuration mode.

egress-ampli-power *power-value*

Syntax Description

power-value	Sets the amplifier power value. The range is <-30, +250> in units of 0.1dB. • For subport 0, the range is from 10 dB to 170 dB • For subport 1, the range is from 0 dB to 170 dB

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

The following example shows how to configure the power control operational mode and the amplifier output power of the OLS pluggable :

```
Router#config
Router(config)#controller ots 0/0/2/1/0
Router(config-Ots)#ampli-control-mode powermode
Router(config-Ots)#egress-ampli-power 30
Router(config-Ots)#commit
Router(config-Ots)#exit
Router(config)#exit
```

egress-ampli-safety-control-mode

To enable the safety control mode in the OLS pluggable, use the **egress-ampli-safety-control-mode** command in the controller ots configuration mode.

egress-ampli-safety-control-mode { **auto** | **disabled** }

Syntax Description

auto	Enables the safety control mode (automatic laser shutdown (ALS)) only on sub-port 1 of the OLS pluggable.
disabled	Disables the safety control mode (automatic laser shutdown (ALS)) on sub-port 1 of the OLS pluggable.

Command Default

None

Command Modes

controller ots

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

You can enable safety control mode only on subport 1. With safety-control-mode set as **auto** and if LOS is detected on the line RX, the line TX normalizes the signal output power to 8 dBm and the ALS alarm is raised.

Task ID

Task ID	Operation
dwdm	read, write

Example

The following example shows how to enable the safety control mode on the OLS pluggable (on sub-port 1):

```
Router#config
Router(config)#controller ots 0/0/2/1/1
Router(config-Ots)#egress-ampli-safety-control-mode auto
Router(config-Ots)#commit
Router(config-Ots)#exit
Router(config)#exit
```

rx-low-threshold

To configure the low receive (RX) power threshold on the QDD OLS pluggable, use the **rx-low-threshold** command in the controller ots configuration mode.

rx-low-threshold *rx-low*

Syntax Description

rx-low	Configures the low receive power threshold. The range is -400 to 400 (in the units of 0.1 dBm). • For subport 0, the range is from -300 dBm to 170 dBm • For subport 1, the range is from -300 dBm to 170 dBm

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

This example shows how to configure the ots controller and set the low power threshold at the receiving side.

```
Router#config
Router(config)#controller ots 0/0/2/1/0
Router(config-Ots)#rx-low-threshold -200
Router(config-Ots)#commit
Router(config-Ots)#exit
Router(config)#exit
```

show controllers ots (QDD OLS)

To display the configuration details of the OLS pluggable, use the **show controllers ots** command in XR EXEC mode.

show controllers ots *R/S/I/P/SuP*

Syntax Description

R/S/I/P/SuP	Rack/Slot/Instance/Port/Sub-Port of the QDD OLS pluggable. *SuP* is the QDD pluggable sub-port which can be 0 or 1. Com port is represented as 0 and line port is represented as 1.

Command Default

None.

Command Modes

XR EXEC

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

None

Task ID

Task ID	Operation
interface	read

Example

The following example displays the configuration details of the OLS pluggable:

```
Router#show controllers ots 0/0/1/1/1
Wed Mar 29 06:59:00.016 UTC

 Controller State: Up

 Transport Admin State: In Service

 LED State: Yellow

         Alarm Status:
         -------------
         Detected Alarms: None


         Alarm Statistics:
         -----------------
         RX-LOS-P = 1
         RX-LOC = 0
         TX-POWER-FAIL-LOW = 0
         INGRESS-AUTO-LASER-SHUT = 0
         INGRESS-AUTO-POW-RED = 0
         INGRESS-AMPLI-GAIN-LOW = 0
         INGRESS-AMPLI-GAIN-HIGH = 0
```

```
        EGRESS-AUTO-LASER-SHUT = 1
        EGRESS-AUTO-POW-RED = 1
        EGRESS-AMPLI-GAIN-LOW = 0
        EGRESS-AMPLI-GAIN-HIGH = 0
        HIGH-TX-BR-PWR = 0
        HIGH-RX-BR-PWR = 0
        SPAN-TOO-SHORT-TX = 0
        SPAN-TOO-SHORT-RX = 0

        Parameter Statistics:
        ---------------------
        Total Tx Power = 7.52 dBm
        Rx Signal Power = -26.77 dBm
        Tx Signal Power = 7.23 dBm
        Egress Ampli Gain = 20.8 dB
        Egress Ampli Safety Control mode = auto
        Egress Ampli OSRI = OFF


        Configured Parameters:
        ----------
        Egress Ampli Gain = 15.0 dB
        Egress Ampli Power = 8.0 dBm
        Egress Ampli Safety Control mode = auto
        Egress Ampli OSRI = OFF
        Ampli Control mode = Manual
        Rx Low Threshold = -30.0 dBm
        Tx Low Threshold = -5.0 dBm


        Temperature = 35.09 Celsius
        Voltage = 3.37 V

Optical Module Details

        Optics type            : QDD DUAL EDFA
        Name                   : CISCO-ACCELINK
        OUI Number             : 00.00.00
        Part Number            : EDFA-211917-QDD
        Rev Number             : 21
        Serial Number          : ACW2651Z003
        PID                    : ONS-QDD-OLS
        VID                    : VES1
        Firmware Version       : 2.01
        Date Code(yy/mm/dd)    : 22/12/28
        Fiber Connector Type   : CS
```

tx-low-threshold

To configure the low transmit (TX) power threshold on the QDD OLS pluggable, use the **tx-low-threshold** command in the controller ots configuration mode.

tx-low-threshold *tx-low*

Syntax Description

tx-low	Configures the low transmit power threshold. The range is -400 to 400 (in the units of 0.1 dBm). • For subport 0, the range is from -50 dBm to 190 dBm • For subport 1, the range is from -50 dBm to 190 dBm

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 24.1.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

This example shows how to configure the ots controller and set the low power threshold at the transmit side.

```
Router#config
Router(config)#controller ots 0/0/2/1/0
Router(config-Ots)#tx-low-threshold -200
Router(config-Ots)#commit
Router(config-Ots)#exit
Router(config)#exit
```

Ethernet Interface Commands

This module provides command line interface (CLI) commands for configuring Ethernet interfaces on the Cisco 8000 Series Routers.

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

carrier-delay

To delay the processing of hardware link down or up notifications, use the **carrier-delay** command in interface configuration mode.

carrier-delay {**down** *milliseconds* [**up** *milliseconds*] | **up** *milliseconds* [**down** *milliseconds*]}

Syntax Description

down *milliseconds*	Length of time, in milliseconds, to delay the processing of hardware link down notifications. Range is from 0 through 2147483647.
up *milliseconds*	Length of time, in milliseconds, to delay the processing of hardware link up notifications. Range is from 0 through 2147483647.

Command Default

- The carrier-delay up timer has a default value of 200 ms. There is a delay of 200 ms before the upper layer protocols are notified when a physical link goes up.
- The carrier-delay down timer does not have a default value. The upper layer protocols are notified as quickly as possible when a physical link goes down.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.
Release 24.2.11	A default value of 200 ms was introduced for the carrier-delay up timer.

Usage Guidelines

When you delay the processing of hardware link down notifications, the higher layer routing protocols are unaware of a link until that link is stable.

If the **carrier-delay down** *milliseconds* command is configured on a physical link that fails and cannot be recovered, link down detection is increased, and it may take longer for the routing protocols to re-route traffic around the failed link.

In the case of very small interface state flaps, running the **carrier-delay down** *milliseconds* command prevents the routing protocols from experiencing a route flap.

Although the router accepts a value between 0 to 2147483647 milliseconds, the minimum value that is configured to the interface is 10 milliseconds, so as to avoid overloading the linecard control stack. We recommend that if your router has a value below 10 milliseconds, reconfigure the value to a minimum of 10 milliseconds, and if required assign a higher value.

Note Enter the **show interface** command to see the current state of the carrier-delay operation for an interface. No carrier-delay information is displayed if carrier-delay has not been configured on an interface.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to delay the processing of hardware link down notifications:

```
RP/0/RP0/CPU0:router(config-if)# carrier-delay down 10
```

The following example shows how to delay the processing of hardware link up and down notifications:

```
RP/0/RP0/CPU0:router(config-if)# carrier-delay up 100 down 100
```

clear lldp

To reset Link Layer Discovery Protocol (LLDP) traffic counters or LLDP neighbor information, use the **clear lldp** command in XR EXEC mode.

clear lldp {**counters** | **table**}

Syntax Description

counters	Specifies that LLDP traffic counters are cleared.
table	Specifies that LLDP information in the neighbor table is cleared.

Command Default

LLDP traffic counters are not reset, and LLDP neighbor information is not cleared.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

To reset counters from the **show lldp traffic** command, use the **clear lldp counters** command. To clear neighbor information displayed by the **show lldp neighbors** command, use the **clear lldp table** command.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to clear the LLDP counters and display LLDP traffic. The output from the **show lldp traffic** command shows that all the traffic counters have been reset to zero.

```
RP/0/RP0/CPU0:router# clear lldp counters
RP/0/RP0/CPU0:router# show lldp traffic
LLDP traffic statistics:
        Total frames out: 0
        Total entries aged: 0
        Total frames in: 0
        Total frames received in error: 0
        Total frames discarded: 0
        Total TLVs discarded: 0
        Total TLVs unrecognized: 0
```

The following example shows how to clear the LLDP table. The output of the **show lldp neighbors** command shows that all information has been deleted from the table.

```
RP/0/RP0/CPU0:router# clear lldp table
RP/0/RP0/CPU0:router# show lldp neighbors
Capability codes:
    (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
    (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Device ID           Local Intf     Hold-time  Capability      Port ID
```

In the `config` mode:

```
RP/0/RP0/CPU0:ios(config)#int hun 0/1/0/0
RP/0/RP0/CPU0:ios(config-if)#clear lldp ?
destination  Configure LLDP Destination MAC on the interface
enable       Enable LLDP TX and RX on an interface
receive      Disable LLDP RX on an interface
transmit     Disable LLDP TX on an interface
```

interface (Ethernet)

To specify or create an Ethernet interface and enter interface configuration mode, use the **interface (Ethernet)** command in XR Config mode.

interface {**TenGigE | TwentyFiveGigE | FortyGigE | HundredGigE | FourHundredGigE**} *interface-path-id*
no interface {**TenGigE | TwentyFiveGigE | FortyGigE | HundredGigE | FourHundredGigE**} *interface-path-id*

Syntax Description

TenGigE	Specifies or creates a Ten Gigabit Ethernet (10 Gbps) interface.
TwentyFiveGigE	Specifies or creates a Twentyfive Gigabit Ethernet (25 Gbps) interface
FortyGigE	Specifies or creates a Forty Gigabit Ethernet (40 Gbps) interface
HundredGigE	Specifies or creates a Hundred Gigabit Ethernet (100 Gbps) interface.
FourHundredGigE	Specifies or creates a Four hundred Gigabit Ethernet (400 Gbps) interface.
interface-path-id	Physical 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

None

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

To specify a physical interface, the notation for the *interface-path-id* is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the line card.
- *module*: Module number. Always 0.
- *port*: Physical port number of the interface.

The *interface-path-id* is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. The supported *interface-path-id* ranges are:

- **TenGigE** — 0/0/0/0 - 0/0/0/31
- **TwentyFiveGigE** — 0/0/0/24 - 0/0/0/31

- **FortyGigE** — 0/0/1/0 - 0/0/1/1
- **HundredGigE** — 0/0/1/0 - 0/0/1/1

This example shows how to enter interface configuration mode for a HundredGigE Ethernet interface:

```
RP/0/RP0/CPU0:router(config)#  interface HundredGigE 0/4/0/0
RP/0/RP0/CPU0:router(config-if)#
```

l2transport (Ethernet)

To enable Layer 2 transport port mode on an Ethernet interface and enter Layer 2 transport configuration mode, use the **l2transport** command in interface or subinterface configuration mode for an Ethernet interface.

l2transport

This command has no keywords or arguments.

Command Default

None

Command Modes

Interface configuration

Sub-interface configuration

Command History

Release	Modification
Release 7.2.12	This command was introduced.

Usage Guidelines

The l2transport command and these configuration items are mutually exclusive:

- IPv4 address and L3 feature configuration
- IPv4 enable and L3 feature configuration
- Bundle-enabling configuration
- L3 sub-interfaces

Note

- After an interface or connection is set to Layer 2 switched, commands such as **ipv4 address** are not usable. If you configure routing commands on the interface, **l2transport** is rejected.
- The **l2transport** command is mutually exclusive with any Layer 3 interface configuration.

Note Not all options in the command are supported. For instance, translate command can translate VLAN value, not Ethertype.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows how to enable Layer 2 transport port mode on an Ethernet interface and enter Layer 2 transport configuration mode:

```
Router# configure
Router(config)# interface hundredGigE 0/0/0/24
Router(config-if)# l2transport
Router(config-if-l2)#
```

Note Ensure that the **l2transport** command is applied on the same line as the **interface** command for the Ethernet sub-interface.

The following example shows how to use the l2transport command on an Ethernet sub-interface:

```
Router# configure
Router(config)# interface hundredGigE 0/0/0/24.10 l2transport
Router(config-subif)# encapsulation dot1q 10
```

To disable Layer 2 transport port mode on an Ethernet interface, use the **no** form of this command in the global configuration mode.

```
Router# configure
Router(config)# interface hundredGigE 0/0/0/24
Router(config-if)# l2transport
Router(config-if-l2)# exit
Router(config)# no interface hundredGigE 0/0/0/24
```

Examples

The following example shows how to configure an interface or connection as Layer 2 switched under several different modes:

Ethernet Port Mode:

```
Router# configure
Router(config)# interface hundredGigE 0/0/0/10
Router(config-if)# l2transport
```

Ethernet VLAN Mode:

```
Router# configure
Router(config)# interface hundredGigE 0/0/0/0.1 l2transport
Router(config-if)# encapsulation dot1q 10
```

Ethernet VLAN Mode (QinQ):

```
Router# configure
Router(config)# interface hundredGigE 0/0/0/0.1 l2transport
Router(config-if)# encapsulation dot1q 10 second-dot1q 11
```

Note Ensure that the **l2transport** command is applied on the same line as the **interface** command for the Ethernet subinterface.

lldp

To enable the Link Layer Discovery Protocol (LLDP) globally for both transmit and receive operation on the system, use the **lldp** command in XR Config mode. To disable LLDP, use the **no** form of this command.

lldp

Syntax Description

This command has no keywords or arguments.

Command Default

LLDP is disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

When you enable LLDP globally using the **lldp** command, LLDP is not enabled on subinterfaces or bundle subinterfaces by default. This is to prevent the LLDP process from consuming high CPU cycles. In order to enable LLDP on subinterfaces and bundle subinterfaces as well, the **lldp subinterfaces enable** command is introduced.

Note When you use this command, you must remember that as the scale of interfaces(with subinterfaces and bundle subinterfaces) becomes higher, it might cause the LLDP process to hog the CPU.

Task ID

Task ID	Operation
ethernet-services	read, write

This example shows how to enable LLDP globally on the router:

```
RP/0/RP0/CPU0:router(config)# lldp
```

This example shows how to enable LLDP on subinterfaces:

lldp (interface)

To enter LLDP configuration mode, use the **lldp (interface)** command.

lldp

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	read, write
interface	read, write

This example shows how to enter LLDP configuration mode from Ethernet interface configuration mode:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigabitEthernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lldp
RP/0/RP0/CPU0:router(config-lldp)#
```

Related Commands

Command	Description
show lldp interface, on page 84	Displays LLDP configuration and status information on an interface.
lldp, on page 45	Enables LLDP globally for both transmit and receive operation on the system.

lldp holdtime

To specify the length of time that information from a Link Layer Discovery Protocol (LLDP) packet should be held by the receiving device before aging and removing it, use the **lldp holdtime** command in XR Config mode. To return to the default, use the **no** form of this command.

lldp holdtime *seconds*

Syntax Description

seconds	Number from 0 to 65535 that specifies the amount of time (in seconds) to hold the packet information. The default is 120.

Command Default

The packet hold time is 120 seconds (2 minutes).

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Task ID

Task ID	Operation
ethernet-services	read, write

This example shows how to change the default hold time to 1 minute:

```
RP/0/RP0/CPU0:router(config)# lldp holdtime 60
```

lldp reinit

To specify the length of time to delay initialization of the Link Layer Discovery Protocol (LLDP) on an interface, use the **lldp reinit** command in XR Config mode. To return to the default, use the **no** form of this command.

lldp reinit *seconds*

Syntax Description

seconds	Number from 2 to 5 that specifies the length of time (in seconds) that LLDP should delay initialization. The default is 2.

Command Default

Initialization of LLDP is delayed for 2 seconds on an interface.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to change the default initialization delay from 2 to 4 seconds:

```
RP/0/RP0/CPU0:router(config)# lldp reinit 4
```

Related Commands

Command	Description
lldp, on page 45	Enables LLDP globally for both transmit and receive operation on the system.

lldp timer

To specify the Link Layer Discovery Protocol (LLDP) packet rate, use the **lldp timer** command in XR Config mode. To return to the default, use the **no** form of this command.

lldp timer *seconds*

Syntax Description

seconds	Number from 5 to 65534 that specifies the rate (in seconds) at which to send LLDP packets. The default is 30.

Command Default

LLDP packets are sent every 30 seconds.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to change the default LLDP packet rate from 30 seconds to 1 minute:

```
RP/0/RP0/CPU0:router(config)# lldp timer 60
```

Related Commands

Command	Description
lldp, on page 45	Enables LLDP globally for both transmit and receive operation on the system.

lldp tlv-select disable

To disable transmission of the selected Type Length Value (TLV) in Link Layer Discovery Protocol (LLDP) packets, use the **lld tlv-select disable** command in XR Config mode. To return to the default, use the **no** form of this command.

lldp tlv-select *tlv-name* **disable**

Syntax Description

tlv-name	Name of the TLV to be suppressed from LLDP packets. The *tlv-name* can be one of the following LLDP TLV types: • **management-address** • **port-description** • **system-capabilities** • **system-description** • **system-name**

Command Default

All TLVs are sent in LLDP packets.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Certain TLVs are classified as mandatory in LLDP packets, such as the Chassis ID, Port ID, and Time to Live (TTL) TLVs. These TLVs must be present in every LLDP packet. You can use the **lldp tlv-select disable** command to suppress transmission of certain other optional TLVs in LLDP packets.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to disable transmission of the System Capabilities TLV from LLDP packets:

```
RP/0/RP0/CPU0:router(config)# lldp tlv-select system-capabilities disable
```

loopback (Ethernet)

To configure an Ethernet controller for loopback mode, use the **loopback** command in interface configuration mode. To disable loopback, use the **no** form of this command.

loopback {**external** | **internal** | **line**}

Syntax Description

external	All IPv4 self-ping packets are sent out of the interface and looped back externally before being received on the ingress path.
internal	All packets are looped back internally within the router before reaching an external cable.
line	Incoming network packets are looped back through the external cable.

Command Default

Loopback mode is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Line loopback mode is supported only on Cisco 8000 series line cards and fixed-port routers based on Q100 and Q200 silicon.

The **loopback** command is available for all Ethernet interface types.

Two loopback operation modes are supported for diagnostic purposes: internal and line. In the terminal (internal) loopback, the sent signal is looped back to the receiver. In the facility (line) loopback, the signal received from the far end is looped back and sent on the line. The two loopback modes cannot be active at the same time. In normal operation mode, neither of the two loopback modes is enabled.

Tip Use the **loopback external** command when an external loopback connector is attached to the interface.

Task ID

Task ID	Operations
interface	read, write

Examples

In the following example, all packets are looped back to the TenGigE controller:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-if)# loopback internal
```

packet-gap non-standard

To change the packet interval for traffic on an interface for improved interoperability with Cisco 8000 Series Routers, use the **packet-gap non-standard** command in interface configuration mode. To use the standard packet interval as defined by the IEEE 802.ae specification, use the **no** form of this command.

packet-gap non-standard

Syntax Description

This command has no keywords or arguments.

Command Default

The interface uses the standard packet interval as defined by the IEEE 802.ae specification.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to change the packet interval for traffic on an interface from standard to nonstandard:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RP0/CPU0:router(config-if)# packet-gap non-standard
```

port-mode

To configure the Ethernet, Fibre Channel (FC), Optical Transport Network (OTN), Synchronous Digital Hierarchy (SDH), or Synchronous optical networking (SONET) port mode, use the **port-mode** command in optics controller configuration mode.

port-mode *controller-type* **framing cem-packetize rate** *rate-options*

Syntax Description

controller-type	Specifies the port mode type. The supported port mode options are: • Ethernet • FC • otn • SDH • Sonet
framing	Specifies the port mode framing type.
cem-packetize	Configures the circuit emulation option.
rate *rate-options*	Specifies port mode rate options. The following *rate-options* are available for each of the selected port mode type:

Port mode type	Rate options
Ethernet	1GE and 10GE
FC	FC1, FC2, FC4, FC8, FC16, and FC32
otn	otu2 and otu2e
SDH	STM16 and STM64
Sonet	OC48 and OC192

Command Default

None

Command Modes

Optics controller

Command History

Release	Modification
Release 7.11.1	This command was introduced on Cisco 8011-2X2XP4L PLE Service Endpoint Router.

Usage Guidelines

To change the port-mode type, you must remove the existing port mode configuration by executing the **no port-mode** command. You can then configure the required port mode.

Examples

This example shows how to configure the Ethernet port mode and enable 10GbE rate.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller optics 0/0/0/0
RP/0/RP0/CPU0:router(config-Optics)# port-mode Ethernet framing cem-packetize rate 10GE
RP/0/RP0/CPU0:router(config-Optics)# exit
```

Examples

This example shows how to change the Ethernet port mode to Fibre Channel port mode and enable FC-16 rate.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller optics 0/0/0/1
RP/0/RP0/CPU0:router(config-Optics)# no port-mode Ethernet framing cem-packetize rate 10GE
RP/0/RP0/CPU0:router(config-Optics)# port-mode FC framing cem-packetize rate FC16
RP/0/RP0/CPU0:router(config-Optics)# exit
```

Note You can apply the port mode configuration only on ports 0 and 1. For FC-32 (under fiber channel), the configuration is supported only on the port 0/0/0/0. If you have configured under the port 0/0/0/1, then you can't use the port to configure with the other port mode.

After executing the **port-mode** command, it creates two controllers on the router: controller-type as given in the command and cem controller.

```
RP/0/RP0/CPU0:router#show controller tengigectrlr 0/0/0/0
Fri Oct 13 03:27:46.333 UTC
Operational data for interface TenGigECtrlr0/0/0/0:

State:
    Administrative state: enabled
    Operational state: Up
    LED state: Red Flashing
    PRBS:
      Status: Not Running
      Mode: None
      Pattern: None
      Direction: Not configured
      Error-inject: None
      Framing: Not Configured
      User-pattern: 0x0

Phy:
    Media type: Not known
    Alarms:
        Current:
            Local Fault
        Previous:
            Local Fault

Autonegotiation disabled.

Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
```

```
    Flowcontrol: None
    Loopback: Internal
    Inter-packet gap: standard (12)
    BER monitoring:
        Not supported


RP/0/RP0/CPU0:router#show controller sixteenGigFibreChanCtrlr 0/0/0/1
Fri Oct 13 03:41:02.690 UTC

Operational data for Fibre Channel controller SixteenGigFibreChanCtrlr0/0/0/1

State:
        Admin State           : Up
        Operational state     : Down
        LED state             : Red Flashing
        Secondary admin state : Normal
        Laser Squelch         : Disabled
        TTS                   : Disabled

Performance Monitoring is enabled

Operational values:
        Speed                    : 16 Gbps
        Loopback                 : None
        BER monitoring:
                Signal Degrade   : 1e-0
                Signal Fail      : 1e-0
        Hold-off Time            : 0 ms
        Forward Error Correction : Disabled

Alarms :
        Current :
                Remote Fault
                NOS
        Previous :
                Remote Fault
                PCS Error
                NOS
```

show controllers (Ethernet)

To display status and configuration information about the Ethernet interfaces on a specific node, use the **show controllers command** in XR EXEC mode.

show controllers {**TenGigE | TwentyFiveGigE | FortyGigE | HundredGigE | FourHundredGigE**} *interface-path-id* [**all** | **bert** | **control** | **internal** | **mac** | **phy** | **regs** | **stats** | **xgxs**]

Syntax Description

{**TenGigE**| **TwentyFiveGigE**|**FortyGigE**|**HundredGigE**|**FourHundredGigE**}	Specifies the type of Ethernet interface whose status and configuration information you want to display. Enter TenGigE or HundredGigE.
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.
all	Displays detailed information for the specified interface.
bert	Displays BERT status information for the interface.
control	Displays configuration and control information for the interface.
internal	Displays internal information for the interface.
mac	Displays mac information for the interface.
phy	Displays physical information for the interface.
regs	Displays registers information for the interface.
stats	Displays statistical information for the interface.
xgxs	Displays information about the 10 Gigabit Ethernet Extended Sublayer (XGXS).

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.
  - *slot*: Physical slot number of the line card.
  - *module*: Module number. Always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

When there is a mismatch in port speeds between peer routers, no state difference is visible in the show controller optics command. However, during such a mismatch, the traffic route is not functional.

The *interface-path-id* is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. The supported *interface-path-id* ranges are:

- **TenGigE** — 0/0/0/0 - 0/0/0/31
- **TwentyFiveGigE** — 0/0/0/24 - 0/0/0/31
- **FortyGigE** — 0/0/1/0 - 0/0/1/1
- **HundredGigE** — 0/0/1/0 - 0/0/1/1

Task ID

Task ID	Operations	
cisco-support	read	
	Note	Required in addition to the interface (read) task ID to use the **control** keyword only.
dwdm	read	
interface	read	
sonet-sdh	read	

Examples The following example shows sample output from the base form of the **show controllers TenGigE all** command:

```
RP/0/RP0/CPU0:router#
Operational data for interface TenGigE0/0/0/4:

State:
    Administrative state: disabled
    Operational state: Down (Reason: The optics for the port are not present)
    LED state: Yellow On

Media:
    Media type: Initializing, true state or type not yet known
    No optics present

MAC address information:
    Operational address: 001d.353b.975e
    Burnt-in address: 001d.353b.975e
    No unicast addresses in filter
    No multicast addresses in filter

Autonegotiation disabled.

Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    MTU: 1526
    MRU: 1526
    Inter-packet gap: standard (12)

BERT status for TenGigE0/0/0/4:
BERT State                      :       DISABLED
Test Pattern                    :       None test pattern
Time Remaining                  :       0
Time Interval                   :       0
Statistics for interface TenGigE0/0/0/4 (cached values):

Ingress:
    Input total bytes           = 0
    Input good bytes            = 0

    Input total packets         = 0
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 0
    Input pkts 65-127 bytes     = 0
    Input pkts 128-255 bytes    = 0
    Input pkts 256-511 bytes    = 0
    Input pkts 512-1023 bytes   = 0
    Input pkts 1024-1518 bytes  = 0
    Input pkts 1519-Max bytes   = 0

    Input good pkts             = 0
    Input unicast pkts          = 0
    Input multicast pkts        = 0
    Input broadcast pkts        = 0

    Input drop overrun          = 0
    Input drop abort            = 0
    Input drop unknown 802.1Q   = 0
    Input drop other            = 0

    Input error giant           = 0
    Input error runt            = 0
    Input error jabbers         = 0
```

```
    Input error fragments       = 0
    Input error CRC             = 0
    Input error collisions      = 0
    Input error symbol          = 0
    Input error other           = 0

    Input MIB giant             = 0
    Input MIB jabber            = 0
    Input MIB CRC               = 0

Egress:
    Output total bytes          = 0
    Output good bytes           = 0

    Output total packets        = 0
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 0
    Output pkts 65-127 bytes    = 0
    Output pkts 128-255 bytes   = 0
    Output pkts 256-511 bytes   = 0
    Output pkts 512-1023 bytes  = 0
    Output pkts 1024-1518 bytes = 0
    Output pkts 1519-Max bytes  = 0

    Output good pkts            = 0
    Output unicast pkts         = 0
    Output multicast pkts       = 0
    Output broadcast pkts       = 0

    Output drop underrun        = 0
    Output drop abort           = 0
    Output drop other           = 0

    Output error other          = 0

Management information for interface TenGigE0/0/0/4:

Port number: 2
Bay number: 0
Interface handle: 0x100000c0

Config:
    Auto-negotiation: Configuration not supported (Off)
    Carrier delay (up): Not configured
    Carrier delay (down): Not configured
    Speed: Configuration not supported (10Gbps)
    Duplex: Configuration not supported (Full Duplex)
    Flow Control: Not configured (None)
    IPG: Not configured (standard (12))
    Loopback: Not configured (None)
    MTU: Not configured
    Soft Bandwidth: Not configured

Driver constraints:
    Min MTU: 64 bytes
    Max MTU: 9216 bytes
    Max speed: 10Gbps
    Interface type: TenGigE
    Management interface: No
    Promiscuous mode: Yes
    Allowed config mask: 0x27b

Cached driver state:
```

```
    MTU: 1522 bytes
    Burnt-in MAC address: 001d.353b.975e

Bundle settings:
    Aggregated: No
    Bundle MTU: 1514 bytes
    Bundle MAC address: 001d.353b.975e

Port FSM state:
    Port is disabled, due to an admin down condition.
Complete FSM state:
    Admin down
    Bundle admin up
    Client admin up
    Client admin tx not disabled
    Port disabled
    Port tx disabled
    Hardware link down
IDB interface state information:
    IDB bundle admin up
    IDB client admin up
    IDB client tx admin up
    IDB error disable not set

0 Unicast MAC Addresses:

0 Multicast MAC Addresses:

0 Unicast Bundle MAC Addresses:

0 Multicast Bundle MAC Addresses:


Current Data
NP(01) Version      : 0003
Structure Version   : 2582
XAUI Interface      : B
MAC addr            : 00.1d.35.3b.97.5e
 RX enabled         : False
 TX enabled         : True
 Obey Pause Frames  : False
 TX Pause Frames    : False
 Pause Re-TX Period : 3000000
 Min Frame Len      : 60
 Max Frame Len      : 1526
 Ignore Errors      : False
 Add CRC            : True
 Strip CRC          : True
 Ignore CRC Errors  : False
 DMA Add CRC        : False
 DMA Strip CRC      : False
 Ignore Length Error: True
 Pad Short Frames   : True
 Min TX IFG         : 12
 Min RX IFG         : 4
 IFG Rate Control   : False
 Hi Gig Mode        : False
 Discard Ctrl Frames: True
 Enable Stats Update: True
 RX Stats Int Mask  : 0x00000000
 TX Stats Int Mask  : 0x00000000

Port Number       : 2
Port Type         : 10GE
```

```
Transport mode    : LAN
BIA MAC addr      : 001d.353b.975e
Oper. MAC addr    : 001d.353b.975e
Port Available    : true
Status polling is : enabled
Status events are : enabled
I/F Handle        : 0x100000c0
Cfg Link Enabled  : disabled
H/W Tx Enable     : yes
MTU               : 1526
H/W Speed         : 10 Gbps
H/W Duplex        : Full
H/W Loopback Type : None
H/W FlowCtrl type : None
H/W AutoNeg Enable: Off
H/W Link Defects  : interface is admin down
Link Up           : no
Link Led Status   : Shutdown
Symbol errors     : 0
Serdes version    : 14.42
Input good underflow          : 0
Input ucast underflow         : 0
Output ucast underflow        : 0
Input unknown opcode underflow: 0
Pluggable Present   : no
Pluggable Type      : Unknown pluggable optics
Pluggable Compl.    : Not Checked
Pluggable Type Supp.:  Not Checked
Pluggable PID Supp. :  Not Checked
Pluggable Scan Flg: false



XFP #2 is not present


Serdes Registers and info port: 2
  EDC Status    : 000000050 - EDC Aquiring
  Rx detected   : No
  Block lock    : No
  Tx aligned    : Yes



Operational data for interface HundredGigE0/2/0/0:
State:
    Administrative state: disabled
    Operational state: Down (Reason: State undefined)

Phy:
    Media type: IEEE 802.3/802.3ae clause 30.2.5
    No optics present

MAC address information:
    Burnt-in address: 0000.0000.0000

Autonegotiation disabled.

Operational values:
    Speed: Unknown
    Duplex: Unknown
    Flowcontrol: None
    Loopback: None (or external)
```

```
    MTU: 0
    MRU: 0

Statistics for interface HundredGigE0/2/0/0 (cached values):

Ingress:
    Input total bytes           = 0
    Input good bytes            = 0

    Input total packets         = 0
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 0
    Input pkts 65-127 bytes     = 0
    Input pkts 128-255 bytes    = 0
    Input pkts 256-511 bytes    = 0
    Input pkts 512-1023 bytes   = 0
    Input pkts 1024-1518 bytes  = 0
    Input pkts 1519-Max bytes   = 0

    Input good pkts             = 0
    Input unicast pkts          = 0
    Input multicast pkts        = 0
    Input broadcast pkts        = 0

    Input drop overrun          = 0
    Input drop abort            = 0
    Input drop invalid VLAN     = 0
    Input drop invalid DMAC     = 0
    Input drop invalid encap    = 0
    Input drop other            = 0

    Input error giant           = 0
    Input error runt            = 0
    Input error jabbers         = 0
    Input error fragments       = 0
    Input error CRC             = 0
    Input error collisions      = 0
    Input error symbol          = 0
    Input error other           = 0

    Input MIB giant             = 0
    Input MIB jabber            = 0
    Input MIB CRC               = 0

Egress:
    Output total bytes          = 0
    Output good bytes           = 0

    Output total packets        = 0
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 0
    Output pkts 65-127 bytes    = 0
    Output pkts 128-255 bytes   = 0
    Output pkts 256-511 bytes   = 0
    Output pkts 512-1023 bytes  = 0
    Output pkts 1024-1518 bytes = 0
    Output pkts 1519-Max bytes  = 0

    Output good pkts            = 0
    Output unicast pkts         = 0
    Output multicast pkts       = 0
    Output broadcast pkts       = 0
```

```
    Output drop underrun        = 0
    Output drop abort           = 0
    Output drop other           = 0

    Output error other          = 0

 Management information for interface HundredGigE0/2/0/0:

Bay number: 96
Port number: 0
Interface handle: 0x1000130

Config:
    Auto-negotiation: Configuration not supported (Off)
    Carrier delay (up): Not configured
    Carrier delay (down): Not configured
    Speed: Configuration not supported (100Gbps)
    Duplex: Configuration not supported (Full Duplex)
    Flow Control: Configuration not supported (None)
    Forward Error Correction: Not configured
    IPG: Configuration not supported (standard (12))
    Loopback: Not configured (None)
    MTU: Not configured
    Bandwidth: Not configured
    BER-SD Threshold: Configuration not supported
    BER-SD Report: Configuration not supported
    BER-SF Threshold: Configuration not supported
    BER-SF Report: Configuration not supported
    BER-SF Signal Remote Failure: Configuration not supported

Driver constraints:
    Min MTU: 64 bytes
    Max MTU: 9216 bytes
    Max speed: 100Gbps
    Interface type: HundredGigE
    Management interface: No
    Promiscuous mode: Yes
    Default carrier delay up (auto-neg on): 0 ms
    Default carrier delay down (auto-neg on): 0 ms
    Default carrier delay up (auto-neg off): 0 ms
    Default carrier delay down (auto-neg off): 0 ms
    Default carrier delay down (tx enable): 0 ms
    Allowed config mask: 0x1243

Cached driver state:
    MTU: 1514 bytes
    Burnt-in MAC address: 089f.40ec.b120

Operational carrier delay:
    Carrier delay (up): 0 ms
    Carrier delay (down): 0 ms

Not a member of a bundle interface.

Port FSM state:
    Port is enabled, link is up

Complete FSM state:
    Admin down
    Client admin down
    Client admin tx not disabled
    Port enabled
    Port tx enabled
```

```
    Hardware link up
IDB interface state information:
    IDB client admin down
    IDB client tx admin up
    IDB error disable not set

0 Unicast MAC Addresses:

0 Multicast MAC Addresses:
```

The following example shows sample output from the **show controllers hundredGigE control** command:

```
RP/0/RP0/CPU0:router#
Management information for interface TenGigE0/0/0/2:

Port number: 2
Bay number: 0
Interface handle: 0x100000c0

Config:
    Auto-negotiation: Configuration not supported (Off)
    Carrier delay (up): Not configured
    Carrier delay (down): Not configured
    Speed: Configuration not supported (10Gbps)
    Duplex: Configuration not supported (Full Duplex)
    Flow Control: Not configured (None)
    IPG: Not configured (standard (12))
    Loopback: Not configured (None)
    MTU: Not configured
    Soft Bandwidth: Not configured

Driver constraints:
    Min MTU: 64 bytes
    Max MTU: 9216 bytes
    Max speed: 10Gbps
    Interface type: TenGigE
    Management interface: No
    Promiscuous mode: Yes
    Allowed config mask: 0x27b

Cached driver state:
    MTU: 1522 bytes
    Burnt-in MAC address: 001d.353b.975e

Bundle settings:
    Aggregated: No
    Bundle MTU: 1514 bytes
    Bundle MAC address: 001d.353b.975e

Port FSM state:
    Port is disabled, due to an admin down condition.
Complete FSM state:
    Admin down
    Bundle admin up
    Client admin up
    Client admin tx not disabled
    Port disabled
    Port tx disabled
    Hardware link down
IDB interface state information:
    IDB bundle admin up
    IDB client admin up
```

```
    IDB client tx admin up
    IDB error disable not set

0 Unicast MAC Addresses:

0 Multicast MAC Addresses:

0 Unicast Bundle MAC Addresses:

0 Multicast Bundle MAC Addresses:
Management information for interface HundredGigE0/2/0/0:

Bay number: 96
Port number: 0
Interface handle: 0x1000130

Config:
    Auto-negotiation: Configuration not supported (Off)
    Carrier delay (up): Not configured
    Carrier delay (down): Not configured
    Speed: Configuration not supported (100Gbps)
    Duplex: Configuration not supported (Full Duplex)
    Flow Control: Configuration not supported (None)
    Forward Error Correction: Not configured
    IPG: Configuration not supported (standard (12))
    Loopback: Not configured (None)
    MTU: Not configured
    Bandwidth: Not configured
    BER-SD Threshold: Configuration not supported
    BER-SD Report: Configuration not supported
    BER-SF Threshold: Configuration not supported
    BER-SF Report: Configuration not supported
    BER-SF Signal Remote Failure: Configuration not supported

Driver constraints:
    Min MTU: 64 bytes
    Max MTU: 9216 bytes
    Max speed: 100Gbps
    Interface type: HundredGigE
    Management interface: No
    Promiscuous mode: Yes
    Default carrier delay up (auto-neg on): 0 ms
    Default carrier delay down (auto-neg on): 0 ms
    Default carrier delay up (auto-neg off): 0 ms
    Default carrier delay down (auto-neg off): 0 ms
    Default carrier delay down (tx enable): 0 ms
    Allowed config mask: 0x1243

Cached driver state:
    MTU: 1514 bytes
    Burnt-in MAC address: 089f.40ec.b120

Operational carrier delay:
    Carrier delay (up): 0 ms
    Carrier delay (down): 0 ms

Not a member of a bundle interface.

