Interface and Hardware Component Command Reference for the Cisco NCS 6000 Series Routers

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Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

CONTENTS

Preface

This command reference describes the Cisco IOS XR Interfaces commands. The preface for the *Interface and Hardware Component Command Reference for Cisco CRS RoutersInterface and Hardware Component Command Reference for Cisco ASR 9000 Series RoutersInterface and Hardware Component Command Reference for the Cisco NCS 6000 Series Routers* contains the following sections:

Changes to this Document

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

Table 1: Changes to this Document

Date	Change Summary
September 2013	Initial Release of this document.
January 2014	Republished for Release 5.0.1
August 2014	Republished for Release 5.2.1
January 2015	Republished for Release 5.2.3
August 2016	Republished for Release 6.1.2
September 2017	Republished for Release 6.3.1
March 2018	Republished for Release 6.3.2
August 2020	Republished for Release 7.2.1

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Dense Wavelength Division Multiplexing Commands

This module provides command line interface (CLI) commands for configuring dense wavelength division multiplexing (DWDM) on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 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.

admin-state

To configure the transport administration state on a DWDM port, use the **admin-state** command in DWDM configuration mode. To return the administration state from a DWDM port to the default, use the **no** form of this command.

Note ASR 9000 64-bit (eXR) does not support the **admin-state in-service** and **admin-state out-of-service** commands.

admin-state {**in-service** | **maintenance** | **out-of-service**}

Syntax Description

in-service	Places the DWDM port in In Service (IS) state, to support all normal operation.
maintenance	Places the DWDM port in Out of Service Maintenance (OOS-MT) state to perform configuration, while the laser and G.709 framer remain up.
out-of-service	Places the DWDM port in Out of Service (OOS) state. The laser is turned off and all traffic flow is stopped. This is the default.

Command Default

Out-of-service is the default transport administration state.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced. It replaced the **laser** and **shutdown (DWDM)** commands.
Release 3.9.1	The **maintenance** keyword was added.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

When you configure **admin-state maintenance**, the DWDM port is placed in OOS-MT state and any configuration of **maintenance disable** for the port can be overridden. The laser for the port and the G.709 framing remains enabled, and Fast Re-Route (FRR) is triggered. This form of the command is usually used in FRR context for traffic to move over backup path while maintenance is going on.

When you configure **admin-state out-of-service**, the DWDM port is placed in OOS state. The laser is turned off, traffic flow is stopped, and proactive protection is disabled. However, configuration changes can still be made on the port.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to turn on the laser and place a DWDM port in In Service (IS) state:

Note This is a required configuration beginning in Cisco IOS XR Software Release 3.9.0 and later releases. The DWDM cards will not operate without this configuration.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# admin-state in-service
RP/0/RP0RSP0/CPU0:router(config-dwdm)# commit
```

The following example shows how to stop all operation on a DWDM port:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# admin-state out-of-service
```

The following example shows how to enable the out-of-service maintenance transport administration state on a DWDM port:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# admin-state maintenance
```

Related Commands

Command	Description
maintenance disable, on page 28	Provisions a maintenance embargo flag.

controller dwdm

To configure a DWDM controller, use the **controller dwdm** command in Global Configuration modeXR Config mode. To return to the default state, use the **no** form of this command.

controller dwdm *interface-path-id* [**vtxp-monitor**]

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.
vtxp-monitor	Enables VTXP (virtual transponder) attribute on the interface. The purpose of VTXP attribute tagging is to easily identify a set of interfaces (on which VTXP is enabled) and use them for further configuration or monitoring.

Command Default

No default behavior or values

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.
Release 5.3.0	**vtxp-monitor** keyword 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*/*subport*. 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.
  - *subport*: Physical port number of the sub-interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

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

Examples

This example shows how to configure a DWDM controller in slot 6:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/6/0/0
```

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/6/0/0 vtxp-monitor
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.
show vtxp-monitored ports, on page 74	Displays ports on which VTXP attribute is enabled.

fec standard

To enable RS-FEC (Forward Error Correction) on an interface, use the **fec standard** command in interface config mode. Use the no form of the command to disable the FEC.

fec standard

Syntax Description

standard	Configures the RS-FEC (Reed-Solomon Codec for Ethernet IEEE 802.3 Clause 91)

Command Default

FEC is disabled.

Command Modes

interface configuration mode

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

None.

Example

This sample configuration shows how to enable RS-FEC on an interface:

```
Router(config)# interface HundredGigE <0/3/2/6>
  Router(config-if)# fec standard
Router(config)# commit
```

g709 bdi-to-client-gais

To insert a Generic Alarm Indication Signal (GAIS) pattern to client on the detection of a backward defect indication (BDI), use the **g709 bdi-to-client-gais** command in DWDM configuration mode. To disable this feature, use the **no** form of this command.

g709 bdi-to-client-gais

Syntax Description

This command has no keywords or arguments.

Command Default

By default, no GAIS to client is inserted.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

The **g709 bdi-to-client-gais** command is available on the 10-GE DWDM PLIM only.

Task ID

Task ID	Operations
dwdm	read, write

Examples

This example shows how to configure sending a Generic Alarm Indication Signal (GAIS) pattern signal to client when a BDI is received:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/6/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 bdi-to-client-gais
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 enable

To enable the ITU-T G.709 wrapper, use the **g709 enable** command in DWDM configuration mode. To disable the ITU-T G.709 wrapper, use the **no** form of this command.

g709 enable

Syntax Description

This command has no keywords or arguments.

Command Default

The G.709 wrapper is disabled.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
dwdm	read, write

Example

This example shows how to enable the G.709 wrapper on an interface:

```
RP/0/RP0/CPU0:Router(config)# controller dwdm 0/5/0/0
RP/0/RP0/CPU0:Router(config-dwdm)# g709 enable
RP/0/RP0/CPU0:Router(config-dwdm)# admin-state in-service
```

g709 disable

To disable the ITU-T G.709 wrapper, use the **g709 disable** command in DWDM configuration mode. To enable the ITU-T G.709 wrapper, use the **no** form of this command.

g709 disable

Syntax Description

This command has no keywords or arguments.

Command Default

The G.709 wrapper is enabled.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

Note The **g709 disable** command is available on the 10-GE DWDM PLIM only.

The G.709 wrapper must be enabled to enable forward error correction (FEC) mode on the controller.

To display the G.709 alarms and counters, use the **show controller dwdm g709** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The G.709 wrapper is enabled by default. This example shows how to disable the G.709 wrapper on an interface:

```
RP/0/RP0/CPU0:Router(config)# controller dwdm 0/6/0/0
RP/0/RP0/CPU0:Router(config-dwdm)# g709 disable
```

If you have disabled the G.709 wrapper using the **g709 disable** command, use the **no g709 disable** command to re-enable it, as shown in the following example:

```
RP/0/RP0/CPU0:Router(config)# controller dwdm 0/6/0/0
RP/0/RP0/CPU0:Router(config-dwdm)# no g709 disable
```

Related Commands

Command	Description
g709 fec, on page 12	Configures the FEC mode for the DWDM controller.
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 fec

To configure the Forward Error Correction (FEC) mode for the DWDM controller, use the **g709 fec** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

Note ASR 9000 64-bit (eXR) does not support the **g709 disable**, **g709 enhanced<I.4>**, and **g709 standard** commands.

g709 fec {[**disable**] | **enhanced** | **standard** | **ci-bch** | **high-gain-hd-fec** | **high-gain-sd-fec** | **long-haul-hd-fec** | **long-haul-sd-fec**}

Syntax Description

disable	Disables FEC.
enhanced	