Port FSM state:
    Port is enabled, link is up

Complete FSM state:
    Admin down
    Client admin down
```

```
    Client admin tx not disabled
    Port enabled
    Port tx enabled
    Hardware link up
IDB interface state information:
    IDB client admin down
    IDB client tx admin up
    IDB error disable not set

0 Unicast MAC Addresses:

0 Multicast MAC Addresses:
```

The following example shows sample output from the **show controllers TenGigE regs** command:

```
RP/0/RP0/CPU0:router# show controllers tenGigE 0/0/0/1 regs

MAC Registers for port: 1
 GE MAC CFG       (#0954): 704c5e5a
 GPCS Config      (#0147): 00000f08
 GPCS Status      (#0236): 000000ca
 GSERDES Status   (#0237): 0007fe09

RP/0/RP0/CPU0:router# show controllers tenGigE 0/0/0/4 regs

MAC Registers for port: 0
 CONFIG1          (#1034): 03100a1a
 CONFIG2          (#1035): 040c2398
 CONTROL          (#1036): 00000000
 ADDRESS_LOW      (#1037): 53ffa780
 ADDRESS_HIGH     (#1038): 0000001b
 MII_MGMT_CONFIG  (#1039): 00000007
 MII_MGMT_CMD     (#1040): 00000000
 MII_MGMT_ADDRESS (#1041): 00000000
 MII_MGMT_DATA    (#1042): 40000000
 STAT_CONFIG      (#1043): 00000007
 MASK_R           (#1044): 00000000
 MASK_T           (#1045): 00000000
 COMP             (#1046): 00100d24
 MAC_CONFIG       (#1047): ffffffff
 INTERRUPT_C      (#1048): 00000000
```

The following example shows sample output from the **show controllers hundredGigE stats** command:

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

Statistics for interface TenGigE0/0/0/0 (cached values):

Ingress:
    Input total bytes           = 9614339316
    Input good bytes            = 9614339316

    Input total packets         = 106713557
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 103907216
    Input pkts 65-127 bytes     = 2494185
    Input pkts 128-255 bytes    = 3410
    Input pkts 256-511 bytes    = 3406
    Input pkts 512-1023 bytes   = 2
    Input pkts 1024-1518 bytes  = 0
    Input pkts 1519-Max bytes   = 305338

    Input good pkts             = 106713557
```

```
    Input unicast pkts          = 105627141
    Input multicast pkts        = 1086414
    Input broadcast pkts        = 2

    Input drop overrun          = 0
    Input drop abort            = 0
    Input drop unknown 802.1Q   = 0
    Input drop other            = 0

    Input error giant           = 0
    Input error runt            = 0
    Input error jabbers         = 0
    Input error fragments       = 0
    Input error CRC             = 0
    Input error collisions      = 0
    Input error symbol          = 0
    Input error other           = 0

    Input MIB giant             = 305338
    Input MIB jabber            = 0
    Input MIB CRC               = 0

Egress:
    Output total bytes          = 15202682421
    Output good bytes           = 15202682421

    Output total packets        = 107534855
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 103862713
    Output pkts 65-127 bytes    = 2448054
    Output pkts 128-255 bytes   = 308716
    Output pkts 256-511 bytes   = 6
    Output pkts 512-1023 bytes  = 13
    Output pkts 1024-1518 bytes = 0
    Output pkts 1519-Max bytes  = 915353

    Output good pkts            = 107534855
    Output unicast pkts         = 105321133
    Output multicast pkts       = 1298368
    Output broadcast pkts       = 1

    Output drop underrun        = 0
    Output drop abort           = 0
    Output drop other           = 0

    Output error other          = 0

Statistics for interface HundredGigE0/2/0/0 (cached values):

Ingress:
    Input total bytes           = 0
    Input good bytes            = 0

    Input total packets         = 0
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 0
    Input pkts 65-127 bytes     = 0
    Input pkts 128-255 bytes    = 0
    Input pkts 256-511 bytes    = 0
    Input pkts 512-1023 bytes   = 0
    Input pkts 1024-1518 bytes  = 0
    Input pkts 1519-Max bytes   = 0
```

```
    Input good pkts             = 0
    Input unicast pkts          = 0
    Input multicast pkts        = 0
    Input broadcast pkts        = 0

    Input drop overrun          = 0
    Input drop abort            = 0
    Input drop invalid VLAN     = 0
    Input drop invalid DMAC     = 0
    Input drop invalid encap    = 0
    Input drop other            = 0

    Input error giant           = 0
    Input error runt            = 0
    Input error jabbers         = 0
    Input error fragments       = 0
    Input error CRC             = 0
    Input error collisions      = 0
    Input error symbol          = 0
    Input error other           = 0

    Input MIB giant             = 0
    Input MIB jabber            = 0
    Input MIB CRC               = 0

Egress:
    Output total bytes          = 0
    Output good bytes           = 0

    Output total packets        = 0
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 0
    Output pkts 65-127 bytes    = 0
    Output pkts 128-255 bytes   = 0
    Output pkts 256-511 bytes   = 0
    Output pkts 512-1023 bytes  = 0
    Output pkts 1024-1518 bytes = 0
    Output pkts 1519-Max bytes  = 0

    Output good pkts            = 0
    Output unicast pkts         = 0
    Output multicast pkts       = 0
    Output broadcast pkts       = 0

    Output drop underrun        = 0
    Output drop abort           = 0
    Output drop other           = 0

    Output error other          = 0
```

show controllers np descriptions location

To view a complete list of NP traps descriptions, use the **show controllers np descriptions** command in EXEC mode.

show controllers np descriptions [**location** *node-id*]

Syntax Description

location	(Optional) Specifies a fully-qualified line card location.
node-id	The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

None

Command Modes

EXEC mode

Command History

Release	Modification
Release 7.3.4	This command was introduced.

Usage Guidelines

Use the **show controllers np descriptions location** *node-id* command to view a complete list of NP traps descriptions.

Following example shows you the NP traps descriptions and their locations.

```
RP/0/RP0/CPU0:ios#show controllers np ?
  descriptions  descriptions of all the traps(cisco-support)
RP/0/RP0/CPU0:ios#show controllers np descriptions ?
  location  Location of the traps(cisco-support)
RP/0/RP0/CPU0:ios#show controllers np descriptions location ?
  0/1/CPU0    Fully qualified location specification
  0/2/CPU0    Fully qualified location specification
  0/3/CPU0    Fully qualified location specification
  0/RP0/CPU0  Fully qualified location specification
  0/RP1/CPU0  Fully qualified location specification
  WORD        Fully qualified location specification
  all         Display all nodes(cisco-support)
RP/0/RP0/CPU0:ios#show controllers np descriptions location
```

show controllers npu resource

To display the current status and configured thresholds in a hardware module configuration, use `show controllers npu resource` command in XR EXEC mode.

show controllers npu resource { **all** | **centralem** | **egressacltcam** | **egressipv4unifiedacltcam** | **egressipv6unifiedacltcam** | **egressl3dlp** | **egresslargeencap** | **egresssmallencap** | **ingressacltcam** | **ingressipv4qosacltcam** | **ingressipv4unifieddefaultacltcam** | **ingressipv4unifiednondefaultacltcam** | **ingressipv6qosacltcam** | **ingressipv6unifieddefaultacltcam** | **ingressipv6unifiednondefaultacltcam** | **ipv6compressedsips** | **l2serviceport** | **l3acport** | **lpmtcam** | **lptsmeters** | **mcemdb** | **myipv4tbl** | **nativefecentry** | **oglpts** | **protectiongroup** | **sipidxtbl** | **stage1lbgroup** | **stage1lbmember** | **stage2lbgroup** | **stage2lbmember** | **stage2protectionmonitor** | **tunneltermination** | **v4lpts** | **v6lpts** }

Syntax Description

all	Displays all the hardware resources.
centralem	Displays the central exact match table used for exact match routes, MPLS route label, multicast.
egressacltcam	Displays the TCAM utilization for the ACL features for the outgoing traffic.
egressipv4unifiedacltcam (egressacltcam)	Display the egress ipv4 unified acl tcam table, that is used for TCAM-based ACL matching on egress, QoS, security zones, NAT-T, and virtualization.
egressipv6unifiedacltcam (egressacltcam)	Displays the TCAM table used for exact match routes and unified ACLs for IPv6 egress traffic on the network device.
egressl3dlp	Displays Information about egress L3 Data-Link Layer Processing (DLP) resource on a particular NPU.
egresslargeencap	Displays the egress large encapsulation table.
egresssmallencap	Displays the egress small encapsulation table.
ingressacltcam	Displays the TCAM utilization for the ACL features for the incoming traffic.
ingressipv4qosacltcam (ingressacltcam)	Display the ingress IPv4 QoS ACL TCAM table.
ingressipv4unifieddefaultacltcam (ingressacltcam)	Displays the ingressacltcam for the show table.
ingressipv4unifiednondefaultacltcam (ingressacltcam)	Displays the utilization of the ingress IPv4 unified non-default ACL TCAM resources for the specified NPU or for all NPUs.
ingressipv6qosacltcam (ingressacltcam)	Displays the ingress ACL TCAM table used for IPv6 QoS ACLs.
ingressipv6unifieddefaultacltcam (ingressacltcam)	Display the contents of the TCAM table used for IPv6 unified default ACL on ingress interfaces on the router.

ingressipv6unifiednondefaultacltcam (ingressacltcam)	Displays the TCAM configuration for non-default IPv6 ACLs and provides details on the number of TCAM entries, rows, and active ACEs.
ipv6compressedsips	Displays the multicast IPv6 source addresses.
l2serviceport	Displays the L2 forwarding interface.
l3acport	Displays the L3 forwarding interface.
lpmtcam	Displays the longest prefix match.
lptsmeters	Displays the QoS metering table for control path.
mcemdb	Displays multicast replication and route statistics.
myipv4tbl	Displays the ARP route and loopback.
nativefecentry	Displays the Default Route created in VRF.
oglpts	Displays the OGLPTS entries for BGP sessions.
protectiongroup	Displays the protection group for FRR, TILFA, TE-FRR.
sipidxtbl	Displays the IP Index table.
stage1lbgroup	Displays the recursive ecmp group to next hop resolution.
stage1lbmember	Displays the recursive ecmp member to next hop resolution.
stage2protectionmonitor	Displays the stage2 protection monitor table used for fast reroute protection.
tunneltermination	Displays the tunnel termination database 0 for SIP, DIP lookup.
v4lpts	Displays the IPv4 control Path.
v6lpts	Displays the IPv6 control Path

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
7.0.12	This command was introduced.
7.3.2	The **ingressacltcam** and **egressacltcam** options were introduced.

Usage Guidelines

None

Example

This example shows sample output of `show controllers npu resources all location 0/RP0/CPU0` command:

```
RP/0/RP0/CPU0:ios#show controllers npu resources all location 0/RP0/CPU0
Wed Oct 13 16:27:26.218 UTC
HW Resource Information
    Name                            : counter_bank
    Asic Type                       : Q100

NPU-0
OOR Summary
        Estimated Max Entries       : 108
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %
        OOR State                   : Green

Current Hardware Usage
    Name: counter_bank
        Estimated Max Entries       : 108
        Total In-Use                : 60
        OOR State                   : Green

HW Resource Information
    Name                            : l3_ac_port
    Asic Type                       : Q100

NPU-0
OOR Summary
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %


OFA Table Information
(May not match HW usage)
        l3if                        : 37

Current Hardware Usage
    Name: l3_ac_port

       Name: slice_pair_0
           Estimated Max Entries       : 4294967295
           Total In-Use                : 13       (0 %)
           OOR State                   : Green

       Name: slice_pair_1
           Estimated Max Entries       : 4294967295
           Total In-Use                : 10       (0 %)
           OOR State                   : Green

       Name: slice_pair_2
           Estimated Max Entries       : 4294967295
           Total In-Use                : 12       (0 %)
           OOR State                   : Green

HW Resource Information
    Name                            : native_fec_entry
    Asic Type                       : Q100

NPU-0
OOR Summary
        Estimated Max Entries       : 4294967295
```

```
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %
        OOR State                   : Green


OFA Table Information
(May not match HW usage)
        exceptionnh                 : 12

Current Hardware Usage
    Name: native_fec_entry
        Estimated Max Entries       : 4294967295
        Total In-Use                : 13       (0 %)
        OOR State                   : Green

HW Resource Information
    Name                            : stage1_lb_group
    Asic Type                       : Q100

NPU-0
OOR Summary
        Estimated Max Entries       : 8192
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %
        OOR State                   : Green

OFA Table Information
(May not match HW usage)
        nhgroup                     : 0

Current Hardware Usage
    Name: stage1_lb_group
        Estimated Max Entries       : 8192
        Total In-Use                : 0        (0 %)
        OOR State                   : Green

HW Resource Information
    Name                            : stage1_lb_member
    Asic Type                       : Q100

NPU-0
OOR Summary
        Estimated Max Entries       : 4294967295
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %
        OOR State                   : Green

OFA Table Information
(May not match HW usage)
        nhgroup                     : 0

Current Hardware Usage
    Name: stage1_lb_member
        Estimated Max Entries       : 4294967295
        Total In-Use                : 0        (0 %)
        OOR State                   : Green



HW Resource Information
    Name                            : stage2_lb_group
    Asic Type                       : Q100

NPU-0
```

```
OOR Summary
        Estimated Max Entries       : 8192
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %
        OOR State                   : Green

OFA Table Information
(May not match HW usage)
        nhgroup                     : 18

Current Hardware Usage
    Name: stage2_lb_group
        Estimated Max Entries       : 8192
        Total In-Use                : 3        (0 %)
        OOR State                   : Green

HW Resource Information
    Name                            : stage2_lb_member
    Asic Type                       : Q100

NPU-0
OOR Summary
        Estimated Max Entries       : 4294967295
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %
        OOR State                   : Green

OFA Table Information
(May not match HW usage)
        nhgroup                     : 18

Current Hardware Usage
    Name: stage2_lb_member
        Estimated Max Entries       : 4294967295
        Total In-Use                : 3        (0 %)
        OOR State                   : Green


<Output truncated>
```

Example for the egressacltcam option

This example shows sample output of `sshow controllers npu resources egressacltcam location 0/RP0/CPU0` command:

```
RP/0/RP1/CPU0:router#show controllers npu resources egressacltcam location 0/RP0/CPU0
Thu Aug 12 18:34:46.471 UTC
HW Resource Information
    Name                            : egress_acl_tcam
    Asic Type                       : Q100

NPU-0
OOR Summary
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %


Current Hardware Usage
    Name: egress_acl_tcam
```

```
Name: narrow

    Name: slice_0
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_1
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_2
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_3
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_4
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_5
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

Name: wide

    Name: slice_0
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_1
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_2
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_3
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_4
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)

    Name: slice_5
        Estimated Max Entries       : 32768
        Total In-Use                : 0        (0 %)
```

Example for the protection group

This example shows sample output of `show controllers npu resources protection group location 0/RP0/CPU0` command:

```
RP/0/RP0/CPU0:router#show controllers npu resources protection group location 0/3/CPU0
Tue Mar 14 19:55:56.739 UTC
HW Resource Information
    Name                            : protection_group
    Asic Type                       : Q200
```

```
  NPU-0
  OOR Summary
        Estimated Max Entries       : 4096
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %
        OOR State                   : Red

Current Hardware Usage
    Name: : protection_group
        Estimated Max Entries       : 4096
        Total In-Use                : 4062(99 %)
        OOR State                   : Red

  NPU-1
  OOR Summary
        Estimated Max Entries       : 4096
        Red Threshold               : 95 %
        Yellow Threshold            : 80 %
        OOR State                   : Red

Current Hardware Usage
    Name: : protection_group
        Estimated Max Entries       : 4096
        Total In-Use                : 4062(99 %)
        OOR State                   : Red
```

Example for the protection group

Note Use the "debugshell" command for the protection group resource to obtain the accurate information.

This example shows sample output of `show controllers npu debugshell 0 "script resource_usage PROTECTION_GROUP" location 0/3/cpu0` command:

```
RP/0/RP0/CPU0:router#show controllers npu debugshell 0 "script resource_usage
PROTECTION_GROUP" location 0/3/cpu0
Tue Mar 14 19:55:37.309 UTC

Node ID: 0/3/CPU0
Executing User File: /pkg/bin/resource_usage.py
Get resource usage for npu_id: 12, Dev id: 12, Resource: PROTECTION_GROUP
+-----------------+------------+----------+------------+-------------+-------+-----------------------+
| Resource        | Granularity | Location | Max Entries | Used Entries | State | Thresholds
 % High/Low |
+-----------------+------------+----------+------------+-------------+-------+-----------------------+
| PROTECTION_GROUP | Device     |   -      | 4096       | 4082        | Red  |   80.0/79.0,
 95.0/94.0, |
+-----------------+------------+----------+------------+-------------+-------+-----------------------+
```

show interface

To display the L2 interface MTU on the main interface, use `show interface` command in Global Configuration mode.

show interface { *interface* } { *location* }

Syntax Description

interface	Displays the interface on which you have configured L2 interface MTU.
location *node id*	Displays information about all interfaces on the specified node. The node-id argument is entered in the rack/slot/module notation.

Command Default

No default behavior or values

Command Modes

Global Configuration mode

Command History

Release	Modification
7.5.2	This command was introduced.

Usage Guidelines

None

Example

This example shows sample output of `show interface` command:

```
RP/0/RP0/CPU0:sf_f2#show int HundredGigE 0/0/0/20
Fri Mar  4 19:06:31.210 UTC
HundredGigE0/0/0/20 is administratively down, line protocol is administratively down
  Interface state transitions: 0
  Hardware is HundredGigE, address is 9077.ee50.eaa0 (bia 9077.ee50.eaa0)
  Internet address is Unknown
  MTU 1514 bytes, BW 100000000 Kbit (Max: 100000000 Kbit)
     reliability 255/255, txload 0/255, rxload 0/255
```

show interfaces counters rates physical

To display the traffic rates and bandwidth for all the physical interfaces, use `show interfaces counters rates physical` command.

show interfaces counters rates physical

Syntax Description

interfaces	Displays all the physical interfaces.
counters	Counter information for interfaces.
rates	Rate information for interfaces.
physical	Rate information for physical interfaces.

Command History

Release	Modification
7.5.4	This command was introduced.

Example

This example shows sample output of `show interfaces counters rates physical` command:

```
Router#show interfaces counters rates physical

    InterfaceName          Intvl   InMbps   InBW%  InKpps  OutMbps  OutBW%   OutKpps
    GigabitEthernet0/2/0/0  0:05    0.0     0.0%    0.0       0.0     0.0%       0.0
    GigabitEthernet0/2/0/1  0:05    0.0     0.0%    0.0       0.0     0.0%       0.0
    GigabitEthernet0/2/0/2  0:05    0.0     0.0%    0.0       0.0     0.0%       0.0
    GigabitEthernet0/2/0/3  0:05  235.0    22.0%   23.5      87.0     9.5%       7.2
    GigabitEthernet0/3/0/0  0:05   88.0     9.3%    7.0     100.0    10.0%      10.5
    GigabitEthernet0/3/0/1  0:05    0.0     0.0%    0.0       0.0     0.0%       0.0
```

The statistics for each physical interface is calculated for the time interval of 5 sec. Hence, the input and output rate (in Mbps and Kpps) is the real-time statistics.

Note The traffic rate displayed is the real-time link utilization of the time interval. The time interval is determined by the system and may vary based on the system processing load. The time interval increases during events where the system is handling, for example, performing routing updates.

show lldp

To display the global Link Layer Discovery Protocol (LLDP) operational characteristics on the system, use the **show lldp** command in XR EXEC mode.

show lldp

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The **show lldp** command displays the LLDP operational characteristics when LLDP is enabled globally on the system using the **lldp** command. The settings for the following commands are displayed:

- **lldp timer**
- **lldp holdtime**
- **lldp reinit**

Task ID

Task ID	Operation
ethernet-services	read

Example 1

The following example shows the default LLDP operational characteristics when LLDP is enabled globally on the system:

```
RP/0/RP0/CPU0:router# show lldp
Wed Apr 13 06:16:45.510 DST
Global LLDP information:
        Status: ACTIVE
        LLDP advertisements are sent every 30 seconds
        LLDP hold time advertised is 120 seconds
        LLDP interface reinitialisation delay is 2 seconds
```

Example 2

The following example shows the output when LLDP is not enabled globally on the system:

```
RP/0/RP0/CPU0:router# show lldp
Wed Apr 13 06:42:48.221 DST
% LLDP is not enabled
```

Related Commands

Command	Description
lldp timer, on page 49	Specifies the LLDP packet rate.
lldp holdtime, on page 47	Specifies the length of time that information from an LLDP packet should be held by the receiving device before aging and removing it.
lldp reinit, on page 48	Specifies the length of time to delay initialization of LLDP on an interface.

show lldp entry

To display detailed information about LLDP neighbors, use the **show lldp entry** command in XR EXEC mode.

show lldp entry {***** *name*}

Syntax Description

*****	Displays detailed information about all LLDP neighbors.
name	Name of a specific LLDP neighbor for which detailed information is displayed.

Syntax Description

This command has no keywords or arguments.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	read

The following example shows sample output for all LLDP neighbor table entries on the system:

```
RP/0/RP0/CPU0:router# show lldp entry *
Wed Apr 13 10:29:40.342 UTC
Capability codes:
        (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
        (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

------------------------------------------------
Local Interface: HundredGigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8
Port Description: HundredGigabitEthernet0/0/0/8
System Name: asr9k-5

System Description:
Cisco IOS XR Software, Version 4.1.0.32I[Default]
Copyright (c) 2011 by Cisco Systems, Inc.

Time remaining: 102 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
Management Addresses:
  IPv4 address: 10.5.173.110
```

```
------------------------------------------------
Local Interface: HundredGigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8.1
Port Description: HundredGigabitEthernet0/0/0/8.1
System Name: asr9k-5

System Description:
Cisco IOS XR Software, Version 4.1.0.32I[Default]
Copyright (c) 2011 by Cisco Systems, Inc.

Time remaining: 96 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
Management Addresses:
  IPv4 address: 10.5.173.110



Total entries displayed: 2
```

show lldp errors

To display Link Layer Discovery Protocol (LLDP) error and overflow statistics, use the **show lldp errors** command in XR EXEC mode.

show lldp errors [**location** *location*]

Syntax Description

location	*location*	(Optional) Displays information about LLDP neighbors for the specified location. The *location* argument is entered in the *rack/slot/module* notation.

Command Default

Totals of LLDP error and overflow statistics for the system are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	read

The following example shows sample output for the **show lldp errors** command:

```
RP/0/RP0/CPU0:router# show lldp errors
Wed Apr 13 06:17:08.321 DST

LLDP errors/overflows:
        Total memory allocation failures: 0
        Total encapsulation failures: 0
        Total input queue overflows: 0
        Total table overflows: 0
```

Related Commands

Command	Description
lldp, on page 45	Enables LLDP globally for both transmit and receive operation on the system.

show lldp interface

To display Link Layer Discovery Protocol (LLDP) configuration and status information on an interface, use the **show lldp interface** command in XR EXEC mode.

show lldp interface [*type interface-path-id* | **location** *location*]

Syntax Description

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.
location *location*	(Optional) Displays information about LLDP neighbors for the specified location. The *location* argument is entered in the *rack/slot/module* notation.

Command Default

LLDP configuration and status information for all interfaces is displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

When LLDP is enabled globally on the system, all supported interfaces are automatically enabled for both LLDP receive and transmit operations. You can individually disable interfaces for either LLDP receive or transmit operations using the **receive disable** command or **transmit disable** command in LLDP configuration mode under the interface.

Task ID

Task ID	Operation
ethernet-services	read

The following example shows sample output for the **show lldp interface** command for the Gigabit Ethernet interface at 0/1/0/7:

```
RP/0/RP0/CPU0:router# show lldp interface hundredgigabitethernet 0/1/0/7
Wed Apr 13 13:22:30.501 DST


HundredGigabitEthernet0/1/0/7:
        Tx: enabled
        Rx: enabled
        Tx state: IDLE
        Rx state: WAIT FOR FRAME
```

Table 4: show lldp interface Field Descriptions

Field	Description
Tx:	Configuration status of the interface to transmit LLDP advertisements.
Rx:	Configuration status of the interface to receive LLDP advertisements.
Tx state:	Status of the LLDP transmit process on the interface.
Rx state:	Status of the LLDP receive process on the interface.

Related Commands

Command	Description
lldp, on page 45	Enables LLDP globally for both transmit and receive operation on the system.
lldp (interface), on page 46	Enters LLDP configuration mode.

show lldp neighbors

To display information about Link Layer Discovery Protocol (LLDP) neighbors, use the **show lldp neighbors** command in XR EXEC mode.

show lldp neighbors [*type interface-path-id* | **location** *location*] [**detail**]

Syntax Description

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.
location *location*	(Optional) Displays information about LLDP neighbors for the specified location. The *location* argument is entered in the *rack/slot/module* notation.
detail	(Optional) Displays all available information about LLDP neighbors.

Command Default

Basic device information for LLDP neighbors is displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.11	This command was introduced.

Usage Guidelines

To clear the neighbor information displayed by the **show lldp neighbors** command, use the **clear lldp table** command.

Task ID

Task ID	Operation
ethernet-services	read

The following example show sample output for the **show lldp neighbors** command:

```
RP/0/RP0/CPU0:router# show lldp neighbors
Capability codes:
    (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
    (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

Device ID           Local Intf     Hold-time  Capability      Port ID
R1                  Et1/0          150        R               Et1/0

Total entries displayed: 1
```

Table 5: show lldp neighbors Field Descriptions

Field	Description
Device ID	Name of the neighbor device. **Note** If the device ID has more than 20 characters, the ID will be truncated to 20 characters in command output because of display constraints.
Local Intf	Local interface through which this neighbor is connected.
Hold-time	Amount of time (in seconds) that the local device will hold the LLDP advertisement from a sending device before discarding it.
Capability	The device type of the neighbor, whose values correspond to the characters and definition displayed in the "Capability codes" section.
Port ID	Interface and port number of the neighboring device.

The following example shows sample output for the **show lldp neighbors detail** command:

```
RP/0/RP0/CPU0:router# show lldp neighbors detail
Wed Apr 13 10:29:40.342 UTC
Capability codes:
        (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
        (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other

------------------------------------------------
Local Interface: HundredGigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8
Port Description: HundredGigabitEthernet0/0/0/8
System Name: asr9k-5

System Description:
Cisco IOS XR Software, Version 4.1.0.32I[Default]
Copyright (c) 2011 by Cisco Systems, Inc.

Time remaining: 102 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
Management Addresses:
  IPv4 address: 10.5.173.110



------------------------------------------------
Local Interface: HundredGigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8.1
Port Description: HundredGigabitEthernet0/0/0/8.1
System Name: asr9k-5

System Description:
Cisco IOS XR Software, Version 4.1.0.32I[Default]
```

```
Copyright (c) 2011 by Cisco Systems, Inc.

Time remaining: 96 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
Management Addresses:
  IPv4 address: 10.5.173.110


Total entries displayed: 2
```

show lldp traffic

To display statistics for Link Layer Discovery Protocol (LLDP) traffic, use the **show lldp traffic** command in XR EXEC mode.

show lldp traffic [**location** *location*]

Syntax Description

location	*location*	(Optional) Displays LLDP statistics for traffic at the specified location. The *location* argument is entered in the *rack/slot/module* notation.

Command Default

Totals of LLDP statistics for the system are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

To reset the counters displayed by the **show lldp traffic** command, use the **clear lldp counters** command.

Task ID

Task ID	Operation
ethernet-services	read

The following example shows sample output for statistics for all LLDP traffic on the system:

```
RP/0/RP0/CPU0:router# show lldp traffic
LLDP traffic statistics:
    Total frames out: 277
    Total entries aged: 0
    Total frames in: 328
    Total frames received in error: 0
    Total frames discarded: 0
    Total TLVs discarded: 0
    Total TLVs unrecognized: 0
```

Table 6: show lldp traffic Field Descriptions

Field	Description
Total frames out:	Number of LLDP advertisements sent from the device.
Total entries aged:	Number of LLDP neighbor entries removed due to expiration of the hold time.
Total frames in:	Number of LLDP advertisements received by the device.
Total frames received in error:	Number of times the LLDP advertisements contained errors of any type.

Field	Description
Total frames discarded:	Number of times the LLDP process discarded an incoming advertisement.
Total TLVs discarded:	Number of times the LLDP process discarded a Type Length Value (TLV) from an LLDP frame.
Total TLVs unrecognized:	Number of TLVs that could not be processed because the content of the TLV was not recognized by the device or the contents of the TLV were incorrectly specified.

interface range

To configure multiple interfaces of the same type in the specified range with a single interface configuration element, use the **interface** *type, specified-range* command in interface configuration mode.

interface *{type, specified-range}*

Syntax Description

type	Defines an interface type that is supported in IOS XR.
specified-range	Defines a range for the interface that will be configured. You can either use ',' or '-' to specify the range within system limits. For example, 2-4.

Command Default

None

Command Modes

Global Interface Configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

This command needs memory allocation for the specified interface range. Refer to system limits specifications prior to specifying the range in the command.

Task ID

Task ID	Operation
interface	read, write

This example shows how to configure HundredGigabitEthernet interface type for a specifiied range:

```
RP/0/RP0/CPU0:router(config)# int HundredGigabitEthernet 0/0/0/0,2-4
RP/0/RP0/CPU0:router(config-if-range)# description Test interface range
RP/0/RP0/CPU0:router(config-if-range)# show configuration
Thu Jan 11 06:46:43.502 PST
Building configuration...
interface HundredGigabitEthernet0/0/0/0
description Test Interface range
!
interface HundredGigabitEthernet0/0/0/2
description Test Interface range
!
interface HundredGigabitEthernet0/0/0/3
description Test Interface range
```

```
!
interface HundredGigabitEthernet0/0/0/4
description Test Interface range
!
```

This example shows how to configure TenGigabitEthernet interface type for a specified range:

```
RP/0/RP0/CPU0:router(config)# interface tengig 0/0/0/16/0-3
```

Ethernet OAM Commands

This module provides command line interface (CLI) commands for configuring Ethernet Operations, Administration, and Maintenance (EOAM) on the .

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

cfm-delay-measurement probe

To measure Ethernet frame delay in the Layer 2 networks, use the **cfm-delay-measurement probe** command in XR EXEC mode.

```
{ cfm-delay-measurement probe [priority number] [send { packet {once
|every number { seconds |minutes |hours } } |burst { once |every number
{ seconds |minutes |hours } } } packet count number interval number
seconds] statistics measure {one-way-delay-ds |one-way-delay-sd |
one-way-jitter-ds |one-way-jitter-sd |round-trip-delay |round-trip-jitter
} aggregate {none |bins number width milliseconds} buckets { archive
number |size number {per-probe |probes } } schedule {now |at hh :mm
[.ss] [day [month [year]]] } |in number {seconds |minutes |hours} [for
duration {seconds |minutes |hours } ] [repeat every number {seconds |
minutes |hours} count probes]}
```

Syntax Description

priority *number*	(Optional) Configures the priority of outgoing SLA probe packets. The range is 0 to 7. The default is to use the COS bits for the egress interface.
send packet once	(Optional) Sends one packet one time.
send packet every *number* { **seconds** | **minutes** | **hours**}	(Optional) Sends one packet every specified number of milliseconds, seconds, minutes, or hours, where *number* is in the following range: • 1 to 3600 **seconds** • 1 to 1440 **minutes** • 1 to 168 **hours**
send burst once	(Optional) Specifies that a burst of packets is sent one time. This is the default.

send burst every *number* {**seconds** | **minutes** | **hours**}}	(Optional) Sends a burst of packets every specified number of seconds, minutes, or hours, where *number* is in the following range: • 1–3600 **seconds** • 1–1440 **minutes** • 1–168 **hours** The default is to send a burst every 10 seconds.
packet count *number*	Specifies the number of packets to be sent in a burst, in the range 2 to 600. The default is 10.
interval *number* { **seconds**}	Specifies the time between sending packets in a burst, where *number* is in the following range: • 1 to 30 **seconds** **Note** The total length of a burst (the packet count multiplied by the interval) must not exceed 1 minute.
packet size*bytes*	Minimum size of the packet including padding when necessary. The range is 1 to 9000 bytes. This value is the total frame size including the Layer 2 or Layer 3 packet header.

statistics measure	(Optional) Specifies the type of statistics to collect: • **one-way-delay-ds**—One-way delay statistics from destination to source. • **one-way-delay-sd**—One-way delay statistics from source to destination. • **one-way-jitter-ds**—One-way delay jitter from destination to source. • **one-way-jitter-sd**—One-way delay jitter from source to destination. • **round-trip-delay**—Round-trip delay statistics. • **round-trip-jitter**—Round-trip jitter statistics. All statistics are collected by default.
aggregate none	(Optional) Specifies that statistics are not aggregated into bins, and each statistic is stored individually. **Caution** This option can be memory-intensive and should be used with care.
aggregate bins *number*	(Optional) Specifies the number of bins (from 2 to 100) within each bucket to store sample packets from the probe. The default is to aggregate into one bin.

width *milliseconds*	Specifies the range of the samples to be collected within each bin in milliseconds, from 1 to 10000. Based on the specified width, bins are established in the following way: • Delay measurements (round-trip or one-way)—The lower bound of the bins is zero and the first bin's upper limit is 0 plus the specified width, and the last bin is unbounded. • Jitter measurements (round-trip or one-way)—The bins are evenly distributed around zero, with both the lowest and highest numbered bins being unbounded.
buckets archive *number*	(Optional) Specifies the number of buckets to store in memory from 1 to 100. The default is 100.
buckets size *number*	(Optional) Specifies the number of buckets to be used for probes from 1 to 100. The default is 1.
per-probe	Specifies that probes span multiple buckets.
probes	Specifies that buckets span multiple probes.
schedule now	(Optional) Specifies that the probe begins as soon as you enter the command. This is the default.
schedule at *hh*:*mm*	(Optional) Specifies a specific time at which to start the probe in 24-hour notation.
ss	(Optional) Number of seconds into the next minute at which to start the probe.
day	(Optional) Number in the range 1 to 31 of the day of the month on which to start the probe.

month	(Optional) Name of the month (full word in English) in which to start the probe.
year	(Optional) Year (fully specified as 4 digits) in which to start the probe.
schedule in *number* {**seconds** | **minutes** | **hours**}	(Optional) Specifies a relative time, as a number of seconds, minutes or hours from the current time, at which to start the probe, where *number* is in the following ranges: • 1 to 3600 **seconds** • 1 to 1440 **minutes** • 1 to 24 **hours**
for *duration* {**seconds** | **minutes** | **hours**}	(Optional) Specifies the length of the probe as a number of seconds, minutes, or hours, where *number* is in the following ranges: • 1 to 3600 **seconds** • 1 to 1440 **minutes** • 1 to 24 **hours** **Note** The duration should not exceed the interval specified by the **repeat every** option.
repeat every *number* {**seconds** | **minutes** | **hours**}	(Optional) Specifies the interval at which to restart the probe as a number of seconds, minutes, or hours, where *number* is in the following ranges: • 1 to 90 **seconds** • 1 to 90 **minutes** • 1 to 24 **hours** The default is that probes are not repeated, and there is no default interval.

count *probes*	Specifies the number of probes to run in the range 1–100. There is no default.

Command Default

None.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.5.3	The commad was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

This example shows how to configure Ethernet frame delay measurement.

```
Router(config)#ethernet sla
Router(config-sla)#profile EVC-1 type cfm-delay-measurement
Router(config-sla-prof)#probe
Router(config-sla-prof-pb)#send packet every 1 seconds
Router(config-sla-prof-pb)#schedule
Router(config-sla-prof-schedule)#every 3 minutes for 120 seconds
Router(config-sla-prof-schedule)#statistics
Router(config-sla-prof-stat)#measure round-trip-delay
Router(config-sla-prof-stat-cfg)#buckets size 1 probes
Router(config-sla-prof-stat-cfg)#buckets archive 5
```

clear ethernet cfm ccm-learning-database location

To clear the Continuity Check Message (CCM) learning database, use the **clear ethernet cfm ccm-learning-database location** command in EXEC mode.

clear ethernet cfm ccm-learning-database location {**all***node-id*}

Syntax Description

all	Clears the CCM learning database for all interfaces.
node-id	Clears the CCM learning database for the designated node, entered in *r ack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all the CFM CCM learning databases on all interfaces:

```
RP/0/RP0/CPU0:router# clear ethernet cfm ccm-learning-database location all
```

Related Commands

Command	Description
show ethernet cfm ccm-learning-database, on page 124	Displays the CCM learning database.

clear ethernet cfm interface statistics

To clear the counters for an Ethernet CFM interface, use the **clear ethernet cfm interface statistics** command in XR EXEC mode.

clear ethernet cfm interface *interface-path-id* **statistics** [**location** {**all** | **location**}]
clear ethernet cfm interface statistics location {**all***node-id*}

Syntax Description

interface-path-id	(Optional) 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	(Optional only when used with a specified interface) Clears MAC accounting statistics for a designated interface or for all interfaces.
all	Clears CFM counters for all interfaces.
node-id	Clears CFM counters for a specified interface, using *rack/slot* notation.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all the CFM counters from all interfaces:

```
RP/0/RP0/CPU0:router# clear ethernet cfm interface statistics location all
```

Related Commands

Command	Description
show ethernet cfm interfaces statistics, on page 130	Displays the per-interface counters for CFM.

clear ethernet cfm local meps

To clear the counters for all MEPs or a specified MEP, use the **clear ethernet cfm local meps** command in XR EXEC mode.

clear ethernet cfm local meps {**all** | **domain** *domain-name* {**all** | **service** *service-name* {**all** | **mep-id** *id*}} | **interface** *interface-name* {**all** | **domain** *domain-name*}}

Syntax Description

all	Clears counters for all local MEPs.
domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. **Note** For more information about the syntax, use the question mark (**?**) online help function.
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
mep-id *id*	Maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *interface-name*	String of a maximum of 80 characters that identifies the Ethernet interface.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

The following counters are cleared:

- Number of continuity-check messages (CCMs) sent
- Number of CCMs received
- Number of CCMs received out of sequence
- Number of CCMs received, but discarded due to the **maximum-meps** limit
- Number of loopback messages (LBMs), used for CFM ping
- Number of loopback replies (LBRs), used for CFM ping, sent and received
- Number of LBRs received out of sequence
- Number of LBRs received with bad data (such as LBRs containing padding which does not match the padding sent in the corresponding LBM)
- Number of alarm indication signal (AIS) messages sent and received
- Number of lock (LCK) messages received

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear counters for all MEPs:

```
RP/0/RP0/CPU0:router# clear ethernet cfm local meps all
```

Related Commands

Command	Description
show ethernet cfm local meps, on page 134	Displays information about local MEPs.

clear ethernet cfm offload

To trigger the re-application of Maintenance End Points (MEPs) that have been disabled due to exceeding offload resource limits, use the **clear ethernet cfm offload** command in the XR EXEC mode.

Note This command does not clear any counters or stored statistics for the MEPs.

clear ethernet cfm offloadlocation*node-id*

Syntax Description

location *node-id*	(Optional) Specifies the location for which the re-application of MEPs needs to be triggered.

Command Default

The default action is to clear the CFM offload information for all nodes.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	execute

Example

This example shows how to execute the **clear ethernet cfm offload** command:

```
RP/0/RP0/CPU0:router# clear ethernet cfm offload
```

clear ethernet cfm peer meps

To clear all peer MEPs or peer MEPs for a specified local MEP, use the **clear ethernet cfm peer meps** command in XR EXEC mode.

clear ethernet cfm peer meps {**all** | **domain** *domain-name* {**all** | **service** *service-name* {**all** | **local mep-id** *id*}} | **interface** *interface-name* {**all** | **domain** *domain-name*}}

all	Clears counters for all peer MEPs.
domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. **Note** For more information about the syntax, use the question mark (**?**) online help function.
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance end points belong.
local mep-id *id*	Local maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *interface-name*	String of a maximum of 80 characters that identifies the Ethernet interface.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

This command removes all received CCMs and corresponding peer MEPs from the database (other than those configured with cross-check). The peer MEPs will be added again when the next CCM is received.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all peer MEPs:

```
RP/0/RP0/CPU0:router# clear ethernet cfm peer meps all
```

Related Commands

Command	Description
show ethernet cfm peer meps, on page 140	Displays information about maintenance end points (MEPs) for peer MEPs.

clear ethernet cfm traceroute-cache

To remove the contents of the traceroute cache, use the **clear ethernet cfm traceroute-cache** command in XR EXEC mode.

clear ethernet cfm traceroute-cache {**all** | **domain** *domain-name* {**all** | **service** *service-name* {**all** | **mep-id** *id*}} | **interface** *interface-name* {**all** | **domain** *domain-name*}}

Syntax Description

domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. **Note** For more information about the syntax, use the question mark (**?**) online help function.
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance end points belong.
mep-id *id*	Maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *interface-name*	String of a maximum of 80 characters that identifies the Ethernet interface.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all ethernet cfm traceroute-cache:

```
RP/0/RP0/CPU0:router# clear ethernet cfm traceroute-cache all
```

Related Commands

Command	Description
show ethernet cfm traceroute-cache, on page 148	Displays the contents of the traceroute cache.

cos (CFM)

To configure the class of service (CoS) for all CFM packets generated by the maintenance end point (MEP) on an interface, use the **cos** command in interface CFM MEP configuration mode. To return to the default CoS, use the **no** form of this command.

cos *cos*

Syntax Description

cos	Class of Service for this MEP. The range is 0 to 7.

Command Default

When not configured, the default CoS value is inherited from the Ethernet interface.

Command Modes

Interface CFM MEP configuration (config-if-cfm-mep)

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

Configuring the class of service (CoS) on maintenance end points (MEPs) is supported on all Ethernet interfaces.

The specifed CoS value is used for all CFM messages transmitted by the MEP, except for the following:

- Loopback and Linktrace replies—These are transmitted using the CoS value received in the corresponding loopback or linktrace message.
- AIS messages—If a different CoS value is specified in the AIS configuration.
- Ethernet SLA probe messages.

Note For Ethernet interfaces, the CoS is carried as a field in the VLAN tag. Therefore, CoS only applies to interfaces where packets are sent with VLAN tags. If the **cos (CFM)** command is excuted for a MEP on an interface that does not have a VLAN encapsulation configured, it will be ignored.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the class of service (CoS) for a maintenance end point (MEP) on an interface.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ethernet cfm mep domain Dm1 service Sv1 mep-id 1
RP/0/RP0/CPU0:router(config-if-cfm-mep)# cos 7
```

Related Commands

Command	Description
ethernet cfm (interface), on page 110	Enters interface CFM configuration mode.

ethernet cfm (global)

To enter Connectivity Fault Management (CFM) configuration mode, use the **ethernet cfm (global)** command in XR Config mode.

ethernet cfm

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enter the CFM configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)#
```

Related Commands

Command	Description
ethernet cfm (interface), on page 110	Enters interface CFM configuration mode.
show ethernet cfm configuration-errors, on page 126	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.
show ethernet cfm local maintenance-points, on page 132	Displays a list of local maintenance points.
clear ethernet cfm local meps, on page 102	Clears the counters for all MEPs or a specified MEP.

ethernet cfm (interface)

To enter interface CFM configuration mode, use the **ethernet cfm (interface)** command in interface configuration mode.

ethernet cfm

Syntax Description

This command has no keywords or arguments.

Command Default

No MEPs are configured on the interface.

Command Modes

Interface configuration (config-if)

Subinterface configuration (config-subif)

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enter interface CFM configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0/CPU0:router(config-if-cfm)#
```

Related Commands

Command	Description
cos (CFM), on page 107	Configures the CoS for all CFM packets generated by the MEP on an interface.
ethernet cfm (global), on page 109	Enters CFM configuration mode.
mep domain, on page 114	Creates a MEP on an interface.
show ethernet cfm configuration-errors, on page 126	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.
show ethernet cfm local maintenance-points, on page 132	Displays a list of local maintenance points.

Command	Description
show ethernet cfm local meps, on page 134	Displays information about local MEPs.

maximum-meps

To configure the maximum number of maintenance end points (MEPs) for a service, use the **maximum-meps** command in CFM domain service configuration mode. To return to the default value, use the no form of this command.

maximum-meps *number*

Syntax Description

number	Maximum number of MEPs allowed for this service. The range is 2 to 8190.

Command Default

The default is 100.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

This command configures the maximum number of peer maintenance end points (MEPs). It does not limit the number of local MEPs. The configured **maximum-meps** *number* must be at least as great as the number of configured crosscheck MEPs.

The **maximum-meps** *number* limits the number of peer MEPs, for which local MEPs store continuity-check messages (CCMs). When the limit is reached, CCMs from any new peer MEPs are ignored, but CCMs from existing peer MEPs continue to be processed normally.

The **maximum-meps** *number* also limits the size of the CCM learning database.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the maximum number of maintenance end points (MEPs) for a service:

Related Commands

Command	Description
ethernet cfm (global), on page 109	Enters CFM configuration mode.
ethernet cfm (interface), on page 110	Enters interface CFM configuration mode.
service, on page 121	
show ethernet cfm configuration-errors, on page 126	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.

Command	Description
show ethernet cfm local maintenance-points, on page 132	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 134	Displays information about local MEPs.
show ethernet cfm peer meps, on page 140	Displays information about maintenance end points (MEPs) for peer MEPs.

mep domain

To create a maintenance end point (MEP) on an interface, use the **mep domain** command in interface CFM configuration mode. To remove the MEP from the interface, use the **no** form of this command.

mep domain *domain-name* **service** *service-name* **mep-id** *id-number*

Syntax Description

domain *domain-name*	Domain in which to create the maintenance end point (MEP).
service *service-name*	Operation service in which to create the maintenance end point (MEP).
mep-id *id-number*	Maintenance end points (MEP) identifier to assign to this MEP. The range is 1 to 8191.

Command Default

No MEPs are configured on the interface.

Command Modes

Interface CFM configuration (config-if-cfm)

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

CFM Maintenance end points (MEPs) are supported on all Ethernet interfaces and VLAN subinterfaces.

This command creates MEPs in the UP MEP state, unless the specified **service** is configured with MEPs in the DOWN MEP state. See the service command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to create a MEP using an ID of 1 on the CFM domain named DM1 and service named Sv1:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0/CPU0:router(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
```

Related Commands

Command	Description
ethernet cfm (interface), on page 110	Enters interface CFM configuration mode.
show ethernet cfm configuration-errors, on page 126	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.

mep-id

To enable crosscheck on a maintenance end point (MEP), use the **mep-id** command in CFM MEP crosscheck configuration mode. To disable crosscheck on a MEP, use the **no** form of this command.

mep-id *mep-id-number* [**mac-address** *mac-address*]

Syntax Description

mac *mac-address*	(Optional) MAC address of the interface upon which the MEP resides, in standard hexadecimal format, hh:hh:hh:hh:hh:hh.

Command Default

Not configured, in which case no crosscheck is performed on the MEP.

Command Modes

CFM MEP crosscheck configuration (config-cfm-xcheck)

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

This command enables Crosscheck on the maintenance end point (MEP) specified by the MEP ID number (*mep-id-number*). The range for MEP ID numbers is 1 to 8191. Crosscheck is enabled when the first crosscheck MEP is entered.

Repeat this command for every MEP that you want to include in the expected set of MEPs for crosscheck.

Crosscheck detects the following two additional defects for continuity-check messages (CCMs) on peer MEPs:

- Peer MEP missing—A crosscheck MEP is configured, but has no corresponding peer MEP from which to receive CCMs.
- Peer MEP unexpected—A peer MEP is sending CCMs, but no crosscheck MEP is configured for it.

Note If more than one local MEP is configured for a service, all the local MEPs must be included in the list of configured crosscheck MEPs.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to statically define a maintenance end point (MEP) under a service, so that it can be crosschecked.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
```

```
RP/0/RP0/CPU0:router(config-cfm-xcheck)# mep-id 10
```

ping ethernet cfm

To send Ethernet connectivity fault management (CFM) loopback messages to a maintenance end point (MEP) or MAC address destination from the specified source MEP, and display a summary of the responses, use the **ping ethernet cfm** command in EXEC mode.

ping ethernet cfm domain *domain-name* **service** *service-name* {**mac-address** *mac* | **mep-id** *id*} **source** [**mep-id** *source-id*] **interface** *interface-path-id* [**cos** *cos-val*] [**count** *n*] [**frame-size** *size*] [**data-pattern** *hex*] [**interval** *seconds*] [**timeout** *time*]

Syntax Description

domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. **Note** For more information about the syntax, use the question mark (**?**) online help function.
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
mac-address *mac*	6-byte ID number of the MAC address of the destination MEP.
mep-id *id*	Maintenance end point (MEP) ID number of the destination MEP. The range for MEP ID numbers is 1 to 8191.
source	Source information.
mep-id *source-id*	(Optional) Maintenance end point (MEP) ID number of the source MEP. The range for MEP ID numbers is 1 to 8191.
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.
cos *cos-val*	(Optional) Class of Service (CoS) value that identifies the class of traffic of the source MEP. The valid values are from 0 to 7.
count *n*	(Optional) Number of pings as an integer value. The default is 5.
frame-size *size*	(Optional) Size, as an integer, of the ping frames. Frames are padded to read the specified size. The default is 0 (no padding)
data-pattern *hex*	(Optional) Hexadecimal value to be used as the data pattern for padding within a ping frame, when padding is required due to the **frame-size** configuration. The default is 0.
interval *seconds*	(Optional) Specifies, in seconds, the time between pings. The *n* argument is entered in seconds. The default is 1 second.

timeout *time*	(Optional) Timeout, in seconds, for the ping packet. The default is 2.

Command Modes

EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

Before you can use this command, a local MEP must be configured for the domain and the interface.

The command displays the following infomation:

- Number of loopback message being sent
- Timeout period
- Domain name
- Domain level
- Service name
- Source MEP ID
- Interface
- Target MAC address
- MEP ID – If no MEP ID is specified, “No MEP ID specified” is displayed.
- Running time for the current ping operation to complete

Note The remaining information is not displayed until the current ping operation is complete. If the user interrupts the operation during this time (by pressing control-C), the prompt is returned and no further information is displayed. However, all loopback messages continue to be sent.

- Success rate of responses received – displayed as a percentage followed by the actual number of responses
- The round trip time minimum/maximum/average in milliseconds
- Out-of-sequence responses – displayed as a percentage followed by the actual number of out-of-sequence responses when at least one response is received. An out-of-sequence response occurs if the first response does not correspond with the first message sent, or a subsequent response is not the expected next response after a previously received response.
- Bad data responses – displayed as a percentage followed by the actual number of bad data responses when at least one response is received. A bad data response occurs if the padding data in the response does not match the padding data that in the sent message. This can only happen if the sent message is padded using the **frame-size** option.
- Received packet rate – displayed in packets per second when at least two responses are received. This approximate rate of response is the time between the first response received and the last response received, divided by the total number of responses received.

Task ID

Task ID	Operations
basic-services	execute
ethernet-services	execute

Examples

The following example shows how to send an Ethernet CFM loopback message:

```
RP/0/RP0/CPU0:router# ping ethernet cfm domain D1 service S1 mep-id 16 source
interface GigabitEthernet 0/0/0/0

Type escape sequence to abort.
Sending 5 CFM Loopbacks, timeout is 2 seconds -
Domain foo (level 2), Service foo
Source: MEP ID 1, interface GigabitEthernet0/0/0/0
Target: 0001.0002.0003 (MEP ID 16):
  Running (5s) ...
Success rate is 60.0 percent (3/5), round-trip min/avg/max = 1251/1349/1402 ms
Out-of-sequence: 0.0 percent (0/3)
Bad data: 0.0 percent (0/3)
Received packet rate: 1.4 pps
```

propagate-remote-status

To trigger an interface to be TX-disabled on fault detection, use the **propagate-remote-status** command in the interface CFM MEP configuration mode. To return to the default behavior, use the **no** form of this command.

propagate-remote-status

Command Default

None

Command Modes

Interface CFM MEP configuration

Command History

Release	Modification
Release 7.9.1	This command was introduced.

Usage Guidelines

Link Loss Forwarding (LLF) feature uses this command for triggering an interface to be TX-disabled on fault detection.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to use the command on an interface:

```
Router# configure
Router(config)# interface GigabitEthernet0/2/0/0
Router(config-if)# ethernet cfm
Router(config-if-cfm)# mep domain dom1 service ser1 mep-id 1
Router(config-if-cfm-mep)# propagate-remote-status
```

service

To associate a service with a domain and enter CFM domain service configuration mode, use the **service** command in CFM domain configuration mode. To remove a service from a domain, use the **no** form of this command.

service *service-name* { **down-meps** | **xconnect group** *xconnect-group-name* { **p2p** *xconnect-name* | **mp2mp** *xconnect-name* **ce-id** *ce-id-value* **remote-ce-id** *remote-ce-id-value* } } [**id** [**icc-based** *icc-string umc-string*] | | [**string** *text*] | [**number** *number*] | [**vlan-id** *id-number*] | [**vpn-id** *oui-vpnid*]]

Syntax Description

service-name	Administrative name for the service. Case sensitive ASCII string up to 80 characters. Used in conjunction with one of the following service types: • **down-meps** • xconnect
down-meps	Specifies that all MEPs are down and no MIPs are permitted.
xconnect	Specifies the use of a cross connect. Used in conjunction with **group** and p2p or mp2mp. **Note** When **xconnect** is specified, all MEPs are up and MIPs are permitted.
group *xconnect-group-name*	Specifies the name of the cross connect group.
p2p *xconnect-name*	Specifies the name of the point-to-point cross connect and enters the Ethernet CFM domain service mode.
mp2mp *xconnect-name*	Specifies the name of the multipoint-to-multipoint cross connect and enters the Ethernet CFM domain service mode.
ce-id *ce-id-value*	Specifies the local Customer Edge (CE) identifier.
remote-ce-id *remote-ce-id-value*	Specifies the remote Customer Edge (CE) identifier.
id	(Optional) Service identifier. Valid service identifiers are: • **number** *number*—Number from 0 to 65535. • **string** *text*—String length no longer than 46 minus MDID length. • **vlan-id** *id-number*—Number from 1 to 4094. • **vpn-id** *oui-vpnid* —VPN ID in RFC 2685 format (HHH:HHHH)

Command Default

If **id** is not specified, the service name is used as the Short MA name.

Command Modes

CFM domain configuration (config-cfm-dmn)

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

The Short MA Name is the second part of the Maintenance Assoication Identifier (MAID) in CFM frames. If the Short MA Name (service id) is not specified, the service administrative name is used by default.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to associate a bridge domain service to a domain and enter CFM domain service configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)#
```

The following example shows how to specify that all MEPs are down and no MIPs are permitted, and enter CFM domain service configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Serv_1 down-meps
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)#
```

The following example shows how to associate a p2p cross connect service to a domain and enter CFM domain service configuration mode.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)#
```

The following example shows how to enable CFM on a multipoint-to-multipoint cross connect.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet cfm
RP/0/RP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_2 xconnect group XG2 mp2mp X2
ce-id 201 remote-ce-id 202
RP/0/RP0/CPU0:router(config-cfm-dmn-svc)#
```

Related Commands

Command	Description
ethernet cfm (global), on page 109	Enters Ethernet CFM configuration mode.
p2p	Enters p2p configuration mode to configure point-to-point cross-connects.
show ethernet cfm configuration-errors, on page 126	Displays information about errors that are preventing configured cfm operations from becoming active, as well as any warnings that have occurred.
show ethernet cfm local maintenance-points, on page 132	Displays all the maintenance points that have been created.
show ethernet cfm local meps, on page 134	Displays information about local MEPs.
show ethernet cfm peer meps, on page 140	Displays other MEPs detected by a local MEP.

show ethernet cfm ccm-learning-database

To display the Continuity Check Message (CCM) learning database, use the **show ethernet cfm ccm-learning-database** command in XR EXEC mode.

show ethernet cfm ccm-learning-database [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays the CFM CCM learning database for the designated node. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

All CFM ccm-learning-databases on all interfaces are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

The CCM Learning Database is populated by MEPs and MIPs that have received continuity-check messages (CCMs). The information in the CCM Learning Database is used to reply to traceroutes when no applicable entries are found in the main MAC learning table.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display all the CFM CCM learning databases on all interfaces:

```
RP/0/RP0/CPU0:router# show ethernet cfm ccm-learning-database

Location 0/0/CPU0:

Domain/Level           Service              Source MAC     Interface
---------------------- -------------------- -------------- ------------------
foo/2                  foo                  0001.0203.0401 Gi0/0/0/0
foo/2                  foo                  0001.0203.0402 PW

Location 0/1/CPU0:

Domain/Level           Service              Source MAC     Interface
---------------------- -------------------- -------------- ------------------
foo/2                  foo                  0001.0203.0401 XC ID: 0xff000002
```

Table 7: show ethernet cfm ccm-learning-database Field Descriptions

Domain/Level	The domain name and the level of the domain for the maintenance point that received the CCM that caused this entry to be created. This entry will be used to respond to traceroute messages received by maintenance points in this domain.

Service	The name of the service for the maintenance point that received the CCM that caused this entry to be created. This entry will be used to respond to traceroute messages received by maintenance points in this domain.
Source MAC	Source MAC address in the CCM that caused this entry to be created. This entry will be used to respond to traceroute messages targeted at this MAC address.
Interface	The interface through which the CCM entered the router. This will be one of the following: • An interface or sub-interface name • A pseudowire identification (neighbor address and PW ID) • PW – Indicates the CCM was received through the PW in a cross-connect • XC ID – the internal cross-connect ID value, indicating that the CCM was received through an interface that no longer exists, or is no longer in L2 mode.

show ethernet cfm configuration-errors

To display information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred, use the **show ethernet cfm configuration-errors** command in XR EXEC mode.

show ethernet cfm configuration-errors [**domain** *domain-name*] [**interface** *type interface-path-id*]

Syntax Description

domain *domain-name*	(Optional) Displays information about the specified CFM domain name.
interface *type*	(Optional) Displays information about the specified 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

All CFM configuration errors on all domains are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	read

Examples

```
RP/0/RP0/CPU0:router# show ethernet cfm configuration-errors

Domain fig (level 5), Service bay
 * MIP creation configured using bridge-domain blort, but bridge-domain blort does not
exist.
 * An Up MEP is configured for this domain on interface GigabitEthernet0/1/2/3.234 and an
Up MEP is also configured for domain blort, which is at the same level (5).
 * A MEP is configured on interface GigabitEthernet0/3/2/1.1 for this domain/service, which
 has CC interval 100ms, but the lowest interval supported on that interface is 1s.
```

Related Commands

Command	Description
ethernet cfm (global), on page 109	Enters CFM configuration mode.

Command	Description
ethernet cfm (interface), on page 110	Enters interface CFM configuration mode.

show ethernet cfm interfaces ais

To display the information about interfaces that are currently transmitting Alarm Indication Signal (AIS), use the **show ethernet cfm interfaces ais** command in XR EXEC mode.

show ethernet cfm interfaces [*type interface-path-id*] **ais** [**location** *node-id*]

Syntax Description

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.
location *node-id*	(Optional) Displays information about the node location specified as *rack* / *slot* / *module*. Location cannot be specified if you configure an interface type.

Command Default

If no parameters are specified, information for all AIS interfaces is displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

The **location** keyword cannot be specified if an interface has been specified.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to display the information published in the Interface AIS table:

```
RP/0/RP0/CPU0:router# show ethernet cfm interfaces ais

Defects (from at least one peer MEP):
 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down              D - Local port down

                                Trigger                 Transmission
```

```
                        AIS  ---------    Via     ---------------------------
Interface (State)       Dir  L Defects  Levels   L Int Last started  Packets
----------------------- ---  - -------  -------  - --- ------------ --------
Gi0/1/0/0.234 (Up)      Dn   5 RPC      6        7 1s  01:32:56 ago     5576
Gi0/1/0/0.567 (Up)      Up   0 M        2,3      5 1s  00:16:23 ago      983
Gi0/1/0/1.1 (Dn)        Up     D                7 60s 01:02:44 ago     3764
Gi0/1/0/2 (Up)          Dn   0 RX       1!
```

Table 8: show ethernet cfm interfaces ais Field Descriptions

Interface (State)	The name and state of the interface.
AIS dir	The direction that the AIS packets are transmitted, up or down.
Trigger L	The level of the lowest MEP that is transmitting AIS.The field is blank if there are no down MEPs on the interface, and AIS is being transmitted due to configuration on the interface itself.
Trigger Defects	Defects detected by the lowest MEP transmitting AIS.
Via Levels	The levels of any MEPs on the interface that are receiving AIS from a lower MEP, and potentially re-transmitting the signal. If the highest MEP is not re-transmitting the signal, the list of levels is ended using an exclamation point.
Transmission L	The level at which AIS is being transmitted outside of the interface, via a MIP. The field is blank if this is not occurring.
Transmission Int	The interval at which AIS is being transmitted outside of the interface via a MIP. The field is blank if this is not occurring.
Transmission last started	If AIS is being transmitted outside of the interface, the time that the signal started. The field is blank if this is not occurring.
Transmission packets	If AIS is being transmitted outside of the interface, the number of packets sent by the transmitting MEP since it was created or since its counters were last cleared. The field is blank if this is not occurring.

Related Commands

Command	Description
show ethernet cfm local meps	Displays information about local MEPs.

show ethernet cfm interfaces statistics

To display the per-interface counters for Ethernet Connectivity Fault Management (CFM), use the **show ethernet cfm interfaces statistics** command in XR EXEC mode.

show ethernet cfm interfaces [*type interface-path-id*] **statistics** [**location** *node-id*]

Syntax Description

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.
location *node-id*	(Optional) Displays information about the node location specified as *rack* / *slot* / *module*. Location cannot be specified if you configure an interface type.

Command Default

All CFM counters from all interfaces are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	The command is enhanced to retrieve PM statistics from satellite.

Usage Guidelines

The location cannot be specified if a particular interface is specified.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows all the CFM counters on all interfaces:

```
RP/0/RP0/CPU0:router# show ethernet cfm interfaces statistics
Location 0/1/CPU0:

Interface         Malformed   Dropped Last Malformed Reason
----------------- --------- --------- ----------------------
Gi0/1/0/3.185             0         0
Gi0/1/0/7.185             0         0
Gi0/1/0/7.187             0         0
```

Table 9: show ethernet cfm statistics Field Descriptions

Interface	Name of the interface.
Malformed	Number of packets that have been received at this interface that have been found to be non-compliant with the packet formats specified in IEEE 802.1ag and ITU-T Y.1731.
Dropped	Number of valid (well-formed) packets that have been received at this interface, that have been dropped in software. Packets may be dropped for the following reasons: • Packet has an unknown operation code, and reached a MEP. • Packet dropped at a MEP because it has a lower CFM level than the MEP. • Packet could not be forwarded because the interface is STP blocked. • Packet could not be forwarded because it is destined for this interface.
Last Malformed Reason	Operation code for the last malformed packet received, and the reason that it was found to be malformed. If no malformed packets have been received, this field is blank.

Related Commands

Command	Description
clear ethernet cfm interface statistics, on page 101	Clears the counters for an Ethernet CFM interface.

show ethernet cfm local maintenance-points

To display a list of local maintenance points, use the **show ethernet cfm local maintenance-points** command in XR EXEC mode.

show ethernet cfm local maintenance-points [**domain** *domain-name* [**service** *service-name*] | **interface** *type interface-path-id*] [**mep** | **mip**]

Syntax Description

domain *domain-name*	(Optional) Displays information about the specified domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
service *service-name*	(Optional) Displays information about the specified service, where *service-name* is a string of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
interface *type*	(Optional) Displays information about the specified 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.
mep	(Optional) Displays information about maintenance end points (MEPs).
mip	(Optional) Displays information about maintenance intermediate points (MIPs).

Command Default

All maintenance points from all interfaces are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	read

Examples

This example shows how to display maintenance points:

```
RP/0/RP0/CPU0:router# show ethernet cfm local maintenance-points
```

```
Domain/Level         Service              Interface         Type    ID   MAC
-------------------- -------------------- ----------------- ------- ---- --------
bar/0                bar                  Gi0/0/0/0         Dn MEP     1 03:04:00
baz/4                baz                  Gi0/0/0/1.1       MIP          03:04:01
baz/4                baz                  Gi0/0/0/2         MIP          03:04:02
foo/?                foo                  Gi0/0/0/3         MEP        1 03:04:03!
qux/2                qux                  Gi0/0/0/1.1       Up MEP    10 03:04:01
qux/2                qux                  Gi0/0/0/2         Up MEP    11 03:04:02
```

Table 10: show ethernet cfm local maintenance-points Field Descriptions

Domain/Level	The domain name and the level of the domain. If the domain is not configured globally, a question mark (?) is displayed for the Level.
Service	The name of the service.
Interface	The interface containing the maintenance point.
Type	The type of maintenance point: • MIP • Up MEP • Down MEP • MEP–If the MEP belongs to a service that is not configured globally, the type cannot be determined and just MEP is displayed.
ID	The configured MEP ID. **Note** Since MIPs do not have an ID, this column is blank for MIPs.
MAC	The last 3 octets of the interface MAC address. **Note** The first three octets are typically the Cisco OUI.
Note If the MEP has a configuration error, a exclamation point (!) is displayed at the end of the line in the display output.	

Related Commands

Command	Description
clear ethernet cfm local meps, on page 102	Clears the counters for all MEPs or a specified MEP.
clear ethernet cfm peer meps, on page 105	Clears all peer MEPs or peer MEPs for a specified local MEP.
clear ethernet cfm traceroute-cache, on page 106	Removes the contents of the traceroute cache.

show ethernet cfm local meps

To display information about local maintenance end points (MEPs), use the **show ethernet cfm local meps** command in XR EXEC mode.

show ethernet cfm local meps [**domain** *domain-name* [**service** *service-name* [**mep-id** *id*]] | **interface** *type interface-path-id* [**domain** *domain-name*]] [**errors** [**detail** | **verbose**] | **detail** | **verbose**]

Syntax Description

domain *domain-name*	(Optional) Displays information about the specified CFM domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
service *service-name*	(Optional) Displays information about the specified service, where *service-name* is a string of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
interface *type*	(Optional) Displays information about the specified 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.
mep-id *id*	(Optional) Displays information about the specified MEP, where *id* is a number of a local maintenance end point (MEP). The range is 1 to 8191.
errors	(Optional) Displays information about peer MEPs with errors.
detail	(Optional) Displays detailed information.
verbose	(Optional) Displays detailed information, plus counters for each type of CFM packet.

Command Default

Brief information is displayed for all local MEPs.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

All MEPs are displayed in the **show ethernet cfm local meps** command output, unless they have configuration errors.

Task ID

Task ID	Operations
ethernet-services	read

Examples

Example 1: show ethernet cfm local meps Command

This example shows sample output of the default statistics for local MEPs without any filtering:

```
RP/0/RP0/CPU0:router# show ethernet cfm local meps

 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down

Domain foo (level 6), Service bar
   ID Interface (State)        Dir MEPs/Err RD Defects AIS
----- ------------------------ --- -------- -- ------- ---
  100 Gi1/1/0/1.234 (Up)       Up     0/0   N  A       L7

Domain fred (level 5), Service barney
   ID Interface (State)        Dir MEPs/Err RD Defects AIS
----- ------------------------ --- -------- -- ------- ---
    2 Gi0/1/0/0.234 (Up)       Up     3/2   Y  RPC     L6

RP/0/0/CPU0:router# show ethernet cfm local meps

 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down

Domain foo (level 6), Service bar
   ID Interface (State)        Dir MEPs/Err RD Defects AIS
----- ------------------------ --- -------- -- ------- ---
  100 Gi1/1/0/1.234 (Up)       Up     0/0   N  A

Domain fred (level 5), Service barney
   ID Interface (State)        Dir MEPs/Err RD Defects AIS
----- ------------------------ --- -------- -- ------- ---
    2 Gi0/1/0/0.234 (Up)       Up     3/2   Y  RPC
```

Table 11: show ethernet cfm local meps Field Descriptions

ID	Configured MEP ID of the MEP.

Interface (State)	Interface that the MEP is configured under, and the state of the interface. The states are derived from the interface state, the Ethernet Link OAM interworking state, and the Spanning Tree Protocol (STP) state. The following states are reported: • Up – Interface Up, Ethernet Link OAM Up, STP Up • Down – Interface Down or Admin Down • Test – Interface Up, Ethernet Link OAM loopback mode • Blkd – Interface Up, Ethernet Link OAM Up, STP Blocked • Otherwise, the interface state.
Dir	Direction of the MEP.
RD	Remote Defect. Y (yes) indicates that a remote defect is detected on at least one peer MEP. In which case, the RDI bit is set in outgoing CCM messages. Otherwise, N (no).
MEPs	Total number of peer MEPs sending CCMs to the local MEP.
Err	Number of peer MEPs for which at least one error has been detected.
Defects	Types of errors detected. Each error is listed as a single character. Multiple errors are listed if they are from the same MEP. Possible errors are listed at the top of the display output of the command.
AIS	Alarm Indication Signal. If AIS is configured for the service, the configured level is displayed when an alarm is signaled. If AIS is not configured for the service, or if no alarm is currently signaled, this field is blank.

Example 2: show ethernet cfm local meps Command Filtered by Domain and Service

```
RP/0/RP0/CPU0:router# show ethernet cfm local meps domain foo service bar

 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down

Domain foo (level 6), Service bar
   ID Interface (State)        Dir MEPs/Err RD Defects AIS
----- ----------------------- --- -------- -- ------- ---
  100 Gi1/1/0/1.234 (Up)       Up     0/0   N  A       L7

RP/0/0/CPU0:router# show ethernet cfm local meps domain foo service bar

 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down

Domain foo (level 6), Service bar
```

```
   ID Interface (State)        Dir MEPs/Err RD Defects AIS
----- ------------------------ --- -------- -- ------- ---
  100 Gi1/1/0/1.234 (Up)       Up     0/0   N  X
```

Example 3: show ethernet cfm local meps detail Command

This example shows sample output of detailed statistics for local MEPs:

Note The Discarded CCMs field is not displayed when the number is zero (0). It is unusual for the count of discarded CCMs to be anything other than zero, since CCMs are only discarded when the limit on the number of peer MEPs is reached. The Peer MEPs field is always displayed, but the counts are always zero when continuity check is not enabled.

```
RP/0/RP0/CPU0:router# show ethernet cfm local meps detail

Domain foo (level 6), Service bar
Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 100
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 0 up, 0 with errors, 0 timed out (archived)

  CCM generation enabled:  No
  AIS generation enabled:  Yes (level: 7, interval: 1s)
  Sending AIS:             Yes (started 01:32:56 ago)
  Receiving AIS:           Yes (from lower MEP, started 01:32:56 ago)

Domain fred (level 5), Service barney
Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 2
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 3 up, 2 with errors, 0 timed out (archived)
  Cross-check defects: 0 missing, 0 unexpected

  CCM generation enabled:  Yes (Remote Defect detected: Yes)
  CCM defects detected:    R - Remote Defect received
                           P - Peer port down
                           C - Config (our ID received)
  AIS generation enabled:  Yes (level: 6, interval: 1s)
  Sending AIS:             Yes (to higher MEP, started 01:32:56 ago)
  Receiving AIS:           No

RP/0/0/CPU0:router# show ethernet cfm local meps detail

Domain foo (level 5), Service bar
Down MEP on GigabitEthernet0/1/0/0.123, MEP-ID 20
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 1 up, 0 with errors, 0 timed out (archived)
  Cross-check errors: 0 missing, 0 unexpected

  CCM generation enabled:  Yes, 10ms
                           CCM processing offloaded to high-priority software
  AIS generation enabled:  No
  Sending AIS:             No
  Receiving AIS:           No
```

Example 4: show ethernet cfm local meps verbose Command

This example shows sample output of detailed statistics for local MEPs:

```
RP/0/RP0/CPU0:router# show ethernet cfm local meps verbose

Domain foo (level 6), Service bar
Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 100
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 0 up, 0 with errors, 0 timed out (archived)

  CCM generation enabled:  No
  AIS generation enabled:  Yes (level: 7, interval: 1s)
  Sending AIS:             Yes (started 01:32:56 ago)
  Receiving AIS:           Yes (from lower MEP, started 01:32:56 ago)
  EFD triggered:           No

  Packet        Sent      Received
  ------  ----------  ----------------------------------------------------
  AIS           5576             0
  SLM              0            11
  SLR             11             0
  DMM              0             6
  DMR              5             0

Domain fred (level 5), Service barney
Up MEP on GigabitEthernet0/1/0/0.234, MEP-ID 2
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 3 up, 2 with errors, 0 timed out (archived)
  Cross-check errors: 0 missing (0 auto), 0 unexpected

  CCM generation enabled:  Yes, 1s (Remote Defect detected: Yes)
                             CCM processing offloaded to software
  CCM defects detected:    R - Remote Defect received
                           P - Peer port down
                           C - Config (our ID received)
  AIS generation enabled:  Yes (level: 6, interval: 1s)
  Sending AIS:             Yes (to higher MEP, started 01:32:56 ago)
  Receiving AIS:           No

  Packet        Sent      Received
  ------  ----------  ------------------------------------------------------------
  CCM          12345         67890  (out of seq: 6, discarded: 10)
  LBM              5             0
  LBR              0             5  (out of seq: 0, with bad data: 0)
  AIS              0         46910
  LMM              3             4
  LMR              5             3

Domain gaz (level 4), Service baz
Up MEP on Standby Bundle-Ether 1, MEP-ID 3
================================================================================
  Interface state: Up      MAC address: 6655.4433.2211
  Peer MEPs: 1 up, 0 with errors, 0 timed out (archived)

  CCM generation enabled:  Yes, 1s (Remote Defect detected: No)
                             CCM processing offloaded to software
)
                           Sending disabled on local standby MEP
  CCM defects detected:    Defects below ignored on local standby MEP
                           I - Wrong interval
                           V - Wrong level
```

```
  AIS generation enabled:  No
  Sending AIS:             No
  Receiving AIS:           No

  Packet        Sent      Received
  ------  ----------  ------------------------------------------------------------
  CCM              0         67890  (out of seq: 6, discarded: 10)
  LBM              0             1
  LBR              0             2  (out of seq: 0, with bad data: 0)
  AIS              0             3
  LCK              -             4

Domain bar (level 3), Service boz
Down MEP on GigabitEthernet102/1/0/0.345, MEP-ID 200
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 0 up, 0 with errors, 0 timed out (archived)

  CCM generation enabled:  No
  AIS generation enabled:  No
  Sending AIS:             No
  Receiving AIS:           No

  No packets sent/received
```

Related Commands

Command	Description
show ethernet cfm local maintenance-points, on page 132	Displays a list of local maintenance points.
show ethernet cfm peer meps, on page 140	Displays information about maintenance end points (MEPs) for peer MEPs.
show ethernet cfm traceroute-cache, on page 148	Displays the contents of the traceroute cache.

show ethernet cfm peer meps

To display information about maintenance end points (MEPs) for peer MEPs, use the **show ethernet cfm peer meps** command in XR EXEC mode.

show ethernet cfm peer meps [**domain** *domain-name* [**service** *service-name* [**local mep-id** *id* [**peer** {**mep-id** *id* | **mac-address** *H . H . H*}]]] | **interface** *type interface-path-id* [**domain** *domain-name* [**peer** {**mep-id** *id* | **mac-address** *H . H . H*}]]] [**cross-check** [**missing** | **unexpected**] | **errors**] [**detail**]

Syntax Description

cross-check	(Optional) Displays information about peer MEPs with cross-check errors.
detail	(Optional) Displays detailed information.
domain *domain-name*	(Optional) Displays information about a CFM domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
errors	(Optional) Displays information about peer MEPs with errors.
interface *type*	(Optional) Displays information about the specified 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.
local mep-id *id*	(Optional) Displays information about a local MEP, where *id* is the number of the MEP.
missing	(Optional) Displays information about peer MEPs that are missing.
peer mep-id *id*	(Optional) Displays information about a peer MEP, where *id* is the number of the MEP.
peer mac-address *H.H.H*	(Optional) Displays information about a peer MEP, where *H.H.H* is the hexadecimal address of the MEP.
service *service-name*	(Optional) Displays information about a CFM service, where *service-name* is a string of a maximum of 154 characters that identifies the maintenance association to which the maintenance points belong.
unexpected	(Optional) Displays information about unexpected peer MEPs.

Command Default

Peer MEPs for all domains are displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

If a Local MEP is receiving Wrong Level CCMs, and if the Remote MEP has its CCM processing offloaded, then the last CCM cannot be displayed.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows sample output of MEPs detected by a local MEP:

```
RP/0/RP0/CPU0:router# show ethernet cfm peer meps

Flags:
> - Ok                          I - Wrong interval
R - Remote Defect received      V - Wrong level
L - Loop (our MAC received)     T - Timed out
C - Config (our ID received)    M - Missing (cross-check)
X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
* - Multiple errors received

Domain dom3 (level 5), Service ser3
Down MEP on GigabitEthernet0/0/0/0 MEP-ID 1
================================================================================
St     ID MAC Address    Port    Up/Downtime   CcmRcvd SeqErr   RDI Error
-- ----- -------------- ------- ------------ --------- ------ ----- -----
V      10 0001.0203.0403 Up      00:01:35            2      0     0     2

Domain dom4 (level 2), Service ser4
Down MEP on GigabitEthernet0/0/0/0 MEP-ID 1
================================================================================
St     ID MAC Address    Port    Up/Downtime   CcmRcvd SeqErr   RDI Error
-- ----- -------------- ------- ------------ --------- ------ ----- -----
 >     20 0001.0203.0402 Up      00:00:03            4      1     0     0
 >     21 0001.0203.0403 Up      00:00:04            3      0     0     0

Domain dom5 (level 2), Service dom5
```

Table 12: show ethernet cfm peer meps Field Descriptions

St	Status: one or two characters, representing the states listed at the top of the output.
ID	Peer MEP ID
MAC address	Peer MAC Address. If this entry is a configured cross-check MEP, with no MAC address specified, and no CCMs are currently being received from a peer MEP with a matching MEP ID, then this field is blank.
Port	Port state of the peer, based on the Port Status and Interface Status TLVs. If no TLVs or CCMs have been received, this field is blank. Otherwise, the port status is displayed—unless it is Up. If the port status is Up, then the interface status is displayed.

Up/Downtime	Time since the peer MEP last came up or went down. If CCMs are currently being received, it is the time since the peer MEP last came up, which is the time since the first CCM was received. If CCMs are not currently being received, it is the time since the peer MEP last went down, which is the time since the loss threshold was exceeded and a loss of continuity was detected.
CcmRcvd	Total number of CCMs received from this peer MEP.
SeqErr	Number of CCMs received out-of-sequence.
RDI	Number of CCMs received with the RDI bit set.
Error	Number of CCMs received with CCM defects, such as: • Invalid level error • Maintenance Association Identifier (MAID) error • Interval error • Received with out MEP ID error • Invalid source MAC error

This example shows sample detailed output of MEPs detected by a local MEP:

```
RP/0/RP0/CPU0:router# show ethernet cfm peer meps detail

Domain dom3 (level 5), Service ser3
Down MEP on GigabitEthernet0/0/0/0 MEP-ID 1
================================================================================
Peer MEP-ID 10, MAC 0001.0203.0403
   CFM state: Wrong level, for 00:01:34
   Port state: Up
   CCM defects detected:    V - Wrong Level
   CCMs received: 5
     Out-of-sequence:             0
     Remote Defect received:      5
     Wrong Level:                 0
     Cross-connect (wrong MAID):  0
     Wrong Interval:              5
     Loop (our MAC received):     0
     Config (our ID received):    0
Last CCM received
     Level: 4, Version: 0, Interval: 1min
     Sequence number: 5, MEP-ID: 10
     MAID: String: dom3, String: ser3
     Port status: Up, Interface status: Up


Domain dom4 (level 2), Service ser4
Down MEP on GigabitEthernet0/0/0/0 MEP-ID 1
================================================================================
Peer MEP-ID 20, MAC 0001.0203.0402
   CFM state: Ok, for 00:00:04
   Received CCM handling offloaded to software
   Port state: Up
   CCMs received: 7
     Out-of-sequence:             1
```

```
     Remote Defect received:      0
     Wrong Level:                 0
     Cross-connect (wrong MAID):  0
     Wrong Interval:              0
     Loop (our MAC received):     0
 Config (our ID received):    0
Last CCM received
     Level: 2, Version: 0, Interval: 10s
     Sequence number: 1, MEP-ID: 20
     MAID: String: dom4, String: ser4
     Chassis ID: Local: ios; Management address: 'Not specified'
     Port status: Up, Interface status: Up

Peer MEP-ID 21, MAC 0001.0203.0403
   CFM state: Ok, for 00:00:05
   Port state: Up
   CCMs received: 6
     Out-of-sequence:             0
     Remote Defect received:      0
     Wrong Level:                 0
     Cross-connect (wrong MAID):  0
     Wrong Interval:              0
     Loop (our MAC received):     0
     Config (our ID received):    0
Last CCM received 00:00:05 ago:
     Level: 2, Version: 0, Interval: 10s
     Sequence number: 1, MEP-ID: 21
     MAID: String: dom4, String: ser4
     Port status: Up, Interface status: Up


Domain dom5 (level 2), Service ser5
Up MEP on Standby Bundle-Ether 1 MEP-ID 1
================================================================================
Peer MEP-ID 600, MAC 0001.0203.0401
   CFM state: Ok (Standby), for 00:00:08, RDI received
   Port state: Down
   CCM defects detected:    Defects below ignored on local standby MEP
                            I - Wrong Interval
                            R - Remote Defect received
   CCMs received: 5
     Out-of-sequence:             0
     Remote Defect received:   5
 Wrong Level:                 0
     Cross-connect W(wrong MAID): 0
     Wrong Interval:              5
     Loop (our MAC received):     0
     Config (our ID received):    0
   Last CCM received 00:00:08 ago:
     Level: 2, Version: 0, Interval: 10s
     Sequence number: 1, MEP-ID: 600
     MAID: DNS-like: dom5, String: ser5
     Chassis ID: Local: ios; Management address: 'Not specified'
     Port status: Up, Interface status: Down

Peer MEP-ID 601, MAC 0001.0203.0402
   CFM state: Timed Out (Standby), for 00:15:14, RDI received
   Port state: Down
   CCM defects detected:    Defects below ignored on local standby MEP
                            I - Wrong Interval
                            R - Remote Defect received
                            T - Timed Out
                            P - Peer port down
   CCMs received: 2
```

```
    Out-of-sequence:             0
    Remote Defect received:      2
    Wrong Level:                 0
    Cross-connect (wrong MAID):  0
    Wrong Interval:              2
    Loop (our MAC received):     0
    Config (our ID received):    0
  Last CCM received 00:15:49 ago:
    Level: 2, Version: 0, Interval: 10s
    Sequence number: 1, MEP-ID: 600
    MAID: DNS-like: dom5, String: ser5
    Chassis ID: Local: ios; Management address: 'Not specified'
    Port status: Up, Interface status: Down
```

Table 13: show ethernet cfm peer meps detail Field Descriptions

CFM state	State of the peer MEP, how long it has been up or down, and whether the RDI bit was set in the last received CCM. The following possible states are shown if CCMs are currently being received: • Missing • Timed out—No CCMs have been received for the loss time • Ok • Indication of a defect
Port state	Port state of the peer, based on the Port Status and Interface Status TLVs. If no TLVs or CCMs have been received, this field is blank. Otherwise, the port status is displayed—unless it is Up. If the port status is Up, then the interface status is displayed.

CCM defects detected	Types of CCM defects that have been detected. The possible defects are: • Remote Defect re ceived—The last CCM received from the peer had the RDI bit set. • Loop (our MAC received)—CCMs were received from a peer with the same MAC address as the local MEP. • Config (our ID received)—CCMs were received from a peer with the same MEP ID as the local MEP. • Cross-connect (wrong MAID)—The last CCM received from the peer contained a domain/service identified that did not match the locally configured domain/service identifier. • Peer port down—The last CCM received from the peer contained an Interface Status indicating that the interface on the peer was not up. • Wrong interval—The last CCM received contained a CCM interval that did not match the locally configured CCM interval. • Wrong level—The last CCM received was for a lower level than the level of the local MEP. • Timed out—No CCMs have been received within the loss time. • Missing (cross-check)—Cross-check is configured and lists this peer MEP, but no CCMs have been received within the loss time. • Unexpected (cross-check)—Cross check is configured for this service and does not list this peer MEP, but CCMs have been received from it within the loss time.
CCMs received	Number of CCMs received in total, by defect type.
Last CCM received	How long ago the last CCM was received, and a full decode of its contents. Any unknown TLVs are displayed in hexadecimal.
Offload status	Offload status of received CCM handling.

Related Commands

Command	Description
show ethernet cfm local maintenance-points	Displays a list of local maintenance points.
show ethernet cfm local meps	Displays information about local MEPs.

show ethernet cfm summary

To display summary information about CFM, use the **show ethernet cfm summary** command in the XR EXEC mode.

show ethernet cfm summary location*node-id*

Syntax Description

location *node-id*	(Optional) Specifies the location for which CFM summary is required. If the location is not specified, an overall summary for all nodes is displayed, followed by information for each node. If the location is specified, only information from that node is displayed.

Command Default

An overall summary for all nodes is displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	read

Example

This example shows how to display ethernet CFM summary:

```
RP/0/RP0/CPU0:router# show ethernet cfm summary

CFM System Summary
==================

Domains                                4
Services                           10000
Local MEPS                         10000
  Operational                       9997
    Down MEPs                       9997
    Up MEPs                            0
    Offloaded                        200
      3.3ms                          100
      10ms                           100
  Disabled (misconfiguration)          2
  Disabled (resource limit)            1
  Disabled (operational error)         0
Peer MEPs                          9997
  Operational                      9990
    Defect detected                    5
    No defect detected              9985
  Timed out                            7
MIPs                                   0
```

```
Interfaces                          10000
Bridge domains/Xconnects            10000
Traceroute Cache entries                3
Traceroute Cache replies               11
CCM Learning Database entries       10000


CFM Summary for 0/0/CPU0
========================

Initial resynchronization: complete

Domains                                 4
Services                            10000
Local MEPS                           1000
  Operational                         999
    Down MEPs                         999
    Up MEPs                             0
    Offloaded                         100
      3.3ms                           100
      10ms                              0
  Disabled (misconfiguration)           1
  Disabled (offload resource limit)     0
  Disabled (operational error)          0
Peer MEPs                            999
  Operational                        998
    Defect detected                    2
    No defect detected                996
  Timed out                            1
MIPs                                   0
Interfaces                           1000
Bridge domains/Xconnects            10000
Traceroute Cache entries                1
Traceroute Cache replies                3
CCM Learning Database entries        1000
```

show ethernet cfm traceroute-cache

To display the contents of the traceroute cache, use the **show ethernet cfm traceroute-cache** command in XR EXEC mode.

{**show ethernet cfm traceroute-cache** [[**domain** *domain-name*] [**service** *service-name*] [**local mep-id** *id*] [**transaction-id** *id*]] | **interface** *type interface-path-id* [[**domain** *domain-name*] [**transaction-id** *id*]] [**exploratory** | **targeted**] [**status** {**complete** | **incomplete**}] [**detail**]}

Syntax Description

domain *domain-name*	(Optional) Displays information about a CFM domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
service *service-name*	(Optional) Displays information about a CFM service, where *service-name* is a string of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
local mep-id *id*	(Optional) Displays information for the specified local maintenance end point (MEP). The range for MEP ID numbers is 1 to 8191.
transaction-id *id*	(Optional) Displays information for the specified transaction.
interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	(Optional) 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.
exploratory	(Optional) Displays information for exploratory traceroutes.
targeted	(Optional) Displays information for traceroutes that are not exploratory, but explicitly mapped.
status	(Optional) Displays status information.
complete	(Optional) Displays status information for traceroutes that have received all replies.
incomplete	(Optional) Displays status information for traceroutes that are still receiving replies.
detail	(Optional) Displays detailed information.

Command Default

Shows output for the default traceroute.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.15	This command was introduced.

Usage Guidelines

Use the **show ethernet cfm traceroute-cache** command to display the contents of the traceroute cache; for example, to see the maintenance intermediate points (MIPs) and maintenance end points (MEPs) of a domain as they were discovered. The data is historic. The traceroute cache stores entries from previous traceroute operations.

In the output, the traceroutes sourced from each local MEP are listed. The heading for the local MEP contains the domain name and level, service name, MEP ID and interface name.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows sample output for the **show ethernet cfm traceroute-cache** command:

```
RP/0/RP0/CPU0:router# show ethernet cfm traceroute-cache

Traceroutes in domain bar (level 4), service bar
Source: MEP-ID 1, interface GigabitEthernet0/0/0/0
================================================================================
Traceroute at 2009-05-18 12:09:10 to 0001.0203.0402,
TTL 64, Trans ID 2:

Hop Hostname/Last            Ingress MAC/name       Egress MAC/Name        Relay
--- ------------------------ ---------------------- ---------------------- -----
  1 ios                      0001.0203.0400 [Down]                         FDB
     0000-0001.0203.0400     Gi0/0/0/0
  2 abc                                             0001.0203.0401 [Ok]    FDB
     ios                                            Not present
  3 bcd                      0001.0203.0402 [Ok]                           Hit
     abc                     GigE0/0
Replies dropped: 0


Traceroutes in domain foo (level 2), service foo
Source: MEP-ID 1, interface GigabitEthernet0/0/0/0
================================================================================
Traceroute at 2009-05-18 12:03:31 to 0001.0203.0403,
TTL 64, Trans ID 1:

Hop Hostname/Last            Ingress MAC/name       Egress MAC/Name        Relay
--- ------------------------ ---------------------- ---------------------- -----
  1 abc                      0001.0203.0401 [Ok]                           FDB
     0000-0001.0203.0400     Not present
  2 bob                      0001.0203.0402 [Ok]                           MPDB
     abc                     Gi0/1/0/2.3
  3 cba                                             0001.0203.0403 [Ok]    Hit
     bob                                            Gi0/2/0/3.45
Replies dropped: 0


Traceroute at 2009-05-18 12:15:47 to 0001.0203.0409,
TTL 64, Trans ID 3, automatic:
00:00:05 remaining
```

```
Traceroute at 2009-05-18 12:20:10 explore to ffff.ffff.ffff,
TTL 64, Trans ID 4, Timeout auto, Reply Filter Default:

Hop               Hostname/Last            Ingr/Egr MAC/name               Relay
----------------- ------------------------ -------- ---------------------- -----
1                 abc                      Ingress  0015.0000.323f [Ok]    FDB
                    0000-0001.0203.0400             Gi0/0/0/0.1
 2                abc                      Egress   0015.0000.323e [Ok]    FDB
                    abc                             Te0/1/0/0.1
  3               0002-0016.eeee.1234      Ingress  0016.eeee.1234 [Ok]    FDB
                    abc                             Te0/4.23
   4              0000-0016.eeee.4321      Egress   0016.eeee.4321 [Ok]    FDB
                    0002-0016.eeee.1234             Gi1/2.23
    5             rtr                      Ingress  0015.0000.f123 [Ok]    FDB
                    0002-00.16.eeee.4321            Gi0/0/0/0
 2                abc                      Egress   0015.0000.323d [Ok]    FDB
                    abc                             Te0/1/0/1.1
  3               pe2                      Ingress  0017.0000.cf01 [Ok]    FDB
                    abc                             Te0/0/2/0/1.450
   4              pe2                      Egress   0017.0000.cf01 [Ok]    Drop
                    pe2                             Gi0/0/0/0.451
   4              pe2                      Egress   0017.0000.cf01 [Ok]    FDB
                    pe2                             Gi0/0/0/1.452
    5             ce2                      Ingress  0015.0000.8830 [Ok]    FDB
                    pe2                             Gi0/1/0/0
Replies dropped: 0
```

Table 14: show ethernet cfm traceroute-cache Field Descriptions

Field	Description
Traceroute at	Date and time the traceroute was started.
to	Destination MAC address.
explore to	(Exploratory traceroutes) MAC address of the target for the exploratory traceroute.
TTL	Initial Time To Live used for the traceroute operation.
Trans ID	Transaction ID
Timeout	(Exploratory traceroutes) If no timeout was configured, “Timeout auto” is shown.
Reply Filter	(Exploratory traceroutes) Type of filter.
automatic	Indicates that the traceroute was triggered automatically (for example, as a result of a peer MEP exceeding the loss threshold, or if Continuity-Check Auto-traceroute is configured).
00:00:00 remaining	If the traceroute is in progress, the time remaining until it completes.
No replies received	Traceroute has completed but no replies were received.
Replies dropped	Number of replies dropped.
FDB only	Indicates FDB-only was configured for a standard traceroute.

Field	Description
Hop	Number of hops between the source MEP and the Maintenance Point that sent the reply. (Exploratory traceroutes) The display is indented by an extra character as the hop increases, so that the tree of responses can be seen.
Hostname/Last	On the first line, the hostname of the Maintenance Point that sent the reply. On the second line, the hostname of the previous Maintenance Point in the path. If either of the hostnames is unknown, the corresponding Egress ID is displayed instead.
Ingr/Egr	(Exploratory traceroutes) Indicates whether the reply is for an ingress or egress interface, but never both.
Ingress MAC/Name	If the reply includes information about the ingress interface, then the first line displays the ingress interface MAC address and the ingress action. The ingress interface name, if known, is displayed on the second line.
Egress MAC/Name	If the reply includes information about the egress interface, then the first line displays the egress interface MAC address and the egress action. The egress interface name, if known, is displayed on the second line.
MAC/Name	(Exploratory traceroutes) The MAC address of the interface from which the reply was sent, and the ingress/egress action, are displayed on the first line. If the interface name was present in the reply, it is displayed on the second line.
Relay	Type of relay action performed. For standard traceroutes, the possible values are: • Hit—The target MAC address was reached. • FDB—The target MAC address was found in the Filtering Database (the MAC learning table on the switch) and will be forwarded by the interface. • MPDB—The target MAC address was found in the MP Database (the CCM Learning database on the switch). In addition, “MEP” is displayed on the second line if a terminal MEP was reached. For exploratory traceroutes, the possible values are: • Hit—The target MAC address was reached. • FDB—The target MAC address was found in the Filtering Database and will be forwarded at this interface. • Flood—The target MAC address was not found in the Filtering database, and will be flooded at this interface. • Drop—The target MAC address will not be forwarded at this interface.

The following example shows sample output for the **show ethernet cfm traceroute-cache detail** command:

```
RP/0/RP0/CPU0:router# show ethernet cfm traceroute-cache domain bar detail

Traceroutes in domain bar (level 4), service bar
Source: MEP-ID 1, interface GigabitEthernet0/0/0/0
================================================================================
Traceroute at 2009-05-18 12:09:10 to 0001.0203.0402,
TTL 64, Trans ID 2:

Hop Hostname                 Ingress MAC            Egress MAC             Relay
--- ------------------------ ---------------------- ---------------------- -----
  1 ios                      0001.0203.0400 [Down]                         FDB
        Level: 4, version: 0, Transaction ID: 2
        TTL: 63, Relay Action: RlyFDB
        Forwarded, Terminal MEP not reached
        Last egress ID: 0000-0001.0203.0400
        Next egress ID: 0000-0001.0203.0400
        Ingress interface:
          Action: IngDown, MAC: 0001.0203.0400
          ID: Local: Gi0/0/0/0
        Hostname: Local: ios, address Not specified

  2 abc                                                0001.0203.0401 [Ok]   FDB
        Level: 4, version: 0, Transaction ID: 2
        TTL: 62, Relay Action: RlyFDB
        Forwarded, Terminal MEP not reached
        Last egress ID: 0000-0001.0203.0400
        Next egress ID: 0000-0001.0203.0401
        Egress interface:
          Action: EgOk, MAC: 0001.0203.0401
          ID: Not present
        Hostname: Local: abc, address Not specified

  3 bcd                      0001.0203.0402 [Ok]                           Hit
        Level: 4, version: 0, Transaction ID: 2
        TTL: 61, Relay Action: RlyHit
        Not Forwarded, Terminal MEP not reached
        Last egress ID: 0000-0001.0203.0401
        Next egress ID: Not Forwarded
        Ingress interface:
          Action: IngOk, MAC: 0001.0203.0402
          ID: Local: GigE0/0
        Hostname: Local: bcd, address Not specified

Replies dropped: 0


Traceroute at 2009-05-18 12:30:10 explore to ffff.ffff.ffff from 0204.0608.0a0c,
TTL 255, Trans ID 5, Timeout auto, Reply Filter Spanning Tree:

Hop Hostname                           Ingr/Egr MAC                    Relay
--- ---------------------------------- -------- ---------------------- -----
  1 0000-0015.0000.fffe                Ingress  0015.0000.fffe [Ok]    FDB
        Level: 2, version: 0, Transaction ID: 5
        TTL: 254, Relay Action: RlyFDB
        Forwarded, Terminal MEP not reached
        Next-Hop Timeout: 5 seconds
        Delay Model: Logarithmic
        Last egress ID: 0000-0002.0002.0002
        Next egress ID: 0000-0015.0000.fffe
        Ingress interface:
          Action: ELRIngOk, MAC: 0015.0000.fffe
          ID: Local: Gi0/0/0/0.1
```

```
2 0001-0030.0000.fffd                    Egress   0030.0000.fffd [Ok]    Drop
       Level: 2, version: 0, Transaction ID: 5
       TTL: 253, Relay Action: RlyDrop
       Not Forwarded, Terminal MEP not reached
       Next-Hop Timeout: 5 seconds
       Delay Model: Logarithmic
       Last egress ID: 0000-0015.0000.fffe
       Next egress ID: 0030-0000.0000.fffd
       Egress interface:
         Action: ELREgrOk, MAC: 0030.0000.fffd
         ID: Local: Gi0/1/0/1.2
```

Related Commands

Command	Description
clear ethernet cfm traceroute-cache	Removes the contents of the traceroute cache.

show ethernet oam summary

To display the summary of all the active OAM sessions across all the interfaces, use the **show ethernet oam summary** command in XR EXEC mode.

The summary output hides the fields for which the field count is zero (0).

show ethernet oam summary

Command Default

This command displays summary of all the active OAM sessions for all the interfaces.

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display the summary for all the active OAM sessions across all the interfaces.

```
Router#show ethernet oam summary
Wed Apr 29 09:32:19.874 PDT
Link OAM System Summary
=======================
Profiles:                               1
Interfaces:                             4
  Interface states
    Port down:                          4
    Passive wait:                       0
    Active send:                        0
    Operational:                        0
     Loopback mode:                     0
  Miswired connections:                 1
Events:                                 0
  Local:                                0
    Symbol period:                      0
    Frame:                              0
    Frame period:                       0
    Frame seconds:                      0
  Remote:                               0
    Symbol period:                      0
    Frame:                              0
    Frame period:                       0
    Frame seconds:                      0

Event Logs
==========================================================================
Local Action Taken:
    N/A    - No action needed         EFD    - Interface brought down using EFD
    None   - No action taken          Err.D  - Interface error-disabled
```

```
    Logged - System logged

Interface           Time                        Type           Loc'n  Action
------------------- --------------------------- -------------- ------ ------
Gi0/0/0/0           Wed Apr 29 08:56:54 PDT   Dying gasp     Local  Err.D
Gi0/0/0/0           Wed Apr 29 08:56:54 PDT   Link fault     Remote Err.D
Gi0/0/0/1           Wed Apr 29 08:56:51 PDT   Dying gasp     Local  Err.D
Gi0/0/0/1           Wed Apr 29 08:56:51 PDT   Link fault     Remote Err.D
Gi0/0/0/2           Wed Apr 29 08:56:50 PDT   Dying gasp     Local  Err.D
Gi0/0/0/2           Wed Apr 29 08:56:50 PDT   Dying gasp     Remote Err.D
Gi0/0/0/3           Wed Apr 29 08:56:46 PDT   Dying gasp     Local  Err.D
Gi0/0/0/3           Wed Apr 29 08:56:46 PDT   Link fault     Remote Err.D
```

Ethernet Services Commands

This module describes the command line interface (CLI) commands for configuring ethernet services on the Cisco 8000 Series Routers.

aps-channel

To configure G.8032 instance APS channel and to enter Ethernet ring G.8032 instance aps-channel configuration submode, use the **aps-channel** command in the Ethernet ring g8032 instance configuration submode. To remove the G.8032 instance APS channel configuration, use the **no** form of this command.

aps-channel [**level** *message-level* | **port0** **interface** { **Bundle-Ether** | **FastEthernet** | **GigabitEthernet** | **TenGigE** } *interface-id* | **port1** { **bridge-domain** *bridge-domain-name* | **interface** { **Bundle-Ether** | **FastEthernet** | **GigabitEthernet** | **TenGigE** } *interface-id* | **none** | **xconnect** *xconnect-name* }]
no aps-channel [**level** *message-level* | **port0** **interface** { **Bundle-Ether** | **FastEthernet** | **GigabitEthernet** | **TenGigE** } *interface-id* | **port1** { **bridge-domain** *bridge-domain-name* | **interface** { **Bundle-Ether** | **FastEthernet** | **GigabitEthernet** | **TenGigE** } *interface-id* | **none** | **xconnect** *xconnect-name* }]

Syntax Description

level	Specifies the APS message level. The message level ranges from 0 to 7.
port0	Configures G.8032 aps-channel information associated to port0.
port1	Configures G.8032 aps-channel information associated to port1.
interface	Assigns interface associated to port0 or port1. You can assign one of these interfaces: • Bundle Ethernet • Fast Ethernet • Gigabit Ethernet • TenGigabit Ethernet
bridge-domain	Specifies VPLS domain where virtual channel is connected.
none	Specify APS channel port0 or port1 as none.
xconnect	Specifies VPWS xconnect where virtual channel is connected.

Command Default

None

Command Modes

L2VPN configuration mode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows how to configure G.8032 instance APS channel:

```
Router#configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 r1
Router(config-l2vpn-erp)# instance 1
Router(config-l2vpn-erp-instance)# description test
Router(config-l2vpn-erp-instance)# profile p1
Router(config-l2vpn-erp-instance)# rpl port0 neighbor
Router(config-l2vpn-erp-instance)# inclusion-list vlan-ids e-g
Router(config-l2vpn-erp-instance)# aps-channel
Router(config-l2vpn-erp-instance-aps)#
```

description (G.8032)

To specify a string that serves as a description for a G.8032 Ethernet ring instance, use the **description** command in the Ethernet ring G.8032 instance configuration submode.

description *ring-instance-identifier*

Syntax Description

ring-instance-identifier	A string that serves as a description for a G.8032 Ethernet ring instance. The string can be a maximum of 32 characters.

Command Default

None

Command Modes

Ethernet ring G.8032 instance configuration submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows how to specify a description for G.8032 Ethernet ring instance:

```
Router#configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 r1
Router(config-l2vpn-erp)# instance 1
Router(config-l2vpn-erp-instance)# description test
Router(config-l2vpn-erp-instance)#
```

ethernet ring g8032

To enable G.8032 ring mode and enter the G.8032 configuration submode, use the **ethernet ring g8032** command in the L2VPN configuration mode. To disable the G.8032 ring mode, use the **no** form of this command.

ethernet ring g8032 *protocol ring identifier*
no ethernet ring g8032 *protocol ring identifier*

Syntax Description

protocol ring identifier	Ring profile name. The maximum size of the profile name is 32 characters.

Command Default

None

Command Modes

L2VPN configuration mode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows how to enable the G.8032 ring mode:

```
Router#configure
Router(config)#l2vpn
Router(config-l2vpn)#ethernet ring g8032 p1
Router(config-l2vpn-erp)#
```

ethernet ring g8032 profile

To configure G.8032 ring profile and to enter the G.8032 ring profile configuration mode, use the **ethernet ring g8032 profile**command in the global configuration mode. To disable the G.8032 ring profile, use the **no** form of this command.

ethernet ring g8032 profile *profile-name* [**non-revertive** | **timer** { **guard** *milliseconds* | **hold-off** *seconds* | **wtr** *minutes* }]

Syntax Description

non-revertive	Configures non-revertive ring instance.
timer	Configures G.8032 timer.
guard	Configures G.8032 guard timer. The Guard timer can be configured and the default time interval is 500 ms. The time interval ranges from 10 to 2000 ms.
hold-off	Configures G.8032 hold-off timer. The hold-off timer can be configured and the default time interval is 0 seconds. The time interval ranges from 0 to 10 seconds.
wtr	Configures G.8032 WTR timer. The WTR timer can be configured by the operator, and the default time interval is 5 minutes. The time interval ranges from 1 to 12 minutes.

Command Default

None

Command Modes

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

This example shows you how to configure a G.8032 ring profile:

```
Router# configure
Router(config)# ethernet ring g8032 profile p1
Router(config-g8032-ring-profile)#
```

exclusion list

To define a set of Virtual LAN (VLAN) IDs that are not protected by the Ethernet ring protection mechanism, use the **exclusion list** command in Ethernet ring g8032 configuration submode. To delete the set of VLAN IDs, use the **no** form of this command.

exclusion list vlan-ids *vlan range*
no exclusion list vlan-ids *vlan range*

Syntax Description

vlan-ids	Specifies a list of VLANs. Ranges in the form a-b,c,d,e-f,g where VLAN value is 1–4094 and/or untagged. By default, all the VLANs configured under ring ports are blocked. VLAN IDs specified here cannot belong to the inclusion-list. VLAN IDs range cannot overlap with the IDs specified under inclusion-list.

Command Default

Configured physical Ethernet or ether bundle interface

Command Modes

Ethernet ring g8032 configuration submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows the output from the exclusion list command:

```
Router# configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 r1
Router(config-l2vpn-erp)# exclusion-list vlan-ids e-g
Router(config-l2vpn-erp)#
```

inclusion-list

To associate a set of VLAN IDs with the current instance, use the **inclusion-list** command in the Ethernet ring G.8032 instance configuration submode. To disassociate the VLAN IDs with the current instance, use the **no** form of this command.

inclusion-list vlan-ids *vlan-id*
no inclusion-list vlan-ids *vlan-id*

Syntax Description

vlan-ids	Associates a set of VLAN IDs with the current instance.
vlan-id	List of VLAN IDs in the form vlan-id <vlan range>[,<vlan range][,<vlan range>][,<vlan range>].

Command Default

None

Command Modes

Ethernet ring G.8032 instance configuration submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows how to associate VLAN IDs with instance 1:

```
Router#configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 r1
Router(config-l2vpn-erp)# instance 1
Router(config-l2vpn-erp-instance)# description test
Router(config-l2vpn-erp-instance)# profile p1
Router(config-l2vpn-erp-instance)# rpl port0 neighbor
Router(config-l2vpn-erp-instance)# inclusion-list vlan-ids e-g
```

instance (G.8032)

To configure a G.8032 Ethernet ring instance and enter Ethernet ring G.8032 instance configuration submode, use the instance command in the Ethernet ring G.8032 configuration submode. To disable the G.8032 Ethernet ring instance, use the no form of this command.

instance *instance-id*
no instance *instance-id*

Syntax Description

instance-id	Instance ID; currently, supports up to two instances per Ethernet ring. The instance ID can be 1 or 2.

Command Default

None

Command Modes

Ethernet ring G.8032 configuration submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows how to configure G.8032 Ethernet ring instance:

```
Router#configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 r1
Router(config-l2vpn-erp)# instance 1
Router(config-l2vpn-erp-instance)#
```

level

To specify the APS message level, use the **level** command in the Ethernet ring G.8032 instance aps-channel configuration submode.

level *number*

Syntax Description

number	The APS message level. The range is from between 0 to 7.

Command Default

None

Command Modes

Ethernet ring G.8032 instance aps-channel configuration submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows how to enable the G.8032 ring mode:

```
Router#configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 r1
Router(config-l2vpn-erp)# instance 1
Router(config-l2vpn-erp-instance)# description test
Router(config-l2vpn-erp-instance)# profile p1
Router(config-l2vpn-erp-instance)# rpl port0 neighbor
Router(config-l2vpn-erp-instance)# inclusion-list vlan-ids e-g
Router(config-l2vpn-erp-instance)# aps-channel
Router(config-l2vpn-erp-instance-aps)# level 3
```

monitor interface (port0)

To specify a port to detect a ring link failure, use the **monitor interface** command in g8032 port0 submode. To delete the port, use the **no** form of this command.

monitor interface *interface-name*
no monitor interface *interface-name*

Syntax Description

interface-name	Name of the monitored interface. The monitored interface must be a sub-interface of the main interface.

Command Default

Configured physical Ethernet or Ether Bundle interface

Command Modes

Ethernet ring g8032 port0 submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows the output from the monitor interface command:

```
Router# configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 g1
Router(config-l2vpn-erp)# port0 interface TenGigE 0/0/0/0
Router(config-l2vpn-erp-port0)# monitor interface GigabitEthernet 0/0/0/0.5
Router(config-l2vpn-erp-port0)#exit
Router(config-l2vpn-erp)# exit
Router(config-l2vpn)# exit
Router(config)# ethernet cfm
Router(config-cfm)# domain dom23to24 level 6
Router(config-cfm-domain)# service ser23to24 down-meps
Router(config-cfm-svc)# continuity-check interval 10s
Router(config-cfm-svc)# mep crosscheck
Router(config-cfm-svc-xcheck)# mep-id 3
Router(config-cfm-svc-xcheck)# exit
Router(config-cfm-svc)# efd
Router(config-cfm-svc)# exit
Router(config-cfm)# exit
Router(config)# interface Gigabiteethernet0/0/0/0.5
```

```
Router(config-if)# ethernet cfm
Router(config-if-cfm)# mep domain dom23to24 service ser23to24 mep-id 4
```

monitor interface (port1)

To specify the port to detect a ring link failure, use the **monitor interface** command in g8032 port1 submode. To delete the port, use the **no** form of this command.

monitor interface *interface-name*
no monitor interface *interface-name*

Syntax Description

interface-name	Name of the monitored interface. The monitored interface must be a sub-interface of the main interface.

Command Default

Configured physical Ethernet or ether bundle interface

Command Modes

Ethernet ring g8032 port1 submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows the output from the monitor interface command:

```
Router# configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 g1
Router(config-l2vpn-erp)# port1 interface TenGigE 0/0/0/1
Router(config-l2vpn-erp-port1)# monitor interface GigabitEthernet 0/0/0/1.5
Router(config-l2vpn-erp-port1)#exit
Router(config-l2vpn-erp)# exit
Router(config-l2vpn)# exit
Router(config)# ethernet cfm
Router(config-cfm)# domain dom23to24 level 6
Router(config-cfm-domain)# service ser23to24 down-meps
Router(config-cfm-svc)# continuity-check interval 10s
Router(config-cfm-svc)# mep crosscheck
Router(config-cfm-svc-xcheck)# mep-id 3
Router(config-cfm-svc-xcheck)# exit
Router(config-cfm-svc)# efd
Router(config-cfm-svc)# exit
Router(config-cfm)# exit
Router(config)# interface Gigabiteethernet0/0/0/1.5
```

```
Router(config-if)# ethernet cfm
Router(config-if-cfm)# mep domain dom23to24 service ser23to24 mep-id 5
```

open ring

To specify Ethernet ring g8032 as an open ring, use the **open-ring** command in Ethernet ring g8032 configuration submode. To delete, use the **no** form of this command.

open-ring
no open-ring

This command has no keywords or arguments.

Command Default

The default value is FALSE.

Command Modes

Ethernet ring g8032 configuration submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows the output from the **open-ring** command:

```
Router# configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 g1
Router(config-l2vpn-erp)# open-ring
Router(config-l2vpn-erp)#
```

port0 interface

To enable G.8032 for a specified ring port, use the **port0 interface** command in g8032 configuration port0 submode. To disable, use the **no** form of this command.

port 0 interface *interface name*
no port 0 interface *interface name*

Syntax Description

interface name	Any physical Ethernet or Bundle Ethernet interface. A physical port of the local node connected to G.8032 ring.

Command Default

None

Command Modes

Ethernet ring g8032 configuration port0 submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows the output from the port0 interface command:

```
Router# configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 g1
Router(config-l2vpn-erp)# port0 interface Bundle-Ether 555
Router(config-l2vpn-erp-port0)#
```

port1

To enable G.8032 for a specified ring port, use the **port1** command in g8032 configuration port1 submode. To disable, use the **no** form of this command.

port1 { **interface** *interface name* | **none** }

Syntax Description

interface *interface name*	Specifies physical Ethernet or Bundle Ethernet interface. A physical port of the local node connected to G.8032 ring. Enables G.8032 for the specified physical port to form a closed ring.
none	Specifies local node endpoint of an open-ring.

Command Default

None

Command Modes

Ethernet ring g8032 configuration port1 submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows the output from the port1 command:

```
Router# configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 g1
Router(config-l2vpn-erp)# port1 interface TenGigE 0/6/0/3
Router(config-l2vpn-erp-port1)#
```

profile

To specify an associated Ethernet ring G.8032 profile, use the **profile** command in the Ethernet ring G.8032 instance configuration submode.

profile *profile-name*

Syntax Description

profile-name	Ethernet ring G.8032 profile name.

Command Default

None

Command Modes

Ethernet ring G.8032 instance configuration submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows how to specify a G.8032 ring profile name:

```
Router#configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 r1
Router(config-l2vpn-erp)# instance 1
Router(config-l2vpn-erp-instance)# description test
Router(config-l2vpn-erp-instance)# profile p1
Router(config-l2vpn-erp-instance)#
```

rpl

To specify one ring port on local node being RPL owner, neighbor or next-neighbor, use the **rpl** command in the Ethernet ring G.8032 instance configuration submode. To disable the port as RPL owner, neighbor or next-neighbor, use the **no** form of this command.

rpl { **port0** | **port1** } { **owner** | **neighbor** | **next-neighbor** }
no rpl { **port0** | **port1** } { **owner** | **neighbor** | **next-neighbor** }

Syntax Description

port0	Assigns port0 as RPL owner, neighbor or next-neighbor.
port1	Assigns port1 as RPL owner, neighbor or next-neighbor.
owner	Assigns port0 or port1 as RPL owner.
neighbor	Assigns port0 or port1 as neighbor.
next-neighbor	Assigns port0 or port1 as next neighbor.

Command Default

None

Command Modes

Ethernet ring G.8032 instance configuration submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows how to assign port0 as neighbor:

```
Router#configure
Router(config)# l2vpn
Router(config-l2vpn)# ethernet ring g8032 r1
Router(config-l2vpn-erp)# instance 1
Router(config-l2vpn-erp-instance)# description test
```

```
Router(config-l2vpn-erp-instance)# profile p1
Router(config-l2vpn-erp-instance)# rpl port0 neighbor
Router(config-l2vpn-erp-instance)#
```

tcn-propagation

To enable topology change notification (TCN) propagation, use the **tcn-propagation** command in the L2VPN configuration submode.

tcn-propagation

This command has no keywords or arguments.

Command Default

None

Command Modes

L2VPN configuration submode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

Task ID

Task ID	Operation
l2vpn	read, write

Examples

This example shows how to enable the G.8032 ring mode:

```
Router#configure
Router(config)#l2vpn
Router(config-l2vpn-erp)# tcn-propagation
Router(config-l2vpn)#
```

Global Interface Commands

This module describes the global command line interface (CLI) commands for configuring interfaces on the Cisco 8000 Series Routers.

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

bandwidth (global)

To configure the bandwidth of an interface, use the **bandwidth** command in interface configuration mode.

bandwidth *rate*

Syntax Description

rate	Amount of bandwidth to be allocated on the interface, in Kilobits per second (kbps). Range is from 0 through 4294967295.

Command Default

The default bandwidth depends on the interface type.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Note To obtain the default bandwidth for a specific interface, use the **show interfaces** command after you first bring up the interface. The default interface bandwidth is displayed in the **show interfaces** command output.

Task ID

Task ID	Operations
interface	execute
basic-services	read, write

Examples

This example shows how to configure the bandwidth on a Ten Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router# interface TenGigE 0/4/1/0
RP/0/RP0/CPU0:router# bandwidth 4000000
```

cef load-balancing fields user-data

To specify the additional fields that are to be included in the hashing algorithm, which is used for load balancing during forwarding, use the **cef load-balancing fields user-data** command in XR Config mode. To undo a configuration, use the **no** form of this command.

cef load-balancing fields user-data { **ipv4** | **ipv6** } { **non-tcp-udp** | **tcp** | **udp** } **offset** *offset-value* **size** *size* **location** { *location* *WORD* }

Syntax Description

user-data	Considers user data for hashing.
ipv4	Considers IPv4 header for hashing.
ipv6	Considers IPv6 header for hashing.
non-tcp-udp	Considers the additional data for non-tcp-udp packet for hashing.
tcp	Considers the additional data for TCP packet for hashing.
udp	Considers the additional data for UDP packet for hashing.
offset	Considers the payload based on the offset from the end of the chosen header for hashing.
offset-value	Specifies the value of the offset from the end of the header. This value ranges as follows: • ipv4 non-tcp-udp: 0-43 bytes • ipv4 tcp: 0-23 bytes • ipv4 udp: 0-35 bytes • ipv6 non-tcp-dup: 0-23 bytes • ipv6 tcp: 0-3 bytes • ipv6 udp: 0-15 bytes
size	Considers the size of the payload for hashing.
size	Considers the specified number of contiguous payload bytes from the offset-value for hashing. This value can range from 1-4.
location	Considers the ingress card location.
location	Specifies the ingress card location.
WORD	Specifies the ingress card location.

Command Default

By default, user-data fields are not considered for ECMP hashing.

Command Modes

XR Config mode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

- The configuration is effective immediately with minimum load balance hashing impact.
- By default, ECMP hashing algorithm uses fixed fields:
  - L4 protocol TCP or UDP, not fragmented: source IP address, destination IP address, L4 protocol, source port, destination port
  - Non TCP, non UDP, or TCP/UDP fragmented: source IP address, destination IP address, L4 protocol

Note For IPv6 flows, in addition to these fields, 20-bit ipv6 flow-label is also used for hashing.

Task ID

Task ID	Operation
cef	read, write
config-services	read, write

Examples

The following example shows how to specify the additional IPv4 header fields with offset, size, and location for ECMP path calculation:

In this example, the first four bytes of payload of any non-tcp-udp packet are additionally included in the hashing algorithm.

```
Router#configure
Router(config)#cef load-balancing fields user-data ipv4 non-tcp-udp offset 0 size 4 location
 0/0/CPU0
Router(config)#commit
```

- offset 0: The payload considered for hashing starts from the end of IP header
- size 4: Four bytes of payload are considered.

clear interface

To clear interface statistics or packet counters, use the **clear interface** command in XR EXEC mode .

clear 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

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Task ID

Task ID	Operations
interface	execute
basic-services	read, write

Examples

This example shows how to use the **clear interface** command to clear the loopback interface 2:

```
RP/0/RP0/CPU0:router# clear interface loopback 2
```

dampening

To limit propagation of transient or frequently changing interface states on Interface Manager (IM) clients, turn on event dampening by using the **dampening** command in interface configuration mode. To turn dampening off, use the **no** form of this command.

dampening [*half-life* [*reuse suppress max-suppress-time*]]

Syntax Description

half-life	(Optional) Time (in minutes) after which a penalty is decreased. Once the interface has been assigned a penalty, the penalty is decreased by half after the half-life period. The process of reducing the penalty happens every 5 seconds. The range of the half-life period is 1 to 45 minutes. The default is 1 minute.
reuse	(Optional) Penalty value below which a stable interface is unsuppressed. Range is from 1 through 20000. Default value is 750.
suppress	(Optional) Limit at which an interface is suppressed when its penalty exceeds that limit. Range is from 1 through 20000, and must be greater than the reuse threshold. The default value is 2000.
max-suppress-time	(Optional) Maximum time (in minutes) that an interface can be suppressed. This value effectively acts as a ceiling that the penalty value cannot exceed. Default value is four times the half-life period.

Command Default

Dampening is turned off by default. When you use the **dampening** command, the following default values are enabled for any optional parameters that you do not enter:

- *half-life*: 1 minute
- *reuse*: 750
- *suppress*: 2000
- *max-suppress-time*: Four times the half-life

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Event dampening suppresses a constantly unstable interface until it remains stable for a period of time. Enabling dampening on an interface that already has dampening configured has the effect of resetting the penalty associated with that interface to zero. The reuse threshold must always be less than the suppress threshold.

Consider the following guidelines when configuring event dampening:

- Configuring dampening on both a subinterface and its parent is usually unnecessary because their states are almost always the same and dampening would be triggered at the same time on each interface.
- If all subinterfaces require dampening, then apply dampening to the main interface only. Applying configuration to large numbers of subinterfaces requires an abundance of memory and increases the time required to process the configuration during boot and failover.

- When dampening is enabled, an interface has a penalty value associated with it. The value starts at 0 and is increased by 1000 whenever the underlying state of the interface changes from up to down.
- The penalty value decreases exponentially while the interface state is stable. If the penalty value exceeds a configured suppress threshold, then the state of the interface is suppressed and IM will not notify upper layers of further state transitions. The suppressed state remains until the penalty value decreases past a configured reuse threshold.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable dampening with default values on an interface:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/4/0/0
RP/0/RP0/CPU0:router(config-if))# dampening
```

Related Commands

Command	Description
show im dampening, on page 199	Displays the state of all interfaces on which dampening has been configured.

encapsulation dot1ad dot1q

To define the matching criteria to be used in order to map single-tagged 802.1ad frames ingress on an interface to the appropriate service instance, use the **encapsulation dot1ad dot1q** command in sub-interface configuration mode. To remove the configuration, use the **no** form of this command.

encapsulation dot1ad *vlan-id* **dot1q** *vlan-id*

Syntax Description

dot1ad	Indicates that the IEEE 802.1ad provider bridges encapsulation type is used for the outer tag.
dot1q	Indicates that the IEEE 802.1q standard encapsulation type is used for the inner tag.
vlan-id	VLAN ID, can be given as single ID.

Command Default

No matching criteria are defined.

Command Modes

Sub-interface configuration

Command History

Release	Modification
Release 7.2.12	This command was introduced.

Usage Guidelines

The outer VLAN tag is an 802.1ad VLAN tag, instead of an 802.1Q tag. An 802.1ad tag has an ethertype value of 0x88A8, instead of 0x8100 that 802.1Q uses.

Some of the fields in the 802.1ad VLAN header are interpreted differently per 802.1ad standard.

A **tunneling ethertype** command applied to the main interface does not apply to an 802.1ad sub-interface. An interface with encapsulation dot1ad causes the router to categorize the interface as an 802.1ad interface. This causes special processing for certain protocols and other features:

- MSTP uses the IEEE 802.1ad MAC STP address instead of the STP MAC address.
- Certain QoS functions may use the Drop Eligibility (DE) bit of the IEEE 802.1ad tag.

Examples

The following example shows how to map single-tagged 802.1ad ingress frames to a service instance:

```
Router# configure
Router# interface hundredGigE 0/0/0/1.10
Router(config-subif)# encapsulation dot1ad 100 dot1q 20
```

Related Commands

Command	Description
rewrite ingress tag, on page 197	Specifies the encapsulation adjustment that is to be performed on the frame ingress to the service instance.

encapsulation dot1q

To define the matching criteria to map 802.1Q frames ingress on an interface to the appropriate service instance, use the **encapsulation dot1q** command in the sub-interface configuration mode. To delete the matching criteria to map 802.1Q frames ingress on an interface to the appropriate service instance, use the **no** form of this command.

encapsulation dot1q *vlan-id*

Syntax Description

vlan-id	VLAN ID, can be given as single ID.

Command Default

No matching criteria are defined.

Command Modes

Sub-interface configuration

Command History

Release	Modification
Release 7.2.12	This command was introduced.

Usage Guidelines

Only one encapsulation statement can be applied to a sub-interface. Encapsulation statements cannot be applied to main interfaces.

A single encapsulation dot1q statement specifies matching for frames with a single VLAN ID.

Examples

The following example shows how to map 802.1Q frames ingress on an interface to the appropriate service instance:

```
Router# configure
Router(config)#interface HundredGigE 0/0/0/24.10
Router(config-if)# encapsulation dot1q 10
```

The following example shows how to map 802.1Q frames ingress on an l2transport sub-interface:

```
Router# configure
Router(config)# interface HundredGigE 0/0/0/24.10 l2transport
Router(config-subif)# encapsulation dot1q 10
```

Related Commands

Command	Description
rewrite ingress tag, on page 197	Specifies the encapsulation adjustment that is to be performed on the frame ingress to the service instance.

interface (global)

To configure an interface or to create or configure a virtual interface, use the **interface** command in XR Config mode. To delete the interface configuration, use the **no** form of this command.

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

No interfaces are configured

Command Modes

XR Config

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The **interface** command enters interface configuration mode to allow you to configure interfaces. If a virtual interface is configured, then the interface is created if it did not already exist.

The **no** form of this command applies only to virtual interfaces or to subinterfaces (that is, interfaces that have been created in global configuration mode).

Until Release 6.5.1, when you create an interface with some configurations, upon router or interface reload, interface configurations are lost. From Release 6.5.1, onwards, automatic shutdown config behavior is persistent and no shutdown configs are lost on interface or router reload.

Task ID

Task ID	Operations
interface	read, write

Examples

In the following example, the **interface** command is given for the card in location 0/2/0/1, and interface configuration mode is entered for that interface:

```
RP/0/RP0/CPU0:router(config)# interface POS 0/2/0/1
```

Related Commands

Command	Description
clear interface, on page 183	Clears interface statistics or packet counters.

lacp system

To set the default system parameters for the Link Aggregation Control Protocol (LACP) bundles, use the **lacp system** command in XR Config mode .

lacp system { **mac** | **priority** }

Syntax Description

mac	Unique MAC address used to identify the system in LACP negotiations.
priority	Priority for this system. Lower value is higher priority. Range is from 1 to 65535.

Command Default

System priority is 32768. MAC address is automatically assigned from the backplane pool.

Command Modes

XR Config

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The parameters are the system MAC address and the priority of the system. The MAC address must be unique to the system (if it matches a partner system, LACP negotiations fail). The combination of the MAC address and the set system priority determine the priority of the LACP bundles.

Task ID

Task ID	Operation
bundle	read, write

Example

The following example shows how to configure the MAC address on an LACP system:

```
RP/0/RP0/CPU0:router(config)lacp system mac 000c.15c0.bd15
```

mtu

To adjust the maximum transmission unit (MTU) value for packets on the interface, use the **mtu** command in interface configuration mode. To return the interface to the default MTU for the interface type, use the **no** form of this command.

mtu *bytes*

Syntax Description

bytes	Maximum number of bytes in a Layer 2 frame. Range is from 64 through 65535.

Command Default

The default MTU for each interface is as follows:

- Ethernet—1514 bytes
- POS—4474 bytes
- Tunnel—1500 bytes
- Loopback—1514 bytes
- ATM—4470 bytes

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Use the **mtu** command to set a specific MTU value for an interface, or use the **no mtu** command to return the interface to the default MTU value for that interface type. The MTU value can be increased or decreased using the **mtu** command, subject to minimum and maximum MTU limits for the interface type.

If the MTU value is not configured, then each interface will have a default MTU value that is specific to the interface type. The default MTU value is generally the largest Layer 2 frame size possible for the interface type.

The default/configured MTU value on an atm interface includes the L2 header.

The MTU size consists of L2 header that includes either SNAP(8bytes)/MUX(0)/NLPID(2) header or the AAL5 SDU. The AAL5 SDU includes the L3 datagram and the optional Logical Link Control/Subnetwork Access Protocol (LLC/SNAP) header.

The Ethernet interface is the Layer 3 datagram plus 14 bytes. For ATM main interface, the MTU is L3 datagram + 0 bytes.

For ATM L3 sub interface, mtu is as follows:

- SNAP - L3 datagram + 8 bytes
- NLPID - L3 datagram + 2 bytes
- MUX - L3datagram + 0 bytes
- When no pvc is configured under sub interface - L3datagram + 0 bytes

You can use the **show interfaces** command to determine if the MTU value has been changed. The **show interfaces** command output displays the MTU size for each interface in the MTU (byte) field. Note that the MTU size that is displayed includes the Layer 2 header bytes used for each encapsulation type.

Note You can use the **show interfaces** command to determine if the MTU value has been changed. The **show interfaces** command output displays the MTU size for each interface in the MTU (byte) field. Note that the MTU size that is displayed includes the Layer 2 header bytes used for each encapsulation type.

Note Changing the MTU on an interface triggers a change on the protocols and encapsulations configured on that interface, although some protocol-specific configurations can override the interface MTU. For example, specifically changing the interface MTU configuration does not affect the IP MTU configuration, but may affect the resulting MTU on that node.

Note For the 10x10GigE CPAK (10 ports with only 8 profiles), it is not possible to support 10 different MTUs on 10 different 10GigE ports. One of the profiles needs to be reserved for the default MTU, in case you need to change the configured MTU back to the default MTU. Therefore on the 10x10g CPAK, you can configure different MTU sizes on 7 ports and the other 3 ports have the default MTU size. If you configure the 8th port, the configuration command succeeds but an error appears on the console.

Task ID

Task ID	Operations
interface	read, write

Examples

In this example, the MTU value for all interfaces is verified. The MTU value is shown in the next-to-last column:

```
RP/0/RP0/CPU0:router# show interfaces all brief

                Intf        Intf         LineP              Encap  MTU       BW
                Name        State        State               Type (byte)   (Kbps)
--------------------------------------------------------------------------------
                 Nu0           up           up               Null  1500   Unknown
           TenGigE6/0/0/0      up           up               HDLC  4474   2488320
           TenGigE6/0/0/1      up           up               HDLC  4474   2488320
           TenGigE6/0/0/2   admin-down   admin-down          HDLC  4474   2488320
           TenGigE6/0/0/3   admin-down   admin-down          HDLC  4474   2488320
         Mg0//CPU0/0           up           up               ARPA  1514    100000

RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface TenGigE 6/0/0/0
RP/0/RP0/CPU0:router(config-if)# mtu 1000
```

After the **mtu** command is used to decrease the MTU Layer 2 frame size for the POS interface on 6/0/0/0 to 1000 bytes, the **show interfaces all brief** command is used again to verify that the MTU Layer 2 frame size has been changed:

```
RP/0/RP0/CPU0:router# show interfaces all brief

                Intf        Intf         LineP              Encap  MTU       BW
                Name        State        State               Type (byte)    (Kbps)
--------------------------------------------------------------------------------
                 Nu0          up           up                Null  1500   Unknown
           PO6/0/0/0          up           up                HDLC  1000   2488320
           PO6/0/0/1          up           up                HDLC  4474   2488320
           PO6/0/0/2    admin-down   admin-down              HDLC  4474   2488320
           PO6/0/0/3    admin-down   admin-down              HDLC  4474   2488320
 Mg0//CPU0/0            up           up              ARPA  1514    100000
```

replace

To substitute any configuration in the router with new settings, use the **replace** command in XR Config mode.

replace interface *interface_name_before* **with** *interface_name_after*

replace pattern *string_before* **with** *string_after* [**dry-run**]

Syntax Description

interface	Specifies the details of interface configuration replacement follows.
interface_name_before	Specifies the name of an interface in the router that you want to replace. For more information about the syntax for the router, use the question mark (**?**) online help function.
interface_name_after	Specifies the new interface name that replaces the current interface name specified in the *interface_name_before* variable. For more information about the syntax for the router, use the question mark (**?**) online help function.
pattern	Specifies that the details of string replacement follow.
string_before	Specify the configuration string in the router that you need to replace. The *string_before* can be any regular expression that specifies a match pattern in text. **Note** You must specify the *string_before* in a single quote.
string_after	Specify the new string that replaces the configuration matching the *string_before* variable. **Note** You must specify the *string_after* in a single quote.
dry-run	Displays the configuration after the pattern replacement without preparing the config changes for a commit. This option facilitates verifying the pattern replacement changes and provides an extra layer of protection to avoid accidentally committing unwanted configuration changes.

Command Default

No default behavior or values.

Command Modes

XR Config

Command History

Release	Modification
Release 7.1.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to use the **replace** command:

```
Router# config
Router(config)# replace interface gigabitEthernet 0/0/0/0 with loopback 450
Loading.
4 bytes parsed in 1 sec (3)bytes/sec


Router# config
Router(config)# replace pattern '10\.20\.30\.40' with '100.200.250.225‘
Loading.
232 bytes parsed in 1 sec (230)bytes/sec
```

Examples

The following example details configuration changes on using the **replace** command:

Original Configuration:

```
Router(config-ospf-ar-if)#show configuration
Building configuration...
!! IOS XR Configuration 0.0.0
interface GigabitEthernet0/0/0/0
 description first
 ipv4 address 10.20.30.40 255.255.0.0
 shutdown
!
router ospf 10
 cost 100
 area 200
  cost 200
  interface GigabitEthernet0/0/0/0
   transmit-delay 5
  !
```

Using **replace** command:

```
Router(config-ospf-ar-if)# replace interface gigabitEthernet 0/0/0/0 with loopback 450

Building configuration...
Loading.
232 bytes parsed in 1 sec (230)bytes/sec
```

Configuration changes on using **replace** command:

```
Router(config-ospf-ar-if)#show configuration
Building configuration...
!! IOS XR Configuration 0.0.0
interface Loopback450
 description first
 ipv4 address 10.20.30.40 255.255.0.0
 shutdown
```

```
!
no interface GigabitEthernet0/0/0/0
router ospf 10
 area 200
  interface Loopback450
   transmit-delay 5
  !
  no interface GigabitEthernet0/0/0/0
```

Examples

The following example shows how to use the **dry-run** option in the **replace** command:

```
Router# config
Router(config)# replace pattern 'vrf thr' with 'vrf three' dry-run
no vrf thr
vrf three
 address-family ipv4 unicast
  import route-target
   65321:3
  !
  export route-target
   65321:3
  !
 !
exit
router static
 no vrf thr
 vrf three
  address-family ipv4 unicast
   192.168.3.0/24 vrf one 192.168.1.1
   192.168.3.0/24 vrf two 192.168.2.2
  !
exit
end
Router(config)# commit
No configuration changes to commit.
```

rewrite ingress tag

To specify the encapsulation adjustment that is to be performed on the frame ingress to the service instance, use the **rewrite ingress tag** command in the interface configuration mode. To delete the encapsulation adjustment that is to be performed on the frame ingress to the service instance, use the **no** form of this command.

rewrite ingress tag pop { **1** | **2** } **symmetric** | { **push dot1ad** *vlan-id* **dot1q** *vlan-id* | **dot1q** *vlan-id* **symmetric** } | { **translate** { **1-to-1 dot1ad** *vlan-id* | **dot1q** *vlan-id* **symmetric** } | **1-to-2 dot1ad** *vlan-id* **dot1q** *vlan-id* **symmetric** | **2-to-1** { **dot1ad** *vlan-id* | **dot1q** *vlan-id* } **symmetric** | **2-to-2 dot1ad** *vlan-id* **dot1q** *vlan-id* **symmetric** }

Syntax Description

vlan-id	VLAN ID, can be given as single ID.
push dot1q *vlan-id*	Pushes one 802.1Q tag with *vlan-id*.
push dot1ad *vlan-id*	Pushes one Dot1ad tag with *vlan-id*.
pop 1	One tag is removed from the packet. This command can be combined with a push (pop N and subsequent push *vlan-id*).
pop 2	Two tags are removed from the packet. This command can be combined with a push (pop N and subsequent push *vlan-id*).
translate 1-to-1 dot1q *vlan-id* or **translate 1-to-1 dot1ad** *vlan-id*	Replaces the incoming tag (defined in the encapsulation command) into a different 802.1Q or dot1ad tag at the ingress service instance.
translate 1-to-2 dot1q *vlan-id* or **translate 1-to-2 dot1ad** *vlan-id*	Replaces the incoming tag defined by the encapsulation command by a pair of 802.1Q or dot1ad tags.
translate 2-to-2 dot1q *vlan-id* or **translate 2-to-2 dot1ad** *vlan-id*	Replaces the pair of tags defined by the encapsulation command by a pair of VLANs defined by this rewrite.
translate 2-to-1 dot1q *vlan-id* or **translate 2-to-1 dot1ad** *vlan-id*	Replaces a pair of tags defined in the **encapsulation** command by vlan-id.
symmetric	A rewrite operation is applied on both ingress and egress. The operation on egress is the inverse operation as ingress. **Note** Symmetric is the default behavior. Hence, it cannot be disabled.

Command Default

The frame is left intact on ingress.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.2.12	This command was introduced.

Usage Guidelines

The **symmetric** keyword is accepted only when a single VLAN is configured in encapsulation. If a list of VLANs is configured in encapsulation, the **symmetric** keyword is accepted only for push rewrite operations; all other rewrite operations are rejected.

The **pop** command assumes the elements being popped are defined by the encapsulation type.

The **rewrite ingress tag translate**command assume the tags being translated from are defined by the encapsulation type. In the 2-to-1 option, the "2" means 2 tags of a type defined by the **encapsulation** command. The translation operation requires at least "from" tag in the original packet. If the original packet contains more tags than the ones defined in the "from", then the operation should be done beginning on the outer tag.

Examples

The following example shows how to specify the encapsulation adjustment that is to be performed on the frame ingress to the service instance:

```
Router# configure
Router(config)# interface hundredGigE 0/0/0/24.1 l2transport
Router(config-if)# encapsulation dot1q 10
Router(config-if)# rewrite ingress tag push dot1q 200 symmetric
```

The following example shows how to remove one outer tag from the packet:

```
Router# configure
Router(config)# interface hundredGigE 0/0/0/24.1 l2transport
Router(config-if)# encapsulation dot1q 10
Router(config-subif)# rewrite ingress tag pop 1 symmetric
```

The following example shows how to replace the incoming tag (defined in the encapsulation command) into a different dot1ad tag at the ingress service instance:

```
Router# configure
Router(config)# interface hundredGigE 0/0/0/24.1 l2transport
Router(config-if)# encapsulation dot1q 10
Router(config-subif)# rewrite ingress tag translate 1-to-1 dot1ad 2 symmetric
```

Related Commands

Command	Description
encapsulation dot1q, on page 187	Defines the matching criteria to map 802.1Q frames ingress on an interface to the appropriate service instance.
encapsulation dot1ad dot1q, on page 186	Defines the matching criteria to be used in order to map single-tagged 802.1ad frames ingress on an interface to the appropriate service instance.

show im dampening

To display the state of all interfaces on which dampening has been configured, use the **show im dampening** command in XR EXEC mode .

show im dampening [**interface** *type* | **ifhandle** *handle*]

Syntax Description

interface *type*	(Optional) Interface type. For more information, use the question mark (**?**) online help function.
ifhandle *handle*	(Optional) Identifies the caps node whose Interface Manager (IM) dampening information you want to display.

Command Default

If you do not specify an interface, then the system displays brief details about all dampened interfaces.

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

If you do not specify an interface, then the system displays brief details about all dampened interfaces.

The physical hardware (layer 1) is not the only part of an interface that can change state. L2 keepalive failure event is one of the many instances that can have a similar impact on routing protocols despite the underlying interface state staying UP. To take account of such events, when dampening is configured on an interface, it is applied independently to every layer. They all use the same parameters as the interface but they have their own penalty value which is incremented when that layer changes state.

Capsulations that may be dampened in this way include these:

- L2 basecaps, such as HDLC and PPP, which may flap if keepalives are not received due to events such as intermittent packet loss.
- L3 capsulations (for example ipv4, ipv6). These may be brought down if another link has a conflicting IP address configured.
- Other locations where negotiation takes place with a peer router, as in the case of PPP control protocols such as IPCP. If the negotiation fails, then the caps is brought down.

Task ID

Task ID	Operations
interface	read

Examples

This example shows the output from the **show im dampening** command issued with default values:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/4/0/0
RP/0/RP0/CPU0:router(config-if)# no shutdown
```

```
RP/0/RP0/CPU0:router(config-if)# dampening
RP/0/RP0/CPU0:router# show im dampening

Interface               Proto              Caps               Penalty Suppressed

---------               -----              ----               ----------------
TenGigE0/4/0/0              0                  0                  0       NO

RP/0/RP0/CPU0:router# show im dampening interface TenGigE 0/4/0/0

TenGigE0/4/0/0 (0x05000d00)
Dampening enabled: penalty 0, not suppressed
  underlying state: Up
  half_life: 1        reuse:             750
  suppress:  3000     max-suppress-time: 4
  restart-penalty:   0

RP/0/RP0/CPU0:router# show interfaces TenGigE 0/4/0/0

TenGigE0/4/0/0 is up, line protocol is down
  Dampening enabled: penalty 0, not suppressed
    half_life: 1        reuse:             750
    suppress:  3000     max-suppress-time: 4
    restart-penalty:  0
  Hardware is Ten Gigabit Ethernet
  Description: ensoft-gsr5 TenGigE 4\2
  Internet address is Unknown
  MTU 4474 bytes, BW 155520 Kbit
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation HDLC, crc 16, controller loopback not set, keepalive set (10 sec)
  Last clearing of "show interface" counters never
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 total input drops
     0 drops for unrecognized upper-level protocol
     Received 0 broadcast packets, 0 multicast packets
              0 runts, 0 giants, 0 throttles, 0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     48 packets output, 1504 bytes, 0 total output drops
     Output 0 broadcast packets, 0 multicast packets
     0 output errors, 0 underruns, 0 applique, 0 resets
     0 output buffer failures, 0 output buffers swapped out
```

This sample output shows a POS interface with PPP basecaps and IPCP. The subsequent output for **show im dampening interface <ifname>** contains a table of any capsulations which have their own penalty as shown below:

```
RP/0/RP0/CPU0:router# show im dampening

Interface                   Protocol           Capsulation          Pen   Sup
--------------------------- ------------------ -------------------- ----- ---
HundredGigabitEthernet0/0/0/0                                       629   NO
HundredGigabitEthernet0/0/0/1                                       2389  YES
POS0/2/0/0                                                          0     NO
POS0/2/0/0                  <base>             ppp                  0     NO
POS0/2/0/0                  ipv4               ipcp                 0     NO


RP/0/RP0/CPU0:router# show im dampening interface TenGigaE 0/1/0/0
```

```
TenGigE 0/1/0/0 (0x01180020)
Dampening enabled: Penalty 1625, SUPPRESSED (42 secs remaining)
  Underlying state: Down
  half-life: 1        reuse:             1000
  suppress:  1500     max-suppress-time: 4
  restart-penalty:  0

Protocol       Capsulation        Pen   Suppression              U-L State
-------------- ------------------ ----- ---------------------- -------------
 ipv6           ipv6               1625  YES    42s  remaining        Down
```

Note When dampening is configured on an interface it is also applied independently to all capsulations on that interface. For example, the ppp or hdlc basecaps state can flap even while the interface stays up and if keepalives fail. The **show im dampening interface** command contains one line for each such capsulation as well as the interface itself.

Table 15: show im dampening Field Descriptions

Field	Description
Dampening	Indicates the dampening state and penalty value: not suppressed, suppressed.
underlying state	Underlying state of the interface: up, down, administratively down (if an interface has been configured to be “shutdown”).
half_life	This is the time (in minutes) at which the penalty on the interface would be half that of the original penalty (of 1000) when the interface transitions from UP to DOWN. It ranges from 1 to 45 minutes and the default is 1 minute.
reuse	Penalty value below which a stable interface is unsuppressed. It ranges from 1 to 20000 and the default value is 750.
suppress	Limit at which an unstable interface is suppressed when the penalty value exceeds the suppress value. It ranges from 1 to 20000 and the default value is 2000.
max-suppress-time	Maximum time (in minutes) that an interface can be suppressed. The default is 4 minutes.
restart-penalty	Penalty assigned to the interface when it flaps.

Related Commands

Command	Description
dampening, on page 184	Turns on event dampening.

show interfaces

To display statistics for all interfaces configured on the router or for a specific node, use the **show interfaces** command in XR EXEC mode.

show interfaces [*type interface-path-id* | **all** | **local** | **location** *node-id*] [**accounting** | **brief** | **description** | **detail** | **summary** | **counters** *rate physical*]

Syntax Description

type	(Optional) Specifies the type of interface for which you want to display statistics. 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.
all	(Optional) Displays interface information for all interfaces. This is the default.
local	(Optional) Displays interface information for all interfaces in the local card.
location *node-id*	(Optional) Displays information about all interfaces on the specified node. The *node-id* argument is entered in the *rack/slot/module* notation.
accounting	(Optional) Displays the number of packets of each protocol type that have been sent through the interface.
brief	(Optional) Displays brief information of each interface (one line per interface).

description	(Optional) Displays the status, protocol, and description of each interface (one line per interface).
detail	(Optional) Displays detailed information about each interface. This is the default.
summary	(Optional) Displays a summary of interface information by interface type.
counters *rate physical*	(Optional) Displays the ingress and egress statistics of all physical interfaces. The following details are displayed: InterfaceName, Intval, InMbps, InBW%, InKpps, OutMbps, OutBW%, OutKpps. **Note** This keyword is applicable only for Cisco 8000 platform.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.
Release 7.9.1	New keyword "counters" was added for Cisco 8000 platform.

Usage Guidelines

The **show interfaces** command displays statistics for the network interfaces. The resulting display shows the interface processors in slot order.

For example, if you type the **show interfaces** command without an interface type, you receive information for all the interfaces installed in the networking device. Only by specifying the interface *type*, *slot*, and *port* arguments can you display information for a particular interface.

If you enter a **show interfaces** command for an interface type that has been removed from the networking device, an error message is displayed: “Interface not found.”

The output displayed depends on the network for which an interface has been configured.

Note The 5-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average is within 2 percent of the instantaneous rate of a uniform stream of traffic over that period.

Task ID

Task ID	Operations
interface	read

Examples

This example shows the output from the **show interfaces** command. The output displayed depends on the type and number of interface cards in the networking device.

```
RP/0/RP0/CPU0:router# show interfaces HundredGigE 0/3/0/35

HundredGigE0/3/0/35 is up, line protocol is up
  Interface state transitions: 1
  Hardware is HundredGigE, address is e666.9aa0.223c (bia e666.9aa0.223c)
  Description: **To RouterX Hu0/7/0/2**
  Internet address is 192.168.1.29/30
  MTU 1514 bytes, BW 100000000 Kbit (Max: 100000000 Kbit)
     reliability 255/255, txload 239/255, rxload 238/255
  Encapsulation ARPA,
  Full-duplex, 100000Mb/s, unknown, link type is force-up
  output flow control is off, input flow control is off
  Carrier delay (up) is 10 msec
  loopback not set,
  Last link flapped 3w3d
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:00:00, output 00:00:00
  Last clearing of "show interface" counters never
  30 second input rate 93725392000 bits/sec, 32528692 packets/sec
  30 second output rate 93726416000 bits/sec, 32527860 packets/sec
     68118736643563 packets input, 24783244282360579 bytes, 0 total input drops
     0 drops for unrecognized upper-level protocol
     Received 0 broadcast packets, 0 multicast packets
              0 runts, 0 giants, 0 throttles, 0 parity
     174 input errors, 174 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     68115867305777 packets output, 24782409845763776 bytes, 0 total output drops
     Output 0 broadcast packets, 0 multicast packets
     0 output errors, 0 underruns, 0 applique, 0 resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

This example shows bundle member links whose link interface status is “err-disable” and line protocol state is “admin-down” after the bundle interface has been administratively shut down using the **shutdown** command:

```
RP/0/RP0/CPU0:router# show interfaces brief

Thu May  6 06:30:55.797 DST

               Intf       Intf        LineP              Encap  MTU        BW
               Name       State       State               Type (byte)    (Kbps)
--------------------------------------------------------------------------------
```

```
          BE10        down        down              ARPA  1514          0
         BE100          up          up              ARPA  1514  100000000
         BE101          up          up              ARPA  1514  100000000
           Lo0          up          up          Loopback  1500          0
           Nu0          up          up              Null  1500          0
     Fo0/3/0/26  admin-down  admin-down              ARPA  1514   40000000
      Hu0/3/0/0  admin-down  admin-down              ARPA  1514  100000000
      Hu0/3/0/1  admin-down  admin-down              ARPA  1514  100000000
      Hu0/3/0/2  admin-down  admin-down              ARPA  1514  100000000
      Hu0/3/0/3  admin-down  admin-down              ARPA  1514  100000000
      Hu0/3/0/4  admin-down  admin-down              ARPA  1514  100000000
      Hu0/3/0/5  admin-down  admin-down              ARPA  1514  100000000
      Hu0/3/0/6  admin-down  admin-down              ARPA  1514  100000000
      Hu0/3/0/7  admin-down  admin-down              ARPA  1514  100000000
      Hu0/3/0/8  admin-down  admin-down              ARPA  1514  100000000
      Hu0/3/0/9  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/10  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/11  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/12  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/13        down        down              ARPA  1514  100000000
     Hu0/3/0/14          up          up              ARPA  1514  100000000
     Hu0/3/0/15          up          up              ARPA  1514  100000000
     Hu0/3/0/16  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/17  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/18          up          up              ARPA  1514  100000000
     Hu0/3/0/19          up          up              ARPA  1514  100000000
     Hu0/3/0/20  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/21  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/22  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/23  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/24          up          up              ARPA  1514  100000000
     Hu0/3/0/25  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/27  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/28  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/29  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/30  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/31  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/32  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/33  admin-down  admin-down              ARPA  1514  100000000
     Hu0/3/0/34        down        down              ARPA  1514  100000000
     Hu0/3/0/35          up          up              ARPA  1514  100000000
Mg0/RP0/CPU0/0          up          up              ARPA  1514    1000000
Mg0/RP1/CPU0/0          up          up              ARPA  1514    1000000
```

This example shows the output from the **show interfaces** `counters rates physical` command.

```
RP/0/RP0/CPU0:router# show interfaces counters rates physical

Fri Feb  3 23:06:45.101 UTC
InterfaceName                Intval     InMbps    InBW%    InKpps     OutMbps   OutBW%
OutKpps
HundredGigE0/0/0/0             0:03    93715.7   100.0%    32742.9     93715.6   100.0%
 32742.8
HundredGigE0/0/0/35            0:03        0.0     0.0%        0.0         0.0     0.0%
     0.0
HundredGigE0/0/0/34            0:03        0.0     0.0%        0.0         0.0     0.0%
     0.0
HundredGigE0/0/0/33            0:03        0.0     0.0%        0.0         0.0     0.0%
     0.0
HundredGigE0/0/0/32            0:03        0.0     0.0%        0.0         0.0     0.0%
     0.0
HundredGigE0/0/0/31            0:03        0.0     0.0%        0.0         0.0     0.0%
```

```
      0.0
HundredGigE0/0/0/30           0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/29           0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/28           0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/27           0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/26           0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/25           0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/24           0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/13           0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/11           0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/7            0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/6            0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/3            0:03        0.0     0.0%        0.0          0.0     0.0%
      0.0
HundredGigE0/0/0/1            0:03    93715.7   100.0%    32742.9      93715.6   100.0%
 32742.9
```

Table 16: show interfaces Field Descriptions

Field	Description
Interface name	Displays the name of the current interface. In the example, the interface name is TenGigE0/1/0/1.
Interface state	Displays the state of the interface. In the example, the interface is in the administratively down state.
Interface state transitions	Displays the number of times the interface has changed the state. **Note** • Interface state transitions command counts only if the interface stays up. If the line protocol flaps, then it is not counted. • Interface state transitions counts the state when the line protocol state changes the state from up to down/admin-down or admin-down/down to up. If an interface changes the state from down to admin-down or admin-down to down, the counter is not incremented. • Use the **clear state-transitions** command to clear the counter for the current or all interfaces.

Field	Description
line protocol state	Displays the state of the Layer 2 line protocol. This field may be different from the interface state if, for example, a keepalive failure has brought down the Layer 2. **Note** The line protocol state is not the same as the protocol state displayed in the **show ip interfaces** command, because it is the state of Layer 2 (media) rather than Layer 3 (IP protocol).
Hardware	Displays the current hardware type.
address is *n.n.n.n/n*	Displays the Layer 2 address (MAC address for Ethernet interfaces). **Note** Enter the **mac-address** command to configure the hardware address.
bia	Displays the burned-in address (BIA) for the interface. The BIA is the default L2 (MAC) address for the interface. **Note** The BIA is not configurable.
description	Displays the user-defined string that is associated with the interface. **Note** Enter the **description** command to configure the description associated with the interface.
Internet address	Displays the Layer 3 (IP) address for the interface. **Note** Enter the **ipv4 address** command to configure the internet address for the interface.
MTU	Displays the maximum transmission unit (MTU) for the interface. The MTU is the maximum packet size that can be transmitted over the interface. **Note** The MTU field indicates the interface MTU. Enter the **mtu** command to configure a lower MTU value at the Layer 3 level.
BW	Displays the bandwidth of the interface in kbps.
reliability	Displays the proportion of packets that are not dropped and do not have errors. **Note** The reliability is shown as a fraction of 255.

Field	Description
txload	Indicates the traffic flowing out of the interface as a proportion of the bandwidth. **Note** The txload is shown as a fraction of 255.
rxload	Indicates the traffic flowing into the interface as a proportion of the bandwidth. **Note** The rxload is shown as a fraction of 255.
Encapsulation	Layer 2 encapsulation installed on the interface.
CRC	Indicates the length of the cyclic redundancy check (CRC), in bytes. **Note** The CRC is not present for all interface types. **Note** Enter the **pos crc** command to configure the CRC.
loopback or controller loopback	Indicates whether the hardware has been configured to be looped back. **Note** Enter the **loopback** command to configure the loopback or controller loopback.
keepalive	Displays the configured keepalive value, in seconds. **Note** Enter the **keepalive** command to configure the value of the keepalive field. **Note** The *keepalive* field may not be present if it is not applicable to the interface type.
Duplexity	Displays the duplexity of the link. **Note** This field is present only for shared media. **Note** For some interface types, you can configure the duplexity by entering the **full-duplex** and **half-duplex** commands.
Speed	Speed and bandwidth of the link in Mbps. This field is present only when other parts of the media info line are also displayed (see duplexity and media type).
Media Type	Media type of the interface.
output flow control	Whether output flow control is enabled on the interface.

Field	Description
input flow control	See output flow control.
ARP type	Address Resolution Protocol (ARP) type used on the interface. This value is not displayed on interface types that do not use ARP.
ARP timeout	ARP timeout in *hours*:*mins*:*secs*. This value is configurable using the **arp timeout** command.
Last clearing of counters	Time since the following counters were last cleared using the **clear counters** exec command in *hours*:*mins*:*secs*.
5 minute input rate	Average number of bits and packets received per second in the last 5 minutes. If the interface is not in promiscuous mode, it senses network traffic that it sends and receives (rather than all network traffic). **Note** The 5-minute period referenced in the command output is a load interval that is configurable under the interface. The default value is 5 minutes. **Note** The 5-minute input should be used only as an approximation of traffic per second during a given 5-minute period. This rate is exponentially weighted average with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
packets input	Number of packets received on the interface that were successfully delivered to higher layers.
bytes input	Total number of bytes successfully received on the interface.
total input drops	Total number of packets that were dropped after they were received. This includes packets that were dropped due to configured quality of service (QoS) or access control list (ACL) policies. This does not include drops due to unknown Layer 3 protocol. **Note** If CRC errors or giants occur, the total input drops increase. This behavior is unexpected and will be corrected in a future release.

Field	Description
drops for unrecognized upper-level protocol	Total number of packets that could not be delivered because the necessary protocol was not configured on the interface.
Received broadcast packets	Total number of Layer 2 broadcast packets received on the interface. This is a subset of the total input packet count.
Received multicast packets	Total number of Layer 2 multicast packets received on the interface. This is a subset of the total input packet count.
runts	Number of received packets that were too small to be handled. This is a subset of the input errors count.
giants	Number of received packets that were too large to be handled. This is a subset of the input errors count.
throttles	Number of packets dropped due to throttling (because the input queue was full).
parity	Number of packets dropped because the parity check failed.
input errors	Total number of received packets that contain errors and hence cannot be delivered. **Note** See **total input drops** for packets dropped due to CRC errors and giants.
CRC	Number of packets that failed the CRC check.
frame	Number of packets with bad framing bytes.
overrun	Number of overrun errors experienced by the interface. Overruns represent the number of times that the receiver hardware is unable to send received data to a hardware buffer because the input rate exceeds the receiver's ability to handle the data.
ignored	Total number of ignored packet errors. Ignored packets are those that are discarded because the interface hardware does not have enough internal buffers. Broadcast storms and bursts of noise can result in an increased number of ignored packets.
abort	Total number of abort errors on the interface.
packets output	Number of packets received on the interface that were successfully delivered to higher layers.

Field	Description
bytes output	Total number of bytes successfully received on the interface.
total output drops	Number of packets that were dropped before being transmitted
Received broadcast packets	Number of Layer 2 broadcast packets transmitted on the interface. This is a subset of the total input packet count.
Received multicast packets	Total number of Layer 2 multicast packets transmitted on the interface. This is a subset of the total input packet count.
output errors	Number of times that the receiver hardware was unable to handle received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
underruns	Number of underrun errors experienced by the interface. Underruns represent the number of times that the hardware is unable to transmit data to a hardware buffer because the output rate exceeds the transmitter’s ability to handle the data.
applique	Number of applique errors.
resets	Number of times that the hardware has been reset. The triggers and effects of this event are hardware-specifc.
output buffer failures	Number of times that a packet was not output from the output hold queue because of a shortage of MEMD shared memory.
output buffers swapped out	Number of packets stored in main memory when the output queue is full; swapping buffers to main memory prevents packets from being dropped when output is congested. The number is high when traffic is bursty.
carrier transitions	Number of times the carrier detect (CD) signal of a serial interface has changed state.
Intval	Displays the time period in ms over which the rates are calculated.
InMbps	Displays the calculated input data rate for the interface in Mbps.
InBW%	Displays the percent input bandwidth utilization of the interface.

Field	Description
InKpps	Displays the calculated input packets rate for the interface in Kpps.
OutMbps	Displays the calculated output data rate for the interface in Mbps.
OutBW%	Displays the percent output bandwidth utilization of the interface.
OutKpps	Displays the calculated output packets rate for the interface in Kpps.

GRE Tunnel Interface Commands

This module describes the command line interface (CLI) commands for configuring GRE tunnel interfaces on the Cisco 8000 Series Routers.

For information on configuring GRE tunnels, see the *Interface and Hardware Component Configuration Guide for Cisco 8000 Series Routers*.

hw-module profile cef ttl tunnel-ip decrement disable

To disable the decrement of TTL value of inner payload header of an IP-in-IP packet, use the **hw-module profile cef ttl tunnel-ip decrement disable** command in XR Config mode.

hw-module profile cef ttl tunnel-ip decrement disable

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR Config

Command History

Release	Modification
Release 7.0.14	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can disable the decrement of TTL value of inner payload header of an IP-in-IP packet.

```
Router# configure
Router(config)# hw-module profile cef ttl tunnel-ip decrement disable
Router(config)# commit
Thu Jun 11 08:43:52.343 UTC
LC/0/0/CPU0:Jun 11 08:43:52.505 UTC: npu_drvr[204]:
%FABRIC-NPU_DRVR-3-HW_MODULE_PROFILE_TTL_CHASSIS_CFG_CHANGED : Hw-module profile ttl config
 changed. Behaviour of IPinIP tunnel's inner header ttl decrement will be changed.
```

hw-module profile gue

To configure unique GUE port numbers to decapsulate IPv4, IPv6, and MPLS packets using UDP, use the **hw-module profile gue udp-dest-port ipv4 <port number> ipv6 <port number> mpls <port number>** command in XR Config mode on the destination router.

hw-module profile gue udp-dest-port ipv4 *<port number>* **ipv6** *<port number>* **mpls** *<port number>*

Table 17: Command Description

Keyword	Description
gue	The UDP destination port configuration of the GUE decapsulation tunnel.
udp-dest-port	Configure separate UDP port numbers for IPv4, IPv6, and MPLS.
ipv4	Configure unreserved UDP port numbers for IPv4 payload. The supported range is from 1000 through 64000.
ipv6	Configure unreserved UDP port numbers for IPv6 payload. The supported range is from 1000 through 64000.
mpls	Configure unreserved UDP port numbers for MPLS payload. The supported range is from 1000 through 64000.

To remove this configuration, use the no prefix of the command:

```
no hw-module profile gue udp-dest-port ipv4 <port number> ipv6 <port number> mpls <port number>
```

Command Default

None

Command Modes

XR Config

Command History

Release	Modification
Release 7.3.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure unique GUE port numbers to decapsulate IPv4, IPv6, and MPLS packets using UDP.

```
Router(config)#hw-module profile gue udp-dest-port ipv4 1001 ipv6 1002 mpls 1003
```

hw-module profile gue underlay-hash enable

To use only the outer IP header (L3 and L4) for calculating the hashing for incoming GUE packets, use the **hw-module profile gue underlay-hash enable** command in mode.

hw-module profile gue underlay-hash *enable*

Syntax Description

enable	To enable only the outer IP header (L3 and L4) for calculating the hashing.

Command Default

By default, both outer IP header (L3 and L4) and inner IP header (L3 and L4) are considered for calculating the hashing for incoming GUE packets.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.11.1	This command was introduced.

Usage Guidelines

This command is currently supported only on Q200-based ASICs.

Example

The following example shows how to enable only the outer IP header (L3 and L4) for calculating the hashing:

```
RP/0/RP0/CPU0:R2#configure
RP/0/RP0/CPU0:R2(config)#hw-module profile gue underlay-hash enable
RP/0/RP0/CPU0:R2(config)#commit
RP/0/RP0/CPU0:R2(config)#end
```

interface tunnel-ip

Configures an IP-in-IP tunnel interface.

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

interface tunnel-ip *id*
no interface tunnel-ip *id*

Syntax Description

id	Specifies the tunnel interface identifier. Range is from 0 to 131070.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.0.12	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 IP-in-IP tunnel interface.

```
RP/0/RP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0/CPU0:router(config-if)# tunnel destination 50.10.1.2/32
```

tunnel mode

Configures the mode of encapsulation for the tunnel interface.

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

tunnel mode { **gre** { **ipv4** | **ipv6** } [**decap**] | **ipv4** [**decap**] | **ipv6** [**decap**] }
no tunnel mode { **gre** { **ipv4** | **ipv6** } [**decap**] | **ipv4** [**decap**] | **ipv6** [**decap**] }

Syntax Description

tunnel mode gre	Configures IP-over-GRE encapsulation for the tunnel interface.
tunnel mode ipv4	Configures generic packet tunneling over IPv4 encapsulation for the tunnel interface.
tunnel mode ipv6	Configures generic packet tunneling over IPv6 encapsulation for the tunnel interface.
tunnel mode gre ipv4	Configures GRE-over-IPv4 encapsulation for the tunnel interface.
tunnel mode gre ipv6	Configures GRE-over-IPv6 encapsulation for the tunnel interface.
decap	Configures the IP-in-IP or GRE tunnel to be used only for decapsulation.

Command Default

None

Command Modes

Tunnel interface configuration mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure the tunnel mode for an IP-in-IP tunnel interface.

```
RP/0/RP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0/CPU0:router(config-if)# tunnel destination 50.10.1.2/32
```

tunnel source

Configures the source IP address for a tunnel interface.

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

tunnel source { *ipv4-address* | *interface-type interface-number* }
no tunnel source { *ipv4-address* | *interface-type interface-number* }

Syntax Description

ipv4-address	Configures the specified IPv4 address as the source IP for the tunnel interface.
interface-type interface-number	Configures the specified interface type as the source for the tunnel interface.

Command Default

None

Command Modes

Tunnel interface configuration mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure the Loopback 0 interface as the tunnel source for an IP-in-IP tunnel interface.

```
RP/0/RP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0/CPU0:router(config-if)# tunnel destination 50.10.1.2/32
```

tunnel destination

Configures the tunnel destination for the tunnel interface.

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

tunnel destination { *ipv4-address* | *ipv4 address/subnet-mask* | *ipv6-address* | *object-group-ipv4* | *object-group-ipv6* }
no tunnel destination { *ipv4-address* | *ipv4 address/subnet-mask* | *ipv6-address* | *object-group-ipv4* | *object-group-ipv6* }

Syntax Description

ipv4-address	Configures the specified IPv4 address as the destination IP for the tunnel interface.
ipv4-address/subnet mask	Configures the specified IPv4 address with subnet mask as the destination IP for the tunnel interface.
ipv6-address	Configures the specified IPv6 address as the destination IP for the tunnel interface.
object-group-ipv4	Configures the specified IPv4 object group as the destination IP for the tunnel interface.
object-group-ipv6	Configures the specified IPv6 object group as the destination IP for the tunnel interface.

Command Default

None

Command Modes

Tunnel interface configuration mode

Command History

Release	Modification
Release 7.5.4	This command was modified to introduce **object-group-ipv4** and **object-group-ipv6** options.
Release 7.0.12	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 address with subnet mask as the tunnel destination for an IP-in-IP tunnel interface.

```
RP/0/RP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0/CPU0:router(config-if)# tunnel destination 50.10.1.2/32
```

tunnel ttl disable

Disables the decrement of TTL value of an incoming packet in a interface tunnel before encapsulation for GRE forwarding.

tunnel ttl disable

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR Config

Command History

Release	Modification
Release 7.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can disable the decrement of TTL an incoming packet before encapsulation for GRE forwarding.

```
Router# configure
Router(config)# interface tunnel-ip30016
Router(config-if)# tunnel ttl disable
Router(config-if)# commit
Thu Sep 11 08:43:52.343 UTC
```

show interface tunnel accounting (encap)

To display accounting information about a tunnel interface in encapsulation mode, use the `show int tunnel accounting` command in XR EXEC mode.

show interface tunnel-ip *<0-131070>* **accounting**

Command Default

No default behavior or values.

Command Modes

XR EXEC

Command History

Release	Modification
7.3.1	This command was introduced.

Example

This example shows how to display accounting information about a tunnel interface in encapsulation mode.

```
RP/0/RP0/CPU0:router#show interface tunnel-ip 1 accounting
Tue Aug 25 06:23:49.405 UTC
tunnel-ip1
  Protocol              Pkts In         Chars In     Pkts Out        Chars Out
  IPV4_UNICAST                0                0         1848           857822
```

show interface tunnel accounting (decap)

To display accounting information about a tunnel interface in decapsulation mode, use the `show int tunnel accounting` command in XR EXEC mode.

show interface tunnel-ip *<0-131070>* **accounting**

Command Default

No default behavior or values.

Command Modes

XR EXEC

Command History

Release	Modification
7.3.1	This command was introduced.

Example

This example shows how to display accounting information about a tunnel interface in decapsulation mode.

```
RP/0/RP0/CPU0:router#show interface tunnel-ip 2002 accounting
tunnel-ip2002
  Protocol              Pkts In         Chars In     Pkts Out        Chars Out
  IPV4_UNICAST           106908         11759880            0                0
```

show tunnel ip ea database brief

To display tunnel ip ea database parameters in brief, use the **show tunnel ip ea database brief** command in XR EXEC mode.

show tunnel ip ea database brief location *node-id*

Syntax Description

location *node-id*	Displays information about the node location specified as *rack* / *slot* / *module*.

Command Default

No default behavior or values.

Command Modes

XR EXEC

Command History

Release	Modification
24.1.1	This command was introduced.

The following is sample output from the **show tunnel ip ea database brief** command with the **location** keyword:

```
RP/0/RP0/CPU0:router#show tunnel ip ea database brief location 0/1/CPU0
Mon Nov  6 13:04:37.361 IST

----- node0_1_CPU0 -----

Ifhandle        Src                            Dst                              Mode
    Adjacency    Status   Tpt-Vrf-Tbl-ID
0x90           1.1.1.1                       15.15.15.5                      GREoIPv4(lite)
      Up          Up        0xe0000000
0xb0           5.5.5.5                        14.14.14.14                      GREoIPv4
       Up          Up        0xe0000000
0xd0           0.0.0.0                        8.8.8.8                          GREoIPv4
       Down        Down      0xe0000000
0xf0           ::                             2a02:a90:4007:700::192           GREoIPv6
       Down        Down      0xe0800000
```

show tunnel ip ma database brief

To display tunnel ip ma database parameters in brief, use the **show tunnel ip ma database brief** command in XR EXEC mode.

show tunnel ip ma database brief

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values.

Command Modes

XR EXEC

Command History

Release	Modification
24.1.1	This command was introduced.

Example

The following is sample output from the **show tunnel ip ma database brief** command:

```
RP/0/RP0/CPU0:router#show tunnel ip ma database brief
Mon Nov  6 13:04:28.905 IST

Interface       Src                            Dst                            Mode
    Caps         Status     Tpt-Vrf-Name
tunnel-ip100   1.1.1.1                        15.15.15.5                     GREoIPv4(lite)
  ipv4           Up         default
tunnel-ip200   5.5.5.5                         14.14.14.14                    GREoIPv4
   ipv4 ipv6 mpls  Up         default
tunnel-ip300   0.0.0.0                         8.8.8.8                        GREoIPv4
                   Down       default
tunnel-ip500   ::                              2a02:a90:4007:700::192         GREoIPv6
                   Down       default
```

Link Bundling Commands

This module provides command line interface (CLI) commands for configuring Link Bundle interfaces on the Cisco 8000 Series Router.

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

bundle lacp delay

To apply delay of a specified duration in adding a member to a specific bundle, use the **bundle lacp-delay** command in the interface configuration mode.

bundle lacp-delay

Syntax Description

lacp-delay	Duration of delay before a member is added to the bundle. The range is from 1 sec to 15 sec.

Command Default

No default behavior or values. If not configured, there is no delay that is imposed on bundle members.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to set the delay for a newly added member on a bundle interface. In this example, the delay defined is for 6 secs:

```
RP/0/RP0/CPU0:router(config)# int bundle-ether 1
RP/0/RP0/CPU0:router(config-if)#bundle lacp-delay ?
<1000-15000>  Lacp-delay timeout in milliseconds
RP/0/RP0/CPU0:router(config-if)#bundle lacp-delay 6000
RP/0/RP0/CPU0:router(config-if)#commit
```

Related Commands

Command	Description
bundle maximum-active links, on page 237	
show bundle, on page 262	Displays information about configured bundles.

bundle-hash

To display the source and destination IP addresses for the member links, distributed by the load balancing feature, in a multilink interface bundle, use the **bundle-hash** command in XR EXEC mode.

bundle-hash {**Bundle-Ether** *bundle-id* | {**HundredGigabitEthernet** | **TenGigabitEthernet**} *interface-path-id*}

Syntax Description

Bundle-Ether *bundle-id*	Specifies an Ethernet bundle for which you want to calculate load balancing. Range is 1- 65535.
HundredGigabitEthernet	Specifies the Hundred Gigabit Ethernet interface for which you want to calculate load balancing.
TenGigE	Specifies the 10 Gigabit Ethernet interface for which you want to calculate load balancing.
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	Location of source interface.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Bundle interface traffic is distributed over the various member links of a bundle according to a hash function. The **bundle-hash** command allows you to determine which bundle member link will carry a particular flow of traffic.

You can use the **bundle-hash** command to get these information:

- Which members are used for a specified source/destination address pair, such as 10.10.10.1 20.20.20.1
- The destination IP address for a specified source IP address on a specified member.
- The load balancing distribution–how many times the members of a bundle are used for a specified range of IP addresses.

The **bundle-hash** command does not display all possible IP addresses in an entire series. It stops displaying addresses after all the addresses for all the members of the bundle have been displayed once.

The **bundle-hash** command is not applicable to multicast traffic and only applicable to unicast traffic.

The **bundle-hash** command invokes a utility that initially prompts you to select some options. Based on the options you select, the utility prompts you more options to select. The initial options to select are as follows:

- L3/3-tuple or L4/7-tuple
- Single pair or Range
- IPv4 or IPv6

The **bundle-hash** command utility prompts you for these options as follows:

- Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4):
- Single SA/DA pair (IPv4,IPv6) or range (IPv4 only): S/R [S]:
- Enter bundle type IP V4 (1) or IP V6 (2):
- Enter source IP V4 address:
- Enter destination IP V4 address:
- Compute destination address set for all members? [y/n]:
- Enter subnet prefix for destination address set:
- Enter bundle IP V4 address [10.10.10.10]:

You may also be prompted to make further option choices depending on your selections.

You can use the **show bundle** command to get IP address information.

The following table provides a general summary of the options and the information you need to provide for each selected option. The actual information that you need to provide depends on the selections you make and may vary from the information provided.

Table 18: bundle-hash Command Options

Option	Information You Need to Provide
L3/3-tuple	L3 information: • Source IP address • Destination IP address • Destination subnet prefix • Bundle IP address

Option	Information You Need to Provide
L4/7-tuple	L3 information: • Source IP address • Destination IP address • Protocol L4 information: • Source port • Destination port Platform-related information: • Router ID • Ingress interface
Single pair	Information for a single source port and destination port. The utility uses this information to calculate the hash and display the bundle load-balance distribution among the user-provided physical/bundle links. The default is single mode. While in single mode, you may receive the following prompt:
Range	Information for sets of source and destination addresses to generate a packet flow for each set. The utility uses this information to calculate the hash for the generated packet flows and display the user-provided egress member links/bundle interfaces and the number of packet flows on each link.
IPv4	IPv4 addresses
IPv6	IPv6 addresses

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 28) using the 3-tuple hash algorithm, a single source and destination, and IPv4 addresses:

```
RP/0/RP0/CPU0:router# bundle-hash bundle-ether 28

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): l3
Single SA/DA pair (IPv4,IPv6) or range (IPv4 only): S/R [S]: s

Enter bundle type IP V4 (1) or IP V6 (2): 1
Enter source IP V4 address: 10.12.28.2
Enter destination IP V4 address: 10.12.28.1
```

```
Compute destination address set for all members? [y/n]: y
Enter subnet prefix for destination address set: 8
Enter bundle IP V4 address [10.12.28.2]: 10.12.28.2

Link hashed to is HundredGigabitEthernet0/6/5/7

Destination address set for subnet 10.0.0.0:
  10.0.0.6 hashes to link HundredGigabitEthernet0/1/5/6
  10.0.0.8 hashes to link HundredGigabitEthernet0/6/5/5
  10.0.0.12 hashes to link HundredGigabitEthernet0/6/5/6
  10.0.0.2 hashes to link HundredGigabitEthernet0/6/5/7
  10.0.0.1 hashes to link HundredGigabitEthernet0/1/5/7
```

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 28) using the 3-tuple hash algorithm, a range of source and destinations, and IPv4 addresses:

```
RP/0/RP0/CPU0:router# bundle-hash bundle-ether 28

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): 13
Single SA/DA pair (IPv4,IPv6) or range (IPv4 only): S/R [S]: r


Maximum number of flows (num src addr * num dst addr): 65536

Enter first source IP address: 10.12.28.2
Enter subnet prefix for source address set: 8
Enter number of source addresses (1-245): 20
Enter source address modifier (1-12) [def:1]: 5

  Enter destination IP address: 10.12.28.1
  Enter subnet prefix for destination address set: 8
  Enter number of destination addresses (1-245): 20
Enter destination address modifier (1-12) [1]: 5
Many to many (M) or simple pairs (S)? [M]: s

Calculating simple pairs...

Total number of hits 20
Member HundredGigabitEthernet0/1/5/6 has 6 hits
Member HundredGigabitEthernet0/6/5/5 has 2 hits
Member HundredGigabitEthernet0/6/5/6 has 2 hits
Member HundredGigabitEthernet0/6/5/7 has 9 hits
Member HundredGigabitEthernet0/1/5/7 has 1 hits
```

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 202) using the 7-tuple hash algorithm, a single source and destination, and IPv4 addresses:

```
RP/0/RP0/CPU0:router# bundle-hash bundle-ether 202

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): 14
Single SA:SP/DA:SP pair (IPv4,IPv6) or range (IPv4 only): S/R [S]: s

Enter bundle type IP V4 (1) or IP V6 (2): 1
Enter source IP V4 address: 172.20.180.167
Enter destination IP V4 address: 172.30.15.42

  Ingress interface --
```

```
  - physical interface format: [ HundredGigabitEthernet | TenGigE ]R/S/I/P
  - bundle interface format:   [ Bundle-Ether]bundle-id
  Enter ingress interface: HundredGigabitEthernet0/2/0/3

  Enter L4 protocol (TCP,UDP,SCTP,L2TPV3,NONE): UDP
  Enter src port: 1000
  Enter destination port: 2000
Compute destination address set for all members? [y/n]: n

S/D pair 172.20.180.167:1000/172.30.15.42:2000 -- Link hashed to is
HundredGigabitEthernet0/3/3/6

Another? [y]: y

Enter bundle type IP V4 (1) or IP V6 (2): 1
Enter source IP V4 address [172.20.180.167]: 172.20.180.167
Enter destination IP V4 address [172.30.15.42]: 172.30.15.42

  Ingress interface --
  - physical interface format: [HundredGigabitEthernet | TenGigE ]R/S/I/P
  - bundle interface format:   [ Bundle-Ether ]bundle-id
  Enter ingress interface [HundredGigabitEthernet0/2/0/3]: HundredGigabitEthernet0/2/0/3

  Enter L4 protocol (TCP,UDP,SCTP,L2TPV3,NONE) [udp]: UDP
  Enter src port [1000]: 1000
  Enter destination port [2000]: 2000
Compute destination address set for all members? [y/n]: y
Enter subnet prefix for destination address set: 24
Enter bundle IP V4 address [172.20.180.167]: 209.165.200.225

S/D pair 172.20.180.167:1000/172.30.15.42:2000 -- Link hashed to is
HundredGigabitEthernet0/3/3/6

Destination address set for subnet 172.30.15.0:
  S/D pair 172.20.180.167:1000/172.30.15.1:2000 hashes to link HundredGigabitEthernet0/3/3/6

  S/D pair 172.20.180.167:1000/172.30.15.6:2000 hashes to link HundredGigabitEthernet0/2/0/1

  S/D pair 172.20.180.167:1000/172.30.15.3:2000 hashes to link HundredGigabitEthernet0/2/0/2

  S/D pair 172.20.180.167:1000/172.30.15.5:2000 hashes to link HundredGigabitEthernet0/0/3/0


Another? [y]: n
```

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 5001) using entropy label, and ingress interface:

```
RP/0/RP0/CPU0:router# bundle-hash bundle-ether 5001 location 0/0/CPU0
Calculate Bundle-Hash for L2 or L3 or sub-int based: 2/3/4 [3]: 3
Enter traffic type (1:IPv4-inbound, 2:MPLS-inbound, 3:IPv6-inbound, 4:IPv4-MGSCP,
5:IPv6-MGSCP): [1]: 2
Entropy label: y/n [n]: y
Enter Entropy Label (in decimal): 1997
Enter the source interface name (Enter to skip interface details): TenGigE0/0/0/1/0

Entropy Label 1997 -- Link hashed to is TenGigE0/1/0/29, (raw hash 0xb5703292, LAG hash 2,
 ICL (), LON 2, IFH 0x06001740)
```

Related Commands

Command	Description
show bundle, on page 262	Displays information about configured bundles.

bundle id

To add a port to an aggregated interface (or bundle), enter the **bundle id** command in interface configuration mode. To remove a port from the bundle, use the **no** form of the command.

bundle id *bundle-id* [**mode** {**active** | **on** | **passive**}]

Syntax Description

bundle-id	Number of the bundle (from 1 to 65535) on which you want to add a port.
mode	(Optional) Specifies the mode of operation, as follows: • **active**—Use the **mode active** keywords to run Link Aggregation Control Protocol (LACP) in active mode over the port. When you specify **active**, the port joins the bundle and is activated if LACP determines that it is compatible. • **on**—Use the **mode on** keywords to configure an Etherchannel link over the port (no LACP running over the port). • **passive**—Use the **mode passive** keywords to run LACP in passive mode over the port. When you specify **passive**, LACP packets are sent only if the other end of the link is using active LACP. The link joins the bundle and is activated if LACP packets are exchanged and the port is compatible.

Command Default

The default setting is **mode on**.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

If you enter the **bundle id** command and specify a port that is already bound to a bundle, the port unbinds from the original bundle and becomes attached to the new bundle. If the bundle numbers are the same, then the port does not unbind, but the mode changes to mode you specified with the **bundle id** command.

Task ID

Task ID	Operations
bundle	read, write

Examples

This example shows how to add a port onto a bundle:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigabitEthernet 0/1/5/0
RP/0/RP0/CPU0:router(config-if)# bundle id 1
```

This example shows how to add an active LACP port onto an aggregated interface (or bundle):

```
RP/0/RP0/CPU0:router(config)# interface HundredGigabitEthernet 0/6/5/7
RP/0/RP0/CPU0:router(config-if)# bundle id 5 mode active
```

Related Commands

Command	Description
show bundle, on page 262	Displays information about configured bundles.
show lacp bundle, on page 283	Displays detailed information about LACP ports and their peers.

bundle maximum-active links

To designate one active link and one link in standby mode that can take over immediately for a bundle if the active link fails, use the **bundle maximum-active links** command in interface configuration mode. To return to the default maximum active links value, use the **no** form of this command.

bundle maximum-active links *links* [**hot-standby**]

Syntax Description

links	Number of active links you want to bring up in the specified bundle, up to the maximum supported on the platform. The range is 1 to 64.
hot-standby	Modifies some default timeouts, such as wait-while timer and suppress-flaps, to avoid bundle-level flaps when the highest priority link fails or recovers.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Misconfiguration or inconsistent configuration with a remote side can be causing traffic loss even though the bundle is up. We recommend that you use LACP protocol to better protect against the misconfiguration.

If the **bundle maximum-active links** command is issued, then only the highest-priority link within the bundle is active . The priority is based on the value from the **bundle port-priority** command, where a lower value is a higher priority. Therefore, we recommend that you configure a higher priority on the link that you want to be the active link.

- Another Cisco IOS XR device using the same option.
- Another device using an IEEE standard-based switchover. (Cisco does not recommend using this option because unexpected behavior, such as the peer sending traffic on the standby link, can occur.)

When you configure the **hot-standby** keyword, if the partner device is not XR, you may have to further modify the timeouts. Use the commands that are used for refining the timeouts on the partner device as well. For best performance, do not configure with **bundle-maximum-active links** command on the partner device.

The **bundle maximum-active links hot-standby** command can be configured at both ends. However, this will impact the switchover times.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to set default values for timeouts, to avoid bundle-level flaps when the highest priority link fails or recovers:

```
RP/0/RP0/CPU0:router(config)# interface bundle-ether 5
RP/0/RP0/CPU0:router(config-if)# bundle maximum-active links 1 hot-standby
```

The following example shows how to display information about Ethernet bundle 5:

The following example shows how to set the number of active links required to bring up a specific bundle. In this example, the user sets the required number of active links required to bring up Ethernet bundle 5 to 2:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RP0/CPU0:router(config-if)# bundle maximum-active links 1
```

Related Commands

Command	Description
bundle minimum-active links, on page 240	Sets the number of active links required to bring up a specific bundle.
show bundle, on page 262	Displays information about configured bundles.

bundle minimum-active bandwidth

To set the minimum amount of bandwidth required before a user can bring up a specific bundle, use the **bundle minimum-active bandwidth** command in interface configuration mode.

bundle minimum-active bandwidth *kbps*

Syntax Description

kbps	Minimum bandwidth required before you can bring up a bundle. Range is from 1 through a number that is equivalent to the combined bandwidths of 8 TenGigabitEthernet interfaces .

Command Default

The default setting is *kbps* = 1.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read, write

Examples

This example shows how to set the minimum amount of bandwidth required before a user can bring up a specific bundle. In this example, the user sets the minimum amount of bandwidth required to bring up Ethernet bundle 1 to 620000:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# bundle minimum-active bandwidth 620000
```

Related Commands

Command	Description
show bundle, on page 262	Displays information about configured bundles.

bundle minimum-active links

To set the number of active links required to bring up a specific bundle, use the **bundle minimum-active links** command in interface configuration mode.

bundle minimum-active links *links*

Syntax Description

links	Minimum number of active links allowed in the specified bundle. The range is from 1 through 64.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to set the number of active links required to bring up a specific bundle. In this example, the user configures Ethernet bundle 5 so that 2 links must be active before the bundle can be brought up:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RP0/CPU0:router(config-if)# bundle minimum-active links 2
```

Related Commands

Command	Description
bundle maximum-active links, on page 237	
show bundle, on page 262	Displays information about configured bundles.

bundle port-priority

To configure Link Aggregation Control Protocol (LACP) priority for a port , enter the **bundle port-priority** command in interface configuration mode. To return to the default LACP priority value, use the **no** form of this command.

bundle port-priority *priority*

Syntax Description

priority	Priority for this port, where a lower value equals a higher priority. Replace the *priority* argument with a number. Range is from 1 through 65535.

Command Default

priority: 32768

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The LACP priority value forms part of the port ID, which is transmitted within the LACP packets that are exchanged with the peer. The peer uses the LACP packets to determine whether a given port should carry traffic for the bundle.

For Multi-Gigabit Service Control Point (MGSCP), the **bundle port-priority** command applies to working links.

Note A lower LACP value is a higher LACP priority for the port.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to configure LACP priority on a port:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# bundle port-priority 1
```

Related Commands

Command	Description
bundle id, on page 235	Adds a port to an aggregated interface or bundle.

Command	Description
show lacp bundle, on page 283	Displays detailed information about LACP ports and their peers.
show lacp system-id, on page 290	Displays the local system ID used by the LACP.

bundle wait-while

To specify the duration of the wait-while timer for a bundle, use the **bundle wait-while** command in the bundle interface configuration mode. To disable waiting, use the **no** form of the command.

bundle wait-while *wait-while-time*

Syntax Description

wait-while-time	Wait-while time, in milliseconds. The range is between 0 to 2000.

Command Default

The default wait-while time is 2000 milliseconds.

Command Modes

Bundle interface configuration (config-if)

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
bundle	read, write
interface	read, write

The following example shows how to configure the wait-while time.

```
RP/0/(config)# interface Bundle-Ether 100
RP/0/(config-if)#  bundle wait-while 20
```

clear lacp counters

To clear Link Aggregation Control Protocol (LACP) counters for all members of all bundles, all members of a specific bundle, or for a specific port, enter the **clear lacp counters** command in XR EXEC mode.

clear lacp counters [**bundle Bundle-Ether** *bundle-id* | **port** {**HundredGigabitEthernet** *interface-path-id* | **TenGigE** *interface-path-id*}]

Syntax Description

bundle	(Optional) Clears LACP counters for all members of a bundle.
Bundle-Ether *node-id*	(Optional) Ethernet bundle. Use the *node-id* argument to specify the node ID number of the LACP counters you want to clear. Range is 1 through 65535.
port	(Optional) Clears all LACP counters on the specified bundle or interface.
HundredGigabitEthernet	(Optional) Hundred Gigabit Ethernet interface. Use the *interface-path-id* argument to specify the Hundred Gigabit Ethernet interface whose LACP counters you want to clear.
TenGigE	(Optional) Ten Gigabit Ethernet interface. Use the *interface-path-id* argument to specify the Ten Gigabit Ethernet interface whose LACP counters you want to clear.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	execute
basic-services	read, write

Examples

The following example shows how to clear LACP counters:

```
RP/0/RP0/CPU0:router# clear lacp counters
```

Related Commands

Command	Description
show lacp counters, on page 285	Displays LACP statistics.

forwarding-unviable

To set a physical interface unviable for data transmission, use the **forwarding-unviable** command in the interface configuration mode. To disable forwarding-unviability of an interface, use the **no** form of the command.

forwarding-unviable

This command has no keywords or arguments.

Command Default

Forwarding-unviable configuration is disabled.

Command Modes

Interface configuration mode (config-if)

Command History

Release	Modification
Release 7.10.1	This command was introduced.

Usage Guidelines

There is no effect of forwarding-unviable configuration on individual Ethernet interfaces that are not part of a link bundle. That is, irrespective of the configuration, such non-member interfaces continue to attempt data transmission and reception.

Task ID

Task ID	Operation
interface	read, write

The following example shows how to disable traffic forwarding on an interface.

```
RP/0/(config)# interface HundredGigE 0/0/0/34
RP/0/(config-if)# forwarding-unviable
```

interface (bundle)

To create a new bundle and enter interface configuration mode for that bundle, use the **interface (bundle)** command in XR Config mode. To delete a bundle, use the **no** form of this command.

interface Bundle-Ether *bundle-id*

Syntax Description

Bundle-Ether	Specifies or creates an Ethernet bundle interface.
bundle-id	Number from 1 to 65535 that identifies a particular bundle.

Command Default

No bundle interface is configured.

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
bundle	read, write

This example shows how to create an Ethernet bundle and enter interface configuration mode:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 3
RP/0/RP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
show bundle, on page 262	Displays information about configured bundles.

lacp cisco enable

To enable use of Cisco-specific TLVs in addition to standard TLVs for negotiating and exchanging LACP information on link bundles, use the **lacp cisco enable** command in interface configuration mode. To return to the default, use the **no** form of the command.

lacp cisco enable [**link-order signaled**]

Syntax Description

link-order signaled	(Optional) Includes link order numbering as part of the LACP processing. **Note** This keyword is required for MGSCP.

Command Default

Cisco type-length values (TLVs) are not used.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The **lacp cisco enable link-order signaled** command is required on bundle interfaces supporting deployment of Multi-Gigabit Service Control Point (MGSCP), and must be configured symmetrically on both the access and core bundle. When link order signaling is enabled, then only one set of Link Ordering Numbers (LONs) are used for the bundle, and LACP processing of LONs is enabled for load balancing tables.

The LONs from the highest priority LACP system take precedence. Where both systems have the same LACP system ID (for example, with MGSCP where both ends of the bundle terminate on the same device), the LONs from the bundle interface with the numerically lowest bundle ID take precedence.

When **lacp cisco enable** command is configured without link order signaling, then links are assigned ordering numbers as they become active and keep them until the link goes inactive. The numbers are exchanged using LACP, but they are not used.

Task ID

Task ID	Operation
bundle	read, write

Example

The following example enables the use of Cisco TLVs to include link order numbering as part of the LACP processing on this bundle:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RP0/CPU0:router(config-if)# lacp cisco enable link-order signaled
```

Related Commands

Command	Description
interface (bundle), on page 247	Specifies or creates a new bundle and enters interface configuration mode for that bundle.

lacp churn logging

To configure the parameters for LACP churn detection, enter the **lacp churn loggin** command in interface configuration mode. To return to the default, use the **no** form of the command.

lacp churn logging {**actor** | **both** | **partner**}

Syntax Description

actor	Logs the churn events of the actor, which is the router under consideration, only.
both	Logs the churn events of both the actor and the partner.
partner	Logs the churn events of the partner router only

Command Default

The parameters for churn detection are not configured.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
bundle	read, write

The following example shows how to configure the LACP churn detection on a partner router:

```
RP/0/# configure terminal
RP/0/(config)# interface Bundle-Ether 100
RP/0/(config-if)# lacp churn logging partner
```

The following example shows how to configure the LACP churn detection on both actor and partner routers:

```
RP/0/# configure terminal
RP/0/(config)# interface Bundle-Ether 100
RP/0/(config-if)# lacp churn logging both
```

lacp collector-max-delay

To configure the maximum period of wait time between sending of two subsequent Ethernet frames on a link, enter the **lacp collector-max-delay** command in interface configuration mode. To return to the default, use the **no** form of this command.

lacp collector-max-delay *delay-in-tens-of-microseconds*

Syntax Description

delay-in-tens-of-microseconds	Length of wait time, in tens of microseconds. The range is from 0 to 65535. The default is 0xFFFF.

Command Default

The collector-max-delay time is not configured.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
bundle	read, write

The following example shows how to configure the maximum period of wait time between sending of two subsequent Ethernet frames on a link:

```
RP/0/(config)# interface Bundle-Ether 100
RP/0/(config-if)#  lacp collector-max-delay 500
```

lacp packet-capture

To capture LACP packets so that their information can be displayed by the **show lacp packet-capture** command, use the **lacp packet-capture** command in XR EXEC mode.

{**lacp packet-capture hundredgigabitethernet** *interface-path-id* | **tengige** *interface-path-id number-of-packets*}

To stop capturing LACP packets or to clear captured LACP packets, use the **lacp packet-capture stop** or **lacp packet-capture clear** command in EXEC mode.

{**lacp packet-capture** [**bundle-ether** *bundle-id*] [**hundredgigabitethernet** *interface-path-id*] [**tengige** *interface-path-id*] **clear** | **stop**}

Syntax Description

bundle-ether	Ethernet bundle interface specified by *bundle-id*.
TenGigE	Ten Gigabit Ethernet interface specified by *interface-path-id*.
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.
bundle-id	Number specifying the bundle interface. The range is 1 to 65535.
number-of-packets	Number of packets to capture.
clear	Clears all currently captured packets.
stop	Stops capturing packets.

Command Default

The default (no parameters) executes globally for all interfaces on the line card.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The **lacp packet-capture** command captures transmitted and received LACP packets on a single bundle member interface. The contents of these packets can then be displayed by the **show lacp packet-capture** command. If the **lacp packet-capture** command is not issued, the **show lacp packet-capture** command does not display any information.

The **lacp packet-capture** command continues capturing LACP packets until the **stop** keyword is issued for that port or that bundle. Captured packets are stored and continue to be displayed until the **clear** keyword is issued for that port or that bundle.

LACP packets can only be captured for one port on a line card at a time. Starting a packet capture on a port implicitly stops and clears all packet-captures on all other ports on that line card.

To **stop** capturing LACP packets before the specified number of packets have been captured, issue the **stop** keyword.

If **stop** is specified for a single interface, packet capturing is stopped only on that interface.

If **stop** is specified for a bundle interface, packet capturing is stopped on all members of that bundle.

If **stop** is specified globally (the default - no parameters), packet capturing is stopped on all bundle interfaces on the router.

To **clear** all captured LACP packets that are stored for an interface, issue the **clear** keyword.

If **clear** is specified for a single interface, packets are cleared only on that interface.

If **clear** is specified for a bundle interface, packets are cleared on all members of that bundle.

If **clear** is specified globally (the default - no parameters), packets are cleared on all bundle interfaces on the router.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to capture LACP packets on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# lacp packet-capture hundredgigabitethernet 0/2/0/0 100
```

The following example shows how to stop capturing LACP packets on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# lacp packet-capture hundredgigabitethernet 0/2/0/0 stop
```

Related Commands

Command	Description
show lacp packet-capture, on page 287	Displays the contents of LACP packets that are sent and received on an interface.
lacp period short, on page 254	Enables a short period time interval for the transmission and reception of LACP packets.

lacp period short

To enable a short period time interval for the transmission and reception of Link Aggregation Control Protocol (LACP) packets, use the **lacp period short** command in interface configuration mode. To return to the default short period, use the **no** form of this command.

lacp period short [**receive** *interval*] [**transmit** *interval*]

Syntax Description

receive *interval*	Time interval (in milliseconds) for receiving LACP packets when LACP short period is enabled. The range is 100 to 1000 and must be multiples of 100, such as 100, 200, 300, and so on.
transmit *interval*	Time interval (in milliseconds) for transmitting LACP packets when LACP short period is enabled. The range is 100 to 1000 and must be multiples of 100, such as 100, 200, 300, and so on.

Command Default

The default is 1000.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

When you configure a custom LACP short period *transmit* interval at one end of a link, you must configure the same time period for the *receive* interval at the other end of the link.

Note You must always configure the *transmit* interval at both ends of the connection before you configure the *receive* interval at either end of the connection. Failure to configure the *transmit* interval at both ends first results in route flapping (a route going up and down continuously). When you remove a custom LACP short period, you must do it in reverse order. You must remove the *receive* intervals first and then the *transmit* intervals.

Note Starting with Cisco IOS XR Software Release 7.1.1, the `lacp period short receive` and `lacp period short transmit` commands are deprecated. Use the `lacp period <time in milliseconds>` command to configure LACP receive and transmit time. Before using this command, you must first execute `lacp cisco enable` command in the bundle interface mode. Without `lacp cisco enable` command, the members may still transmit at the standard interval of 1 second.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to enable a default Link Aggregation Control Protocol (LACP) short period on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short
RP/0/RP0/CPU0:router(config-if)# commit
```

The following example shows how to configure custom Link Aggregation Control Protocol (LACP) short period transmit and receive intervals at both ends of a connection:

Router A

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short
RP/0/RP0/CPU0:router(config-if)# commit
```

Router B

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short
RP/0/RP0/CPU0:router(config-if)# commit
```

Router A

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RP0/CPU0:router(config-if)# commit
```

Router B

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RP0/CPU0:router(config-if)# commit
```

Router A

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RP0/CPU0:router(config-if)# commit
```

Router B

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RP0/CPU0:router(config-if)# commit
```

Related Commands

Command	Description
show lacp packet-capture, on page 287	Displays the contents of LACP packets that are sent and received on an interface.
lacp packet-capture, on page 252	Captures LACP packets so that their information can be displayed.

lacp system priority

To configure the priority for the current system, enter the **lacp system priority** command in XR Config mode mode. To return to the default LACP system priority value, use the **no** form of this command.

lacp system priority *priority*

Syntax Description

s	Priority for this system. Replace *priority* with a number. Range is from 1 through 65535. A lower value is higher priority.

Command Default

The default setting is *priority* = 32768.

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The system priority value forms part of the LACP system ID, which is transmitted within each LACP packet. The system ID, port ID and key combine to uniquely define a port within a LACP system.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to configure an LACP priority of 100 on a router:

```
RP/0/RP0/CPU0:router(config)# lacp system priority 100
```

The following example shows how to configure an LACP priority of 10 and MAC address on the Bundle-Ether interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# lacp system priority 10
RP/0/RP0/CPU0:router(config-if)# lacp system mac 00c1.4c00.bd15
RP/0/RP0/CPU0:router(config-if)# commit
```

Related Commands

Command	Description
show lacp system-id, on page 290	Displays the local system ID used by the LACP.
show lacp bundle, on page 283	Displays detailed information about LACP ports and their peers.

mlacp switchback

To force a switchback to the local mlacp device for a specified bundle, use the **mlacp switchback** command in the XR EXEC mode .

mlacp switchback interface *interface-path-id* [**at** | **in** | **no prompt**]

Syntax Description

interface *interface-path-id*	Specifies a physical interface instance or a virtual interface instance.
at	Schedules the operation for a future time and date.
in	Schedules the operation for a specified delay.
no prompt	Attempts to carry out the command without prompting.

Command Default

No default behavior or values.

Command Modes

XR EXEC

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
bundle	read, write
interface	read, write

Example

The following example shows how to schedule the operation at a specified time and date on a bundle-ether interface:

```
RP/0/RP0/CPU0:router#mlacp switchback bundle-ether 20 at march 21 08:30:10
```

mlacp reset priority

To reset operational priorities of mlacp members to their configured mLACP prorities, use the **mlacp reset priority** command in XR EXEC mode .

mlacp reset priority bundle-ether *interface-path-id*

Syntax Description

bundle-ether *interface-path-id*	Specifies a physical interface instance or a virtual interface instance.

Command Default

No default behavior or values.

Command Modes

XR EXEC

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

This command is for aggregated ethernet interfaces only. The command cannot be used if brute-force switchover is employed.

Task ID

Task ID	Operation
bundle	execute

Example

The following example shows how to use the **mlacp reset priority** command:

```
RP/0/RP0/CPU0:router #mlacp reset priority bundle-ether 10
```

mlacp switchover maximize

To set the maximum number of links or bandwidth in the bundle, use the **mlacp switchover maximize** command in the bundle interface configuration mode.

mlacp switchover maximize { **links** | **bandwidth** } [**threshold** *value*]

Syntax Description

links	Compares the operational links, with respect to the total number of links.
bandwidth	Compares the available bandwidth, with respect to the total bandwidth.
threshold	Sets the threshold value to switch to the peer, if its has more links/ bandwidth available.
value	• When used with the links keyword, sets the minimum number of links, below which the device switches to the peer if more links are available. Range is 1-64. • When used with the bandwidth keyword, sets the minimum bandwidth (in kbps), below which the device switches to the peer if more bandwidth is available. Range is 1-4294967295.

Command Default

No default behavior or value.

Command Modes

Bundle interface configuration.

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

This command allows switchovers to take place such that the active device is the one with most bandwidth or maximum links in the bundle.

Task ID

Task ID	Operation
bundle	read,write
interface	read,write

Example

The following example shows how to maximize the links:

```
RP/0/RP0/CPU0:router(config-if)#interface bundle-ether 10 mlacp switchover maximize links
threshold 20
```

mlacp switchover type

To specify a non-default switchover method , use the **mlacp switchover type**command in the bundle interface configuration mode.

mlacp switchover type [**brute-force** | **revertive**]

Syntax Description

brute-force	Force switchover by disabling all local member links.
revertive	Revert based on configured priority values.

Command Default

The default switchover type is non-revertive.

Command Modes

Bundle interface configuration.

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The **brute-force** and **revertive** options are mutually exclusive, and the value must match on the bundle on both POAs. They determine whether the dynamic priority management or brute force mechanism is used, and whether the behavior is revertive or non-revertive.

Task ID

Task ID	Operation
interface	read, write

Example

The following example shows how to force a switchover by disabling all local member links on an bundle-ether interface:

```
RP/0/RP0/CPU0:router(config-if)#mlacp switchover type brute-force
```

show bundle

To display information about all bundles or a specific bundle of a particular type, use the **show bundle** command in EXEC mode.

show bundle [**Bundle-Ether** *bundle-id*]

Syntax Description

Bundle-Ether	Displays information for the specified Ethernet bundle.
bundle-id	Number from 1 to 65535 that identifies a particular bundle.

Command Default

Information is displayed for all configured bundles.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

To see information for all bundles configured on the router, use the **show bundle** form of the command.

To see information for a specific bundle, use the **show bundle Bundle-Ether** *bundle-id* form of the command with the number of the configured bundle.

Task ID

Task ID	Operation
bundle	read

The following example shows output for all bundle interfaces that are configured on the router:

```
RP/0/RP0/CPU0:router# show bundle
Bundle-Ether 2
  Status:                                  Up
  Local links <active/standby/configured>:   1 / 0 / 1
  Local bandwidth <effective/available>:     100000 (100000) kbps
  MAC address (source):                      1234.4321.1111 (Gi0/0/0/1)
  Minimum active links / bandwidth:          1 / 500 kbps
  Maximum active links:                      32
  Wait-while timer:                          2000 ms
  Load-balancing:                            Default
  LACP:                                      Operational
    Flap suppression timer:                  2500 ms
    Cisco extensions:                        Disabled
    Non-revertive:                           Disabled
  mLACP:                                     Operational
    Interchassis group:                      3
    Foreign links <active/configured>:       1 / 1
    Switchover type:                         Revertive
    Recovery delay:                          300 s
    Maximize threshold:                      2 links
  IPv4 BFD:                                  Not operational
```

```
    State:                                Off
    Fast detect:                          Enabled
    Start timer:                          Off
    Neighbor-unconfigured timer:          Off
    Preferred min interval:               150 ms
    Preferred multiple:                   3
    Destination address:                  Not Configured

  Port                  Device          State       Port ID        B/W, kbps
  --------------------  --------------- ----------- -------------- -----------
  Gi0/0/0/1             Local           Active      0x8000, 0x0001      100000
  MyFirstInterface      10.10.10.123    Negotiating 0x8000, 0x0032      100000


Bundle-Ether 3
  Status:                               Up
  Local links <active/standby/configured>:   1 / 0 / 1
  Local bandwidth <effective/available>:     100000 / 100000 kbps
  MAC address (source):                 1234.4321.2222 (chassis pool)
  Minimum active links / bandwidth:     1 / 500 kbps
  Maximum active links:                 32 (from partner)
  Wait-while timer:                     100 ms
  Load-balancing:
    Link order signaling:               Operational
    Hash type:                          Src-IP
  LACP:                                 Operational
    Flap suppression timer:             120 s
    Cisco extensions:                   Enabled
    Non-revertive:                      Disabled
  mLACP:                                Not configured
  IPv4 BFD:                             Not operational

  Port                  Device          State       Port ID        B/W, kbps
  --------------------  --------------- ----------- -------------- -----------
  Gi0/0/0/2             Local           Active      0x8000, 0x0002      100000


Bundle-Ether 4
  Status:                               Down
  Local links <active/standby/configured>:   0 / 0 / 1
  Local bandwidth <effective/available>:     0 (0) kbps
  MAC address (source):                 78c6.9991.3504 (Chassis pool)
  Inter-chassis link:                   No
  Minimum active links / bandwidth:     1 / 1 kbps
  Maximum active links:                 64
  Wait while timer:                     2000 ms
  Load balancing:
    Link order signaling:               Not configured
    Hash type:                          Default
    Locality threshold:                 None
  LACP:                                 Operational
    Flap suppression timer:             Off
    Cisco extensions:                   Disabled
    Non-revertive:                      Disabled
  mLACP:                                Not configured
  IPv4 BFD:                             Not configured
  IPv6 BFD:                             Not configured

  Port                  Device           State        Port ID         B/W, kbps
  --------------------  ---------------  -----------  --------------  ----------
  Hu0/0/0/34            Local            Standby      0x8000, 0x0001   100000000
      Link is not forwarding viable and in standby state
```

Table 19: show bundle Field Descriptions

Field	Description
Bundle-*typenumber*	Full name of the bundle interface, where *type* is Ether (Ethernet) , followed by the configured *number* of the bundle.
Status:	State of the bundle on the local device, with one of the following possible values: • Admin down—The bundle has been configured to be shut down. • Bundle shut—The bundle is holding all links in Standby state and will not support any traffic. • Down—The bundle is operationally down. It has no Active members on the local device. • mLACP cold standby—The bundle is acting as a multichassis LACP Standby device, but the higher layers are not synchronized. • mLACP hot standby—The bundle is Up on the mLACP peer device, and the local device is ready to take over if that bundle goes down on the peer. • Nak—The local and peer devices cannot resolve a configuration error. • Partner down—The partner system indicates that the bundle is unable to forward traffic at its end. • PE isolated—The bundle is isolated from the core. • Up—The bundle has Active members on this device.
Local links <active/standby/configured>:	The number of links on the device (from 0 to the maximum number of supported links for the bundle) in the format *x* / *y* / *z*, with the following values: • *x*—Number of links in Active state on the bundle. • *y*—Number of links in Standby state on the bundle. • *z*—Total number of links configured on the bundle.

Field	Description
Local bandwidth <effective/available>:	Bandwidth characteristics on the bundle in kilobits per second (kbps) in the format *x / y*, with the following values: • *x*—Current bandwidth of the bundle (this effective bandwidth might be limited by configuration). • *y*—Available bandwidth of the bundle that is the sum of the bandwidths of all of the locally active links.
MAC address (source):	Layer 2 MAC address on the bundle interface in the format xxxx.xxxx.xxxx. The (*source*) of the address is shown in parentheses with the following possible values: • Interface name—The MAC address is from the displayed member interface type and path. • Configured—The MAC address is explicity configured. • Chassis pool—The MAC address is from the available pool of addresses for the chassis. • [unknown MAC source 0]—No MAC address could be assigned to the bundle. (You might see this display if you have not completed your bundle configuration.)
Minimum active links / bandwidth:	Displays the following information in the format *x / y* kbps, with the following values: • *x*—Minimum number of active links (from 1 to the maximum number of links supported on the bundle) that are required for the bundle to be operative. • *y*—Minimum total bandwidth on active links (in kbps) that is required for the bundle to be operative. • (partner)—Shows that the peer system's value is in use.
Maximum active links:	Maximum number of links (from 1 to the maximum supported on a bundle) that can be active on the bundle.

Field	Description
Wait-while timer:	Amount of time (in milliseconds) that the system allows for the Link Aggregation Control Protocol (LACP) to negotiate on a “working”link, before moving a “protect”or backup link to Standby state.
Load balancing:	Type of load balancing in use on the bundle, with the following possible values: • Default—The default load balancing method for the system is used on the bundle, and the load balancing sub-fields are not displayed. • No value—Another load balancing method is in use on the bundle, with information shown in the related sub-fields of the display.
LACP:	Displays whether or not Link Aggregation Control Protocol (LACP) is active on the bundle, with the following possible values: • Operational—All required configuration has been committed and LACP is in use on active members. • Not operational—LACP is not working because some mandatory configuration is missing on the bundle or on the active members of the bundle. • Not configured—None of the mandatory configuration for LACP has been committed on the bundle, and the LACP sub-fields are not displayed.
Flap suppression timer:	Displays the status of the flap suppression timer, with the following possible values: • Off—The flap suppression timer is not configured using the **lacp switchover suppress-flaps** command. • *x* ms—Amount of time allowed (in milliseconds) for standby links to activate after a working link fails, before putting the link in Down state.
Cisco extensions:	Displays whether or not the Cisco-specific TLVs for LACP are enabled. The possible values are "Enabled" and "Disabled".
Non-revertive:	Displays whether non-revertive behavior for the bundle interface is enabled or not. The possible values are "Enabled" and "Disabled".

Field	Description
mLACP:	Displays whether or not the bundle is operating using Multichassis Link Aggregation (MC-LAG), with the following possible values: • Operational—All required configuration has been committed for MC-LAG and mLACP is in use on the bundle. • Not operational—mLACP is not working because some mandatory configuration for MC-LAG is missing on the bundle or on the active members of the bundle. • Not configured—None of the mandatory configuration for MC-LAG has been committed on the bundle, and the mLACP sub-fields are not displayed.
ICCP group:	Number of the Interchassis Communication Protocol group (if configured) in which the bundle participates. Otherwise, “Not configured” is displayed.
Role	ICCP redundancy role of the local device for this mLACP bundle, with the following possible values: • Active—Bundle is currently active locally. • Standby—Bundle is a backup locally.
Foreign links <active/configured>:	The number of links on the remote device in the format *x / y* , with the following values: • *x*—Number of links in Active state on the remote bundle. • *y*—Total number of links configured on the remote bundle.

Field	Description
Switchover type:	Method of performing an mLACP switchover on the bundle with the following possible values: • Brute force— Trigger the failover by marking member(s) as Not Aggregatable instead of using dynamic priority management. This is the only possible method of control when the dual-homed device (DHD) is the higher-priority system. Only applies to mLACP bundles. • Non-revertive—This is the default. Dynamic priority management is used, where the bundle does not fail back to the originally active point of attachment (PoA) except when a subsequent failure occurs. • Revertive—Dynamic priority management is used, but the higher-priority device (based on the configured port priorities for the bundle) is always Active unless it has encountered a failure. This means that if a failure is encountered triggering a switchover, once the failure condition is cleared the initially-active links become active again. • The switchover type can be changed from the default behavior using the **mlacp switchover type** command,
Recovery delay:	Number of seconds (s) to delay becoming the active mLACP device after recovering from a failure, using the **mlacp switchover recovery delay** command. “None” is displayed when the **mlacp switchover recovery delay** command is not configured.

Field	Description
Maximize threshold:	Threshold value below which mLACP switchovers are triggered to allow the bundle to reach the configured maximum number of active links or bandwidth (using the **mlacp switchover maximize**command), with the following possible values: • *x* links—Number of active links used as the maximum threshold target to be maintained as a trigger for an mLACP switchover on a bundle. • *y* kbps—Bandwidth in kilobits per second used as the target threshold to be maintained as a trigger for an mLACP switchover on a bundle. • Not configured—The **mlacp switchover maximize**command is not configured. mLACP switchovers are based on the minimum active links or bandwidth for the bundle.
IPv4 BFD:	Displays whether or not IPv4-based bidirectional forwarding (BFD) is operating on the bundle interface, with the following possible values: • Operational—All required configuration has been committed for IPv4 BFD, and it is in use on the bundle. • Not operational—IPv4 BFD is not working because some mandatory configuration is missing on the bundle or on the active members of the bundle. • Not configured—None of the mandatory configuration for IPv4 BFD has been committed on the bundle, and the BFD sub-fields are not displayed.
State:	When BFD is enabled, displays the state of BFD sessions on the bundle from the sessions running on bundle members that is communicated to interested protocols, with the following possible values: • Down—The configured minimim threshold for active links or bandwidth for BFD bundle members is not available so BFD sessions are down. • Off—BFD is not configured on bundle members. • Up—BFD sessions on bundle members are up because the minimum threshold for the number of active links or bandwidth is met.

Field	Description
Fast detect:	Displays whether or not BFD fast detection is configured on the bundle, with the following possible values: • Enabled—The**bfd fast-detect** command is configured on the bundle. • Disabled—The **bfd fast-detect** command is not configured on the bundle.
Start timer:	Displays status of the BFD start timer that is configured using the **bfd address-family ipv4 timers start** command, with the following possible values: • *x* s—Number of seconds (from 60 to 3600) after startup of a BFD member link session to wait for the expected notification from the BFD peer to be received, so that the session can be declared up. If the SCN is not received after that period of time, the BFD session is declared down. • Off—The start timer is not configured, and a BFD session is only declared Down upon notification from the BFD server.
Neighbor-unconfigured timer:	Displays status of the BFD start timer that is configured using the **bfd address-family ipv4 timers nbr-unconfig** command, with the following possible values: • *x* s—Number of seconds (from 60 to 3600) to wait after receipt of notification that the BFD configuration has been removed by a BFD neighbor, so that any configuration inconsistency between the BFD peers can be fixed. If the BFD configuration issue is not resolved before the specified timer is reached, the BFD session is declared down. • Off—The neighbor-unconfigured timer is not configured, and a BFD session is only declared Down upon notification from the BFD server.
Preferred min interval:	Number of milliseconds (in the format *x* ms) as the minimum control packet interval for BFD sessions. The range is 15 to 30000.
Preferred multiple:	Value of the multiplier (from 2 to 50) that is used for echo failure detection, which specifies the maximum number of echo packets that can be missed before a BFD session is declared Down.

Field	Description
Destination address:	Destination IP address for BFD sessions on bundle member links that is configured using the **bfd address-family ipv4 destination** command. "Not configured" is displayed when no destination IP address is configured.
Port	Name of the local interface port that is configured to be a bundle member, or a foreign interface received by an mLACP peer device. The possible values are the shortened interface name or a text string.
Device	Label Distribution Protocol (LDP) address of the device where the interface port is located, with the following possible values: • *address*—IP address of the device. • Local—Interface port is on the local device.
State	Status of the port, with one of the following possible values • Active—Link can send and receive traffic. • BFD Running—Link is inactive because BFD is down or has not been fully negotiated. • Configured—Link is not operational or remains down due to a configuration mismatch. The link is not available for switchover from failure of an active link. • Hot Standby—Link is ready to take over if an active link fails and can immediately transition to Active state without further exchange of LACP protocol data units (PDUs). • Negotiating—Link is in the process of LACP negotiation and is being held in a lower LACP state by the peer (for example, because the link is Standby on the peer.) • Standby—Link is not sending or receiving traffic, but is available for swithchover from failure of an active link.
Port ID	ID of the interface port in the format *x/y*, with the following values: • *x*—Port priority as a 2-byte hexadecimal value. • *y*—Link ID as a 2-byte hexadecimal value.

Field	Description
B/W, kbps	Bandwidth of the interface port in kilobits per second.
State reason	Text string that is displayed beneath the bundle member listing explaining why a link has not reached Active state.

Table 20: State Reasons

Reason	Description
BFD session is unconfigured on the remote end	The link is in BFD Running state because LACP is negotiated but the BFD session from the remote device has been unconfigured.
BFD state of this link is Down	The link is in BFD Running state because LACP is negotiated but the BFD session between the local system and the remote device is Down.
Bundle has been shut down	The link is in Configured state because the bundle it is configured as a member of is administratively down.
Bundle interface is not present in configuration	The link is in Configured state because the bundle it is configured as a member of has not itself been configured.
Bundle is in the process of being created	The link is in Configured state because the bundle it is configured as a member of is still being created.
Bundle is in the process of being deleted	The link is in Configured state because the bundle it is configured as a member of is being deleted.
Bundle is in the process of being replicated to this location	The link is in Configured state because the bundle it is configured as a member of is still being replicated to the linecard where the link is located.
Forced switchover to the mLACP peer	The link is in Configured state because it has been brought down as part of a forced switchover to the mLACP peer PoA. This happens only when brute force switchovers are configured.
ICCP group is isolated from the core network	The link is in Configured state because there is no connectivity through the network core for the ICCP group that the link and its bundle are part of. Therefore, the link has been brought down to prevent any traffic being sent by the LACP partner device.
Incompatible with other links in the bundle (bandwidth out of range)	The link is in Configured state because its bandwidth is incompatible with other links configured to be in the same bundle. The bandwidth may be too high or too low.

Reason	Description
LACP shutdown is configured for the bundle	The link is in Standby state because the bundle is configured with LACP shutdown.
Incompatible with other links in the bundle (LACP vs non-LACP)	The link is in Configured state because its use of LACP is incompatible with other links configured in the same bundle. Some links might be running LACP while others are not.
Link is Attached and has not gone Collecting (reason unknown)	The link is in Negotiating state because the mLACP peer PoA has not indicated that the link has gone Collecting in the Mux machine. This could be because of an issue between the mLACP peer and its LACP partner or because this state has not been communicated to the local system.
Link is Collecting and has not gone Distributing (reason unknown)	The link is in Negotiating state because the mLACP peer PoA has not indicated that the link has gone Distributing in the Mux machine. This could be because of an issue between the mLACP peer and its LACP partner or because this state has not been communicated to the local system.
Link is being removed from the bundle	The link is being removed from the bundle and remains in Configured state while this happens.
Link is Defaulted; LACPDUs are not being received from the partner	The link is in Configured state because no LACPDUs are being received from the LACP partner device. Either the partner is not transmitting or the packets are getting lost.
Link is down	The link is in Configured state because it is operationally or administratively down.
Link is Expired; LACPDUs are not being received from the partner	The link is in Negotiating state because no LACPDUs have been received from the LACP Partner device in the Current-While period and the link is now marked as Expired in the Receive machine.
Link is in the process of being created	The link is in Configured state because the member configuration is still being processed.
Link is marked as Standby by mLACP peer	The link is in Standby state because this has been indicated by the mLACP peer PoA.
Link is Not Aggregatable (reason unknown)	The link is in Configured state because it is marked as an Individual link by the mLACP peer PoA.
Link is not forwarding viable and in standby state	The link is not available for data transmission and is configured forwarding-unviable.

Reason	Description
Link is not operational as a result of mLACP negotiations	mLACP negotiations with the peer have led to this link being kept in Configured state. This is likely to indicate a misconfiguration between the two peer devices.
Link is Standby; bundle has more links than are supported	The link is in Standby state because the number of links in Selected state has already reached the hard platform limit on the number of active links.
Link is Standby due to maximum-active links configuration	The link is in Standby state because the number of links in Selected state has already reached the configured maximum active links threshold.
Link is waiting for BFD session to start	The link is in BFD Running state because LACP is negotiated but the BFD session has not started from the remote device.
Loopback: Actor and Partner have the same System ID and Key	The link is in Configured state because a loopback condition has been detected on the link—two links configured to be members of the bundle are actually connected to each other.
Not enough links available to meet minimum-active threshold	The link is in Standby state because there are not enough selectable links (i.e. links which meet the criteria to be marked Selected within the bundle) to meet the minimum active links/bandwidth threshold.
Partner has marked the link as Not Aggregatable	The link is in Configured state because it is marked as an Individual link by the LACP partner device.
Partner has not advertised that it is Collecting	The link is in Negotiating state because the LACP partner device has not advertised that the link is in Collecting state in its LACPDUs.
Partner has not echoed the correct parameters for this link	The link is in Negotiating state because the LACP partner device has not correctly echoed the local system's port information in the LACPDUs it is sending.
Partner is not Synchronized (Waiting, not Selected, or out-of-date)	The link is in Negotiating state because the mLACP peer PoA has not indicated that its LACP partner device is Synchronized. This could be because the devices are genuinely not Synchronized or because this state has not been communicated to the local system.

Reason	Description
Partner is not Synchronized (Waiting, Standby, or LAG ID mismatch)	The link is in Negotiating state because the LACP partner device has not indicated that it is Synchronized in the LACPDUs it is sending. On the partner device the link could still be waiting for the Wait-While timer to expire, it could be held in Standby state, or there could be a misconfiguration leading to a LAG ID mismatch between links configured to be within the same bundle.
Partner System ID/Key do not match that of the Selected links	The link is in Configured state because the System ID or Operational Key specified by the LACP partner device does not match that seen on other Selected links within the same bundle. This probably indicates a misconfiguration.
Wait-while timer is running	The link is in Configured state because the Wait-While timer is still running and the new state has not yet been determined.

Related Commands

Command	Description
interface (bundle), on page 247	Specifies or creates a new bundle and enters interface configuration mode for that bundle.

show bundle brief

To display summary information about all configured bundles, use the **show bundle brief** command in EXEC mode.

show bundle brief

Syntax Description This command has no keywords or arguments.

Command Default Information for all configured bundles is displayed.

Command Modes XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

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

Task ID

Task ID	Operation
bundle	read

These examples shows the status of two bundles, BE16 and BE100, that are configured on the router. Both are Ethernet bundles and only bundle 16 is Up:

```
RP/0/RP0/CPU0:router# show bundle brief
Thu Mar  3 14:40:35.167 PST

Name   | IG       | State         | LACP | BFD |     Links     | Local b/w, |
       |          |               |      |     | act/stby/cfgd |    kbps    |
-------|----------|---------------|------|-----|---------------|------------|
BE16             - Up              On     Off         1 / 1 / 2      1000000
BE100            - Down            Off    Off         0 / 0 / 0            0
```

The following table describes the fields shown in the display.

Table 21: show bundle brief Field Descriptions

Field	Description
Name	Abbreviated name of the bundle interface, with the following format: • BE*x*—Ethernet bundle with ID number *x*.
IG	Interchassis group ID (if configured) of which the bundle is a member.

Field	Description
State	State of the bundle on the local device, with the following possible values: • Admin down—The bundle has been configured to be shut down. • Bundle shut—The bundle is holding all links in Standby state and will not support any traffic. • Down—The bundle is operationally down. It has no Active members on the local device. • mLACP cold standby—The bundle is acting as a multichassis LACP Standby device, but the higher layers are not synchronized. • mLACP hot standby—The bundle is Up on the mLACP peer device, and the local device is ready to take over if that bundle goes down on the peer. • Nak—The local and peer devices cannot resolve a configuration error. • Partner down—The partner system indicates that the bundle is unable to forward traffic at its end. • PE isolated—The bundle is isolated from the core. • Up—The bundle has Active members on this device.
LACP	Status of the Link Aggregation Control Protocol (LACP) on the bundle, with the following possible values: • On—LACP is in use on the bundle. • Off—LACP is not active.

Field	Description
BFD	When BFD is enabled, displays the state of BFD sessions on the bundle from the sessions running on bundle members that is communicated to interested protocols, with the following possible values: • Down—The configured minimim threshold for active links or bandwidth for BFD bundle members is not available so BFD sessions are down. • Off—BFD is not configured on bundle members. • Up—BFD sessions on bundle members are up because the minimum threshold for the number of active links or bandwidth is met.
Links act/stby/cfgd	Number of links on the bundle with a particular status in the format *x/y/z*, with the following values: • *x*—Number of links in Active state on the bundle for the local device (from 1 to the maximum number of links supported on the bundle). • *y*—Number of links in Standby state on the bundle for the local device (from 1 to the maximum number of links supported on the bundle). • *z*—Total number of links configured on the bundle for the local device (from 1 to the maximum number of links supported on the bundle).
Local b/w, kbps	Current bandwidth of the bundle on the local device (this effective bandwidth might be limited by configuration).

Related Commands

Command	Description
show bundle, on page 262	Displays information about configured bundles.

show bundle load-balancing

To display load balancing information, such as the ports, usage, weight, and distribution of traffic on individual members of a link bundle interface, use the **show bundle load-balancing** command in EXEC mode.

show bundle load-balancing [**Bundle-Ether** |*bundle-id*] [**brief**] [**detail**] [**location**]

Syntax Description

Bundle-Ether *bundle-id*	(Optional) Specifies the number of the Ethernet bundle whose information you want to display. Range is 1 through 65535.
brief	(Optional) Displays summary information for all nodes or for a specified location.
detail	(Optional) Displays detailed information for all nodes or for a specified location.
location	(Optional) Specifies the location of the node. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

When the **brief** or **detail** keywords are used and no **location** is specified, information is displayed for all nodes on the router.

Command Modes

EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read

Examples

The following examples show how to use the **show bundle load-balancing** command and its various keywords:

```
RP/0/RP0/CPU0:router# show bundle load-balancing brief

Node: 0/0/CPU0
                     Sub-Intf  Member
                                     Total
  Interface          Count     Count  Wgt.
  -----------------  --------  ------------
  Bundle-Ether12345     10        63    134

Node: 0/1/CPU0
                     Sub-Intf  Member
```

```
                                     Total
  Interface          Count     Count  Wgt.
  -----------------  --------  -------------
  Bundle-Ether12345     10        63    134


show bundle load-balancing brief location 0/0/CPU0

Node: 0/0/CPU0
                     Sub-Intf  Member
                                     Total
  Interface          Count     Count  Wgt.
  -----------------  --------  -------------
  Bundle-Ether12345     10        63    134



RP/0/RP0/CPU0:router# show bundle load-balancing location 0/0/CPU0

================================================================================

Bundle-Ether12345
  Type:            Ether (L2)
  Members:         63
  Total Weighting: 134
  Sub-interfaces:  10

  Member Information:
    Port          ID  BW
    ------------  --  --
    Gi0/0/0/1      0  10
    Gi0/0/0/3      1   1
[...]

Platform Information:
=====================

    Bundle Summary Information:
    ---------------------------
    Interface         : Bundle-Ether100         Ifhandle     : 0xa0000a0
    Lag ID            : 1                       Virtual Port : 20
    Number of Members : 4                       Local to LC  : 1

    Member Information:
    ul_id   Interface        ifhandle       SFP    port   slot
    -----   ---------        ---------      ---    ----   ----
    0       Gi0/4/0/3        0x8000100      16      3       4
    1       Gi0/4/0/10       0x80002c0      17      10      4
    2       Gi0/4/0/17       0x8000480      17      17      4
    3       Gi0/4/0/24       0x8000640      18      4       4

    Bundle Table Information:
    -------------------------
    [NP 0]:
    ------------------------------------------------------------------------
    Unicast (Global) LAG table         |  Multicast (Local) LAG table
    ------------------------------------------------------------------------
    idx  local   ul_id  SFP   port     |  idx   local   ul_id  SFP  port
    ------------------------------------------------------------------------
      1      1       0   16      3          1       1       0   16      3
      2      1       1   17     10          2       1       1   17     10
      3      1       2   17     17          3       1       2   17     17
      4      0       3   18      4          4       0       3   18      4
      5      1       0   16      3          5       1       0   16      3
```

```
      6      1       1   17     10          6       1       1   17     10
      7      1       2   17     17          7       1       2   17     17
      8      0       3   18      4          8       0       3   18      4

    [NP 1]:
    ------------------------------------------------------------------------
    Unicast (Global) LAG table         |  Multicast (Local) LAG table
    ------------------------------------------------------------------------
    idx  local   ul_id  SFP   port     |  idx   local   ul_id  SFP  port
    ------------------------------------------------------------------------
      1      0       0   16      3          1       0       0   16      3
      2      0       1   17     10          2       0       1   17     10
      3      0       2   17     17          3       0       2   17     17
      4      1       3   18      4          4       1       3   18      4
      5      0       0   16      3          5       0       0   16      3
      6      0       1   17     10          6       0       1   17     10
      7      0       2   17     17          7       0       2   17     17
      8      1       3   18      4          8       1       3   18      4

================================================================================
```

```
RP/0/RP0/CPU0:router# show bundle load-balancing Bundle-Ether 12345 detail location 0/0/CPU0

Bundle-Ether12345
  Type:            Ether (L2)
  Members:         63
  Total Weighting: 134
  Sub-interfaces:  10

  Member Information:
    Port          ID  BW
    ------------  --  --
    Gi0/0/0/1      0  10
    Gi0/0/0/3      1   1
[...]

  Sub-interface Information:
    Sub-interface                Type  Load Balance
    ---------------------------  ----  ------------
    Bundle-Ether12345.4294967295 L2    Default
    Bundle-Ether12345.2          L2    Hash: XID
    Bundle-Ether12345.3          L2    Fixed: 2
[...]
```

```
RP/0/RP0/CPU0:router# show bundle load-balancing Bundle-Ether12345.2 location 0/0/CPU0

Bundle-Ether12345
  Type:            Ether (L2)
  Members:         63
  Total Weighting: 134
  Sub-interfaces:  10

  Sub-interface Information:
    Sub-interface                Type  Load Balance
    ---------------------------  ----  ------------
    Bundle-Ether12345.2          L2    Hash: XID

Platform Information:
=====================
```

```
Bundle Summary Information:
---------------------------
Interface         : Bundle-Ether100         Ifhandle     : 0xa0000a0
Lag ID            : 1                       Virtual Port : 20
Number of Members : 4                       Local to LC  : 1

Member Information:
ul_id   Interface        ifhandle       SFP    port   slot
-----   ---------        ---------      ---    ----   ----
0       Gi0/4/0/3        0x8000100      16      3       4
1       Gi0/4/0/10       0x80002c0      17      10      4
2       Gi0/4/0/17       0x8000480      17      17      4
3       Gi0/4/0/24       0x8000640      18      4       4

Bundle Table Information:
-------------------------
[NP 0]:
------------------------------------------------------------------------
Unicast (Global) LAG table         |  Multicast (Local) LAG table
------------------------------------------------------------------------
idx  local   ul_id  SFP   port     |  idx   local   ul_id  SFP  port
------------------------------------------------------------------------
  1      1       0   16      3          1       1       0   16      3
  2      1       1   17     10          2       1       1   17     10
  3      1       2   17     17          3       1       2   17     17
  4      0       3   18      4          4       0       3   18      4
  5      1       0   16      3          5       1       0   16      3
  6      1       1   17     10          6       1       1   17     10
  7      1       2   17     17          7       1       2   17     17
  8      0       3   18      4          8       0       3   18      4
```

Related Commands

Command	Description
bundle-hash, on page 229	Displays the source and destination IP addresses for the member links.
show bundle, on page 262	Displays information about configured bundles.

show lacp bundle

To display detailed information about Link Aggregation Control Protocol (LACP) ports and their peers, enter the **show lacp bundle** command in XR EXEC mode.

show lacp bundle {**Bundle-Ether**} *bundle-id*

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to display LACP information for a specific Ethernet Bundle:

```
RP/0/RP0/CPU0:router# show lacp bundle Bundle-Ether 1

Flags: A - Device is in Active mode. P - Device is in Passive mode.
       S - Device sends PDUs at slow rate. F - Device sends PDUs at fast rate.
       D - Port is using default values for partner information
       E - Information about partner has expired
State: 0 - Port is Not Aggregatable. 1 - Port is Out Of Sync with peer.
       2 - Port is In Sync with peer. 3 - Port is Collecting.
       4 - Port is Collecting and Distributing.

Bundle-Ether1
                                Minimum active     Maximum active
  B/W (Kbps)   MAC address      Links  B/W (Kbps)  Links
  ----------   --------------   -----  ----------  -----
           0   0800.453a.651d       1      620000     32

  Port           State  Flags  Port ID         Key     System-ID
  ------------   -----  -----  --------------  ------  -------------------------
  Gi0/0/2/0      1      ASDE   0x8000, 0x0001  0x0001  0x8000, 08-00-45-3a-65-01
   PEER          0      PSD    0xffff, 0x0000  0x0000  0xffff, 00-00-00-00-00-00
```

Table 22: show lacp bundle Field Descriptions

Field	Description
Flags	Describes the possible flags that may apply to a device or port, under the “Flags” field.

Field	Description
State	Describes the possible flags that may apply the port state, under the “State” field.
Port	Port identifier, in the *rack/slot/module/port* notation.
State	Provides information about the state of the specified port. Possible flags are: • 0—Port is not aggregatable. • 1—Port is out of sync with peer. • 2—Port is in sync with peer. • 3—Port is collecting. • 4—Port is collecting and distributing.
Flags	Provides information about the state of the specified device or port. Possible flags are: • A—Device is in Active mode. • P—Device is in Passive mode. • S—Device requests peer to send PDUs at a slow rate. • F—Device requests peer to send PDUs at a fast rate. • D—Port is using default values for partner information. • E—Information about partner has expired.
Port ID	Port identifier, expressed in the format *N*x*nnnn*. *N* is the port priority, and *nnnn* is the port number assigned by the sending router.
Key	Two-byte number associated with the specified link and aggregator. Each port is assigned an operational key. The ability of one port to aggregate with another is summarized by this key. Ports which have the same key select the same bundled interface. The system ID, port ID and key combine to uniquely define a port within a LACP system.
System-ID	System identifier. The system ID is a LACP property of the system which is transmitted within each LACP packet together with the details of the link.

Related Commands

Command	Description
bundle id, on page 235	Adds a port to an aggregated interface or bundle.
show bundle, on page 262	Displays information about configured bundles.

show lacp counters

To display Link Aggregation Control Protocol (LACP) statistics, enter the **show lacp counters** command in XR EXEC mode.

show lacp counters {**Bundle-Ether**} *bundle-id*

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to display LACP counters on an Ethernet bundle:

```
RP/0/RP0/CPU0:router# show lacp counters bundle-ether 1

Bundle-Ether1
                    LACPDUs                 Marker
Port           Sent         Received    Received    Resp. Sent  Last Cleared
-------------  -----------------------  ----------------------  ------------
Gi0/0/2/0              12            0           0            0  never

Port           Excess                  Excess                  Pkt Errors
-------------  ----------              ----------              ----------
Gi0/0/2/0               0                      0                         0
Port                Last LACP Timeout                  LACP Timeout Transition
-------------        ---------------------              ------------------------------
Gi0/0/2/0             1644331309763699015                                4
```

Table 23: show lacp counters Field Descriptions

Field	Description
LACPDUs	Provides the following statistics for Link Aggregation Control Protocol data units (LACPDUs): • Port • Sent • Received • Last Cleared • Excess • Pkt Errors
Marker	Provides the following statistics for marker packets: • Received • Resp. Sent • Last Cleared • Excess • Pkt Errors **Note** The Marker Protocol is used by IEEE 802.3ad bundles to ensure that data no longer is transmitted on a link when a flow is redistributed away from that link.
Timeouts	Provides the following statistics for LACP timeouts: • Last LACP Timeout—The timestamp indicates the time of the last state change of a LACP timeout. The state change is both a timeout event and when the timeout event is no longer active. • LACP Timeout Transition—The number of times the LACP state has transitioned with a timeout since the time the device restarted or the interface was brought up, whichever is most recent. The state change is both a timeout event and when the timeout event is no longer active.

Related Commands

Command	Description
clear lacp counters, on page 244	Clears LACP counters for all members of all bundles, all members of a specific bundle, or for a specific port.

show lacp packet-capture

To display the contents of Link Aggregation Control Protocol (LACP) packets that are sent and received on an interface, use the **show lacp packet-capture** command in XR EXEC mode.

show lacp packet-capture [**decoded**] [**in** | **out**] {**HundredGigabitEthernet** | **TenGigE**} *interface-path-id*

Syntax Description

decoded	(Optional) Displays packet information in decoded form for the specified interface.
in	(Optional) Displays packet information for ingress packets only.
out	(Optional) Displays packet information for egress packets only.
HundredGigabitEthernet	Displays packet information for the Hundred Gigabit Ethernet interface specified by *interface-path-id*.
TenGigE	Displays packet information for the Ten Gigabit Ethernet interface specified by *interface-path-id*.
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 default displays both in and out information.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Note The **lacp packet-capture** command captures transmit and receive packets on a single interface. The contents of these packets can then be displayed by the **show lacp packet-capture** command. If the **lacp packet-capture** command is not issued, the **show lacp packet-capture** command does not display any information.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to display the contents of an LACP packet, in hexadecimal, for a Hundred Gigabit Ethernet interface:

Note In the following example, after you issue the **lacp packet-capture** command, you must wait for a reasonable amount of time for the system to capture packets that are sent and received on the interface before you issue the **show lacp packet-capture** command. Otherwise, there is no information to display.

```
RP/0/RP0/CPU0:router# lacp packet-capture hundredgigabitethernet 0/1/0/0 100
RP/0/RP0/CPU0:router# show lacp packet-capture hundredgigabitethernet 0/1/0/0

Wed Apr 29 16:27:40.996 GMT
OUT  Apr 29 17:05:50.123
========================
01 01 01 14 80 00 02 a7 4c 81 95 04 00 01 80 00 00 01 45 00
00 00 02 14 ff ff 00 00 00 00 00 00 00 00 ff ff 00 00 40 00
00 00 03 10 ff ff 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00

OUT  Apr 29 17:35:50.124
========================
...
```

The following example shows how to display the LACP parameters, decoded from individual packets, transmitted and received on a Gigabit Ethernet interface:

Note In the following example, after you issue the **lacp packet-capture** command, you must wait for a reasonable amount of time for the system to capture packets that are sent and received on the interface before you issue the **show lacp packet-capture** command. Otherwise, there is no information to display.

```
RP/0/RP0/CPU0:router# lacp packet-capture hundredgigabitethernet 0/1/0/0 100
RP/0/RP0/CPU0:router# show lacp packet-capture decoded hundredgigabitethernet 0/1/0/0

Wed Apr 29 16:27:54.748 GMT
OUT  Apr 29 17:06:03.008
========================
Subtype: 0x01 - LACP     Version: 1

TLV: 0x01 - Actor Information       Length:  20
System: Priority: 32768, ID: 02-a7-4c-81-95-04
Key: 0x0001, Port priority: 32768, Port ID:     1
State:  Act  (T/o)  Agg  (Sync) (Coll) (Dist)  Def  (Exp)

TLV: 0x02 - Partner Information     Length:  20
System: Priority: 65535, ID: 00-00-00-00-00-00
Key: 0x0000, Port priority: 65535, Port ID:     0
State: (Act) (T/o) (Agg) (Sync) (Coll) (Dist)  Def  (Exp)

TLV: 0x03 - Collector Information   Length:  16
```

```
Max delay: 65535

TLV: 0x00 - Terminator              Length:   0
```

Related Commands

Command	Description
lacp period short, on page 254	Enables a short period time interval for the transmission and reception of LACP packets.
lacp packet-capture, on page 252	Captures LACP packets so that their information can be displayed.

show lacp system-id

To display the local system ID used by the Link Aggregation Control Protocol (LACP), enter the **show lacp system-id** command in XR EXEC mode.

show lacp system-id

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 7.0.12	This command was introduced.

Usage Guidelines

The System ID and details about the specific link are transmitted within each LACP packet.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to display the system ID used by the LACP:

```
RP/0/RP0/CPU0:router# show lacp system-id

Priority  MAC Address
--------  -----------------
  0x8000  08-00-45-3a-65-01
```

Table 24: show lacp system-id Field Descriptions

Field	Description
Priority	Priority for this system. A lower value is higher priority.
MAC Address	MAC address associated with the LACP system ID.

Management Ethernet Interface Commands

This module provides command line interface (CLI) commands for configuring Management Ethernet interfaces on the Cisco 8000 Series Router.

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

duplex (Management Ethernet)

To configure duplex mode operation on a Management Ethernet interface, use the **duplex** command in interface configuration mode. To return the interface to autonegotiated duplex mode, use the **no** form of the **duplex** command.

duplex {**full**}

Syntax Description

full Configures the Management Ethernet interface to operate in full duplex mode.

Note The system does not support half duplex on Management Ethernet interface.

Command Default

Autonegotiates duplex operation

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to configure the Management Ethernet interface to operate in full duplex mode:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0//CPU0/0
RP/0/RP0/CPU0:router(config-if)# duplex full
```

The following example shows how to configure the Management Ethernet interface to operate in half duplex mode:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0//CPU0/0
RP/0/RP0/CPU0:router(config-if)# duplex half
```

The following example shows how to return a Management Ethernet interface to autonegotiated duplex mode:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0//CPU0/0
RP/0/RP0/CPU0:router(config-if)# no duplex
```

interface MgmtEth

To enter interface configuration mode for the Management Ethernet interface, use the **interface MgmtEth** command in XR Config mode. To delete a Management Ethernet interface configuration, use the **no** form of this command.

interface MgmtEth *interface-path-id*

Syntax Description

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

No default behavior or values

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enter interface configuration mode for a Management Ethernet interface:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0//CPU0/0
RP/0/RP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
duplex (Management Ethernet), on page 292	Configures duplex mode operation on a Management Ethernet interface.
mac-address (Management Ethernet), on page 296	Sets the MAC layer address of a Management Ethernet interface.
speed (Management Ethernet), on page 298	Configures the speed for a Management Ethernet interface.

ipv6 address autoconfig

The **ipv6 address** command is used to configure IPv6 addresses or prefix on the interface. This command enables IPv6 processing on the interface. To remove all manually configured IPv6 addresses from an interface, use the **no ipv6 address** command without arguments.

ipv6 address { *[ipv6addr]* | *[ipv6-prefix/prefix length]* | **[autoconfig] }**

Syntax Description

ipv6addr	(Optional) Specify the IPv6 address.
ipv6-prefix/prefix length	(Optional) Specify the IPv6 prefix and the prefix length preceded by a slash [/].
autoconfig	(Optional) Enable IPv6 Stateless Address Auto Configuration (SLAAC) on Management interface. **Note** The **autoconfig** option is only available for Management Interfaces.

Command Default

No default behavior or values

Command Modes

Management Interface Configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

In the **ipv6 address** interface configuration command, you can enter the *ipv6addr* or *ipv6-prefix/prefix length* variables with the address specified in hexadecimal using 16-bit values between colons. The *prefix length* variable (preceded by a slash [/]) is a decimal value that shows how many of the high-order contiguous bits of the address comprise the prefix (the network portion of the address).

The IPv6 Stateless Address Auto Configuration (SLAAC) is used to automatically assign IPv6 addresses to the host interfaces. This functionality can be used when the exact addresses used by the host need not be specific, as long as they are unique and can be properly routed. SLAAC helps in automating provisioning of the router. IPv6 auto configuration is disabled by default. To enable IPv6 SLAAC on Management interface, use the **ipv6 address autoconfig** command on the Management interface configuration mode.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to configure the IPv6 address based on the IPv6 prefix 2001:0DB8:c18:1::/64:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface hundredgigabitEthernet 0/2/0/0
```

```
RP/0/RP0/CPU0:router(config-if)# ipv6 address 2001:0DB8:c18:1::/64
```

The following example shows how to enable IPv6 auto configuration on router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface mgmtEth 0/RSP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# ipv6 address autoconfig
```

mac-address (Management Ethernet)

To set the MAC layer address of a Management Ethernet interface, use the **mac-address** command in interface configuration mode. To return the interface to its default MAC address, use the **no** form of the **mac-address** command.

mac-address *value1.value2.value3*

Syntax Description

value1	High 2 bytes of the MAC address in hexadecimal. Range is from 0 to ffff.
value2	Middle 2 bytes of the MAC address in hexadecimal. Range is from 0 to ffff.
value3	Low 2 bytes of the MAC address in hexadecimal. Range is from 0 to ffff.

Command Default

The default MAC address is read from the hardware burned-in address (BIA).

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.5.3	Unified data model `Cisco-IOS-XR-um-if-mac-address-cfg.yang` to configure MAC address on an interface was introduced.
Release 7.0.12	This command was introduced.

Usage Guidelines

The MAC address must be in the form of three 4-digit values (12 digits in dotted decimal notation).

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to set the MAC address of the Management Ethernet interface located at 0/ /CPU0/0:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0//CPU0/0
RP/0/RP0/CPU0:router(config-if)# mac-address 0001.2468.ABCD
```

Configure MAC Address Using YANG Data Model

This example shows how to set the MAC address of the Management Ethernet interface using `Cisco-IOS-XR-um-if-mac-address-cfg.yang` unified data model.

```
<rpc message-id="101" xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
 <edit-config>
     <target>
```

```
        <candidate />
      </target>
      <config type="subtree" xmlns:nc="urn:ietf:params:xml:ns:netconf:base:1.0">
         <interfaces xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-um-interface-cfg">
            <interface>
                <interface-name>GigabitEthernet0/0/0/1</interface-name>
                <mac-address
xmlns="http://cisco.com/ns/yang/Cisco-IOS-XR-um-if-mac-address-cfg">00:aa:00:bb:00:cc</mac-address>

            </interface>
         </interfaces>
       </config>
 </edit-config>
</rpc>
```

speed (Management Ethernet)

To configure the speed for a Management Ethernet interface, enter the **speed** command in interface configuration mode. To return the system to autonegotiate speed, use the **no** form of the **speed** command.

speed {**10** | **100** | **1000**}

Syntax Description

10	Configures the interface to transmit at 10 Mbps.
100	Configures the interface to transmit at 100 Mbps.
1000	Configures the interface to transmit at 1000 Mbps (1 Gbps).

Command Default

Interface speed is autonegotiated.

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Note Keep in mind that both ends of a link must have the same interface speed. A manually configured interface speed overrides any autonegotiated speed, which can prevent a link from coming up if the configured interface speed at one end of a link is different from the interface speed on the other end.

The following table describes the performance of the system for different combinations of the duplex and speed modes. The specified **duplex** command configured with the specified **speed** command produces the resulting system action.

Table 25: Relationship Between duplex and speed Commands

duplex Command	speed Command	Resulting System Action
no duplex	no speed	Autonegotiates both speed and duplex modes.
no duplex	speed 1000	Forces 1000 Mbps (1 Gbps) and full duplex.
no duplex	speed 100	Autonegotiates for duplex mode and forces 100 Mbps.
no duplex	speed 10	Autonegotiates for duplex mode and forces 10 Mbps.
duplex full	no speed	Forces full duplex and autonegotiates for speed.
duplex full	speed 1000	Forces 1000 Mbps (1 Gbps) and full duplex.

duplex Command	speed Command	Resulting System Action
duplex full	speed 100	Forces 100 Mbps and full duplex.
duplex full	speed 10	Forces 10 Mbps and full duplex.
duplex half	no speed	Forces half duplex and autonegotiates for speed (10 or 100 Mbps.)
duplex half	speed 100	Forces 100 Mbps and half duplex.
duplex half	speed 10	Forces 10 Mbps and half duplex.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure the Management Ethernet interface to transmit at one gigabit:

```
RP/0/RP0/CPU0:router(config)# interface MgmtEth 0//CPU0/0
RP/0/RP0/CPU0:router(config-if)# speed 1000
```

Null Interface Commands

This module provides command line interface (CLI) commands for configuring null interfaces on the .

For detailed information about Null interfaces concepts, configuration tasks, and examples, refer to the *Interface and Hardware Component Configuration Guide for Cisco 8000 Series Routers*

interface null 0

To enter null0 interface configuration mode, use the **interface null 0** command in XR EXEC mode mode.

interface null 0

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 7.0.12	This command was introduced.

Usage Guidelines

When you issue the **interface null 0** command in XR EXEC mode mode, the CLI prompt changes to "config-null0," indicating that you have entered interface configuration mode for the null interface. In the following sample output, the question mark (**?**) online help function displays all the commands available under the interface configuration mode for the null interface:

```
RP/0/RP0/CPU0:router(config)# interface null 0
RP/0/RP0/CPU0:router(config-null0)#?

  commit    Commit the configuration changes to running
  describe  Describe a command without taking real actions
  do        Run an exec command
  exit      Exit from this submode
  no        Negate a command or set its defaults
  show      Show contents of configuration
```

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enter null0 interface configuration mode:

```
RP/0/RP0/CPU0:router(config)# interface null 0
RP/0/RP0/CPU0:router(config-null0)#
```

show controllers null interface

To display null interface counters, use the **show controllers null interface** command in XR EXEC mode.

show controllers null interface

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 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read
sysmgr	read

Examples

The following is sample output from the **show controllers null interface** command, which displays null interface counters:

```
RP/0/RP0/CPU0:router# show controllers null interface

Null interface:
name     : Null0
handle   : 0x0800000c
```

Table 26: show controllers null interface Field Descriptions

Field	Description
name	Interface whose controller information is displayed.
handle	Number that identifies the caps node that hosts the node whose controller information is displayed.

show interfaces null0

To display null0 interfaces, use the **show interfaces null0** command with optional keywords in EXEC mode.

show interfaces null0 [**accounting rates** | **brief** | **description** | **detail**] [**location** *node-id*]

Syntax Description

accounting	Shows interface accounting option.
rates	Shows interface accounting (input/output) rates.
brief	Shows interface information in condensed format.
description	Describes interface.
detail	Shows interface information in detail.
location *node-id*	Specifies a fully qualified interface location.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

The **show interfaces null0** command displays statistics about null interfaces. When no keywords are specified, information for all null interfaces is displayed.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows how to use the **show interfaces null0** command:

```
RP/0/RP0/CPU0:router# show interfaces null0

Null0 is up, line protocol is up
  Interface state transitions: 0
  Hardware is Null interface
  Internet address is Unknown
  MTU 1500 bytes, BW Unknown
     reliability 255/255, txload Unknown, rxload Unknown
  Encapsulation Null,  loopback not set,
  Last clearing of "show interface" counters never
  5 minute input rate 0 bits/sec, 0 packets/sec
```

```
5 minute output rate 0 bits/sec, 0 packets/sec
   0 packets input, 0 bytes, 0 total input drops
   0 drops for unrecognized upper-level protocol
   Received 0 broadcast packets, 0 multicast packets
   0 packets output, 0 bytes, 0 total output drops
   Output 0 broadcast packets, 0 multicast packets
```

Traffic Mirroring Commands

This module describes the commands used to configure and monitor traffic mirroring.

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

acl

To configure ACL-based traffic mirroring, use the **acl** command in monitor session configuration mode. To stop ACL-based traffic mirroring, use the **no** form of this command.

acl

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

If you use the **acl** command, traffic is mirrored according to the definition of the global interface access list (ACL) defined in one of the following commands: **ipv4 access-list**, **ipv6 access-list**, **ethernet-services access-list**.

Even 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, although traffic is mirrored, no access list configuration is applied.

Examples

This example shows how to configure ACL-based traffic mirroring on the interface:

```
RP/0/RP0/CPU0:router(config)# monitor-session tm_example
RP/0/RP0/CPU0:router(config)# ethernet-services access-list tm_filter
RP/0/RP0/CPU0:router(config-es-acl)# 10 deny 0000.1234.5678 0000.abcd.abcd any capture
RP/0/RP0/CPU0:router(config-es-acl)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigabitEthernet0/2/0/0
RP/0/RP0/CPU0:router(config-if)# monitor-session tm_example direction rx-only
RP/0/RP0/CPU0:router(config-if)# acl
RP/0/RP0/CPU0:router(config-if-l2)# exit
RP/0/RP0/CPU0:router(config-if)# ethernet-services access-group tm_filter ingress
RP/0/RP0/CPU0:router(config-if)# end
```

Related Commands

Command	Description
ethernet-services access-list	Defines an Ethernet services (Layer 2) access list by name.
ipv4 access-list	Defines an IPv4 access list by name.

clear monitor-session counters

To clear the traffic mirroring session statistics, use the **clear monitor-session counters** command in XR EXEC mode .

clear monitor-session counters [**interface** *type interface-path-id*]

Syntax Description

interface	Identifies the interface for which the counters are to be cleared.
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.
session-name	Name of the monitor session to clear.

Command Default

All stored statistics for all interfaces are cleared.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read

Examples

This example shows how to clear the traffic mirroring statistic counters:

```
RP/0/RP0/CPU0:routerclear monitor-session mon1 ipv6 counters
```

destination interface

To associate a destination interface with a traffic mirroring session, use the **destination interface** command in monitor session configuration mode. To remove the designated destination, use the **no** form of this command.

destination 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

No default behavior or values

Command Modes

Monitor sessions configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Use the **destination interface** command to assign a traffic monitoring session to a specific destination interface. This is the port to which a network analyzer is connected. This is generally called the monitoring port.

A destination port has these characteristics:

- A destination port must reside on the same switch as the source port.
- A destination port can be any Ethernet physical port, nV Satellite ICL port or EFP, but not a bundle interface. Also, the ICL must not be a bundle interface.
- At any one time a destination port can participate in only one traffic mirroring session. A destination port in one traffic mirroring session cannot be a destination port for a second traffic mirroring session. In other words, no two monitor sessions can have the same destination port.
- A destination port cannot also be a source port.

Examples

This example shows how to configure a monitoring port for a traffic mirroring session:

```
RP/0/RP0/CPU0:router(config)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-mon)# destination interface gigabitethernet0/0/0/15
```

destination pseudowire

To direct mirrored traffic to a pseudowire, use the **destination pseudowire** command in monitor session configuration mode. To remove the pseudowire designation, use the **no** form of this command.

destination pseudowire

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Use the **destination pseudowire** command to direct the mirrored traffic to a pseudowire. A network analyzer in a central location can then be used to monitor the traffic. Use the monitor session command to define the exact pseudowire to which the monitored traffic should be replicated.

Examples

This example shows how to configure a monitoring port for a traffic mirroring session:

```
RP/0/RP0/CPU0:router(config)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-mon)# destination pseudowire
```

drops

To mirror Traffic Management (TM) buffer drop packets or forward-drop packets at the ingress of a router to a configured destination, use the **drops** command in XR Config mode.

```
drops { traffic-management { rx | tx } | packet-processing { rx | tx } }
```

Syntax Description

traffic-management rx	Mirror TM buffer drop packets in the Rx direction only.
traffic-management tx	Mirror TM buffer drop packets in the Tx direction only.
packet-processing rx	Mirror forward-drop packets in the Rx direction only.
packet-processing tx	Mirror forward-drop packets in the Tx direction only.

Command Default

Mirroring TM buffer drop packets and forward-drop packets is disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

The command is not available on management interface.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

This example shows how to configure a global traffic mirroring session for TM buffer drop packets.

For ERSPAN destination

```
Router(config)# interface tunnel-ip2
Router(config-if)# tunnel mode gre ipv4
Router(config-if)# tunnel source 10.10.10.10
Router(config-if)# tunnel destination 192.0.2.1
Router(config-if)# exit
Router(config)# monitor-session mon2 ethernet
Router(config-mon)# destination interface tunnel-ip2
Router(config-mon)# drops traffic-management rx
Router(config)# commit
```

For SPAN To File destination

```
Router(config)# monitor-session mon1 ethernet
Router(config-mon)# destination file
Router(config-mon)# drops traffic-management rx
Router(config-mon)# commit
```

This example shows how to configure a global traffic mirroring session for forward-drop packets.

```
Router(config)# interface tunnel-ip2
Router(config-if)# tunnel mode gre ipv4
Router(config-if)# tunnel source 10.10.10.10
Router(config-if)# tunnel destination 192.0.2.1
Router(config-if)# exit
Router(config)# monitor-session mon2 ethernet
Router(config-mon)# destination interface tunnel-ip2
Router(config-mon)# drops packet-processing rx
Router(config-mon)# commit
```

forward-drop rx

To mirror forward-drop packets at the ingress of a router to a configured destination, use the **forward-drop rx** command in XR Config mode.

forward-drop rx

Syntax Description

This command has no keywords or arguments.

Command Default

Mirroring forward-drop packets is disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.5.4	This command was introduced.
Release 24.2.11	This command was deprecated. Use the **drops** command to achieve the same functionality.

Usage Guidelines

The **forward-drop rx** command is not available on management interface.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to configure a global traffic mirroring session for forward-drop packets.

```
Router(config)# interface tunnel-ip 2
Router(config-if)# tunnel mode gre ipv4
Router(config-if)# tunnel source 20.20.20.20
Router(config-if)# tunnel destination 192.1.1.3
Router(config-if)# exit
Router(config)# monitor-session mon2 ethernet
Router(config-mon)#destination interface tunnel-ip2
Router(config-mon)#forward-drop rx
Router(config-mon)#commit
```

mirror enable

To copy files or directories automatically from `/harddisk:/mirror` location in active RP to `/harddisk:/mirror` location in standby RP or RSP without user intervention or EEM scripts, use `mirror enable` command. The `mirror enable checksum` command enables MD5 checksum across active to standby RP to check integrity of the files. This command is optional. A slight delay is observed in `show mirror` command output when mirror checksum configuration is enabled.

mirror enable

Command Default

The `/harddisk:/mirror` directory is created by default, but file mirroring functionality is only enabled by executing the `mirror enable` command from configuration terminal.

Command Modes

Monitor configuration

Command History

Release	Modification
Release 7.2.1 Release 7.0.14	This command was introduced.

File mirroring has to be enabled explicitly on the router. It is not enabled by default.

```
RP/0/RSP0/CPU0:router#show run mirror
Thu Jun 25 10:12:17.303 UTC
mirror enable
mirror checksum
```

mirror first

To configure partial traffic mirroring, use the **mirror first** command in monitor session configuration mode. To stop mirroring a portion of the packet, use the **no** form of this command.

mirror first *bytes*

Syntax Description

bytes	Number of bytes mirrored. The mirrored packet length value can range from 65 to 128.

Command Default

The entire packet is mirrored.

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Use the **mirror first** command to mirror the first 64 to 128 bytes of the packet. The actual mirrored packet is the configured partial packet monitoring size plus the 4-byte trailing CRC.

Examples

This example shows how to mirror the first 100 bytes of the packet:

```
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet0/0/0/11
RP/0/RP0/CPU0:router(config-if)# monitor-session mon1
RP/0/RP0/CPU0:router(config-if-mon)# mirror first 100
```

monitor-session

To define a traffic mirroring session and enter monitor session configuration mode, use the **monitor-session** command in global configuration mode. To remove the traffic mirroring session, use the **no** form of this command.

monitor-session *session-name*

Syntax Description

session-name	Name of the monitor session to configure.

Command Default

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Before you can assign a monitor session to a specific interface, you must configure it using the **monitor-session** command. The *session-name* should not be the same as any interface name.

In monitor session configuration mode, you should define the destination interface to be used in the traffic mirroring session using the **destination** command.

For more information about monitoring a session, see *Configuring Traffic Monitoring* chapter in *Cisco 8000 Series Router Interface and Hardware Component Configuration Guide*.

Examples

This example shows how to enter monitor session configuration mode:

```
RP/0/RP0/CPU0:router(config)# monitor-session mon1
RP/0/RP0/CPU0:router(config-mon)#
```

Related Commands

Command	Description
destination interface, on page 310	Associates a destination interface with a traffic mirroring session.

monitor-session (interface)

To associate a traffic mirroring session with a specific interface, use the **monitor-session** command in interface configuration mode or dynamic-template configuration mode. To remove the association between a traffic mirroring session and an interface, use the **no** form of this command.

monitor-session *session-name* [**direction** {**rx-only** | **tx-only**}] **[port-level]**

Syntax Description

session-name	Name of the monitor session to configure.
direction	Specifies that traffic replication is in only one direction.
rx-only	Specifies that only ingress traffic is replicated.
tx-only	Specifies that only egress traffic is replicated.
ethernet	Specifies ethernet interface as destination.
ipv4	Indicates that Ipv4 traffic needs to be monitored.
ipv6	Indicates that Ipv6 traffic needs to be monitored.
port-level	Specifies the configuration at port level. **Note** • port-level mirroring is only supported in the ingress direction. • port-level mirroring is only supported in sampling mode with a minimal sampling rate of 1:512.

Command Default

Replicates both ingress and egress traffic.

Command Modes

Interface configuration

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

Before you can associate a traffic mirroring session to a specific interface, you must define it using the **monitor-session** global configuration command. After the traffic mirroring session is defined, use the **monitor-session** interface configuration command or dynamic template configuration command to associate this session with a specific source interface. For BNG sessions, the subscriber is attached to the monitor session, only when the dynamic template is applied to the subscriber. When the session is associated, all specified traffic on the interface is then replicated to the destination location defined in the monitor session configuration.

The **monitor-session** interface configuration command also enters monitor session configuration mode for you to configure additional features of the mirroring session.

If a physical interface is configured for Layer 3, then the traffic mirroring session can be associated on physical interfaces. Example:

```
interface TenGigE0/1/0/0
ipv4 address 10.0.0.1 255.255.255.0
```

If a physical interface has sub-interfaces configured for Layer 3, then the traffic mirroring session must be associated on each sub-interface. Example:

```
interface TenGigE0/1/0/1.601
ipv4 address 10.0.1.1 255.255.255.0
encapsulation dot1q 601
```

For more information about monitoring a session, see *Configuring Traffic Monitoring* chapter in *Cisco ASR 8000 Series Router Interface and Hardware Component Configuration Guide*.

Task ID

Task ID	Operations
interface	read, write
config-services	read, write

Examples

This example shows how to enter monitor session configuration mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface hundredgigabitethernet0/0/0/11
RP/0/RP0/CPU0:router(config-if)# monitor-session mon1
RP/0/RP0/CPU0:router(config-if-mon)#
```

This example shows how to configure **monitor-session** command in the dynamic-template configuration mode for BNG:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# dynamic-template type ppp ppp_template
RP/0/RP0/CPU0:router(config-dynamic-template-type)# monitor-session mon1 direction rx-only
```

```
RP/0/RP0/CPU0:router(config-dynamic-template-type)# acl
RP/0/RP0/CPU0:router(config-dynamic-template-type)# mirror first 100
```

show monitor-session status

To display status information about configured traffic mirroring sessions, use the **show monitor-session status** command in XR EXEC mode .

show monitor-session [*session-name*] **status** [**detail**] [**errors**]

Syntax Description

session-name	Name of the monitor session to configure.
detail	Displays the full error string for any errors.
errors	Displays all sessions, but only source interfaces with errors are displayed (if no source interfaces have errors, then 'No errors' is displayed).

Command Default

No default behavior or values

Command Modes

XR EXEC

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The **show monitor-sessions status** command displays the following information:

- Destination information for the session (including the name of the interface).
- Destination status (interface state).
- List of source interfaces.
- Any other status information that may be pertinent, such as a software or hardware error that would stop sessions operating correctly. If an error is returned from interactions with another component, then the full error string is only displayed in detail output; standard tabular output reports that there has been an error but refers the user to the detailed output.

Examples

This example shows sample output from the **show monitor-session status** command:

```
RP/0/RP0/CPU0:router# show monitor-session status

Monitor-session foo
Destination interface HundredGigabitEthernet 0/0/0/0
================================================================================
Source Interface      Dir   Status
--------------------- ----  ------------------------------------------------
Gi0/1/0/0.10          Both  Operational
Gi0/1/0/0.11          Rx    Operational
Gi0/1/0/0.12          Tx    Operational
```

show monitor-session status internal

To display information about monitoring session statistics, use the `show monitor-session status internal` command in XR EXEC mode.

show monitor-session status internal

Command Default No default behavior or values

Command Modes XR EXEC

Command History

Release	Modification
7.2.12	This command was introduced.

Example

This example shows sample output from the `show monitor-session status internal` command:

```
RP/0/RP0/CPU0:router#show monitor-session status internal
Thu Aug 13 20:05:23.478 UTC
Information from SPAN Manager and MA on all nodes:
Monitor-session mon1 (ID 0x00000001) (Ethernet)
SPAN Mgr: Destination interface HundredGigE0/1/0/0 (0x00800190)
Last error: Success
0/1/CPU0: Destination interface HundredGigE0/1/0/0 (0x00800190)
0/RP0/CPU0: Destination interface HundredGigE0/1/0/0 (0x00800190)
Information from SPAN EA on all nodes:
Monitor-session 0x00000001 (Ethernet)
0/1/CPU0: Name 'mon1', destination interface HundredGigE0/1/0/0 (0x00800190)
Platform, 0/1/CPU0:
Monitor Session ID: 1
Monitor Session Packets: 32
Monitor Session Bytes: 4024
0/2/CPU0: Name 'mon1', destination interface HundredGigE0/1/0/0 (0x00800190)
Platform, 0/2/CPU0:
Monitor Session ID: 1
Monitor Session Packets: 0
Monitor Session Bytes: 0
```

show monitor-session counters

To display statistics regarding traffic mirroring sessions, use the **show monitor-session counters** command in XR EXEC mode .

show monitor-session [*session-name*] **counters**

Syntax Description

session-name	Name of the monitor session to configure.

Command Default

No default behavior or values

Command Modes

XR EXEC

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The **show monitor-sessions counters** command displays a list of all source interfaces, and the replicated packet statistics for each interface. The full set of statistics displayed for each interface is:

- Ingress replicated packets and octets
- Egress replicated packets and octets
- Non-replicated packets and octets

Examples

This example shows sample output from the **show monitor-session counters** command:

```
RP/0/RP0/CPU0:router show monitor-session 2 counters

Monitor session 2
  HundredGigabitEthernet 0/3/0/0.100:
    Rx Replicated: 100 Packets 8000 Bytes
    Tx Replicated: 2 Packets 3000 Bytes
    Non Replicated: 0 Packets 0 Bytes
```

VLAN Subinterface Commands

This module provides command line interface (CLI) commands for configuring IEEE 802.1Q VLANs on the Cisco 8000 Series Routers.

To use commands of this module, 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 any command, contact your AAA administrator for assistance.

dot1q vlan

To assign a VLAN ID to a subinterface (or to modify the VLAN ID that is currently assigned to a subinterface), use the **dot1q vlan** command in subinterface configuration mode. To remove the VLAN ID assigned to a subinterface, use the **no** form of this command.

dot1q vlan *vlan-id*

Syntax Description

vlan-id ID of the subinterface. Range is from 1 to 4094 (0 and 4095 are reserved).

Command Default

No default behavior or values

Command Modes

Subinterface configuration

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

The VLAN ID specifies where 802.1Q tagged packets are sent and received on a specified subinterface. An 802.1Q VLAN subinterface must have a configured VLAN ID to send and receive traffic; without a VLAN ID, the subinterface remains in the down state. All VLAN IDs must be unique among all subinterfaces configured on the same physical interface. To change a VLAN ID, the new VLAN must not already be in use on the same physical interface. To exchange VLAN IDs, you must remove the configuration information and reconfigure the ID for each device.

Note The subinterface does not pass traffic without an assigned VLAN ID.

Note The **dot1q vlan** command is is replaced by the **encapsulation dot1q** command. It is still available for backward-compatibility, but only for Layer 3 interfaces. The **encapsulation dot1q** command must be used going forward.

Task ID

Task ID	Operations
vlan	read, write

Examples

This example shows how to configure the VLAN ID and IP address on a subinterface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RP0/CPU0:router(config-subif)# dot1q vlan 10
```

```
RP/0/RP0/CPU0:router(config-subif)# ipv4 addr 10.0.0.1/24
```

This example shows how to configure the VLAN IDs for both VLANS in a single Q-in-Q attachment circuit (AC). In this case, incoming traffic must match both of the VLAN IDs before it is accepted by the subinterface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RP0/CPU0:router(config-subif)# dot1q vlan 10 20
```

This example shows how to configure the VLAN IDs for a Q-in-any AC. In this case, all incoming traffic must have two VLAN tags, where the outer VLAN ID matches the configured value, while the inner VLAN ID can be any value.

encapsulation untagged

To define the matching criteria to map untagged frames on an interface, use the **encapsulation untagged** command in the Interface configuration mode.

encapsulation untagged

Syntax Description

This command has no keywords or arguments.

Command Default

No matching criteria are defined.

Command Modes

Interface configuration

Command History

Release	Modification
Release 24.2.11	This command was introduced.

Usage Guidelines

None

Examples

The following example shows how to configure encapsulation untagged under an L2 transport sub-interface.

```
Router# configure
Router(config)# interface HundredGigE0/0/16.1500 l2transport
Router(config-subif)# encapsulation untagged
```

interface (VLAN)

To create a VLAN subinterface, use the **interface** command in XR Config mode. To delete a subinterface, use the **no** form of this command.

interface *type interface-path-id.subinterface*

Syntax Description

type	Type of Ethernet interface on which you want to create a VLAN. Enter **HundredGigabitEthernet**, **TenGigE**, or **Bundle-Ether**.
interface-path-id.subinterface	Physical interface or virtual interface followed by the subinterface path ID. Naming notation is *interface-path-id.subinterface*. The period in front of the subinterface value is required as part of the notation. 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

XR Config

Command History

Release	Modification
Release 7.0.12	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use the following guidelines:

- If specifying a physical interface, the naming notation is *rack*/*slot*/*module*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *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.
- If specifying an Ethernet bundle interface, the range is from 1 through 65535.

For the *subinterface* argument, the range is from 0 through 4095.

To configure a large number of subinterfaces, we recommend entering all configuration data before you commit the **interface** command.

To change an interface from Layer 2 to Layer 3 mode and back, you must delete the interface first and then re-configure it in the appropriate mode.

Note A subinterface does not pass traffic without an assigned VLAN ID.

Task ID

Task ID	Operations
vlan	read, write

Examples

This example shows how to configure a VLAN subinterface on a 10-Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/0/0/1.2
RP/0/RP0/CPU0:router(config-subif)# dot1q vlan 1
RP/0/RP0/CPU0:router(config-subif)# ipv4 address 50.0.0.1/24
```

Related Commands

Command	Description
dot1q vlan, on page 326	Assigns a VLAN ID to a subinterface (or modifies the VLAN ID that is currently assigned to a subinterface).

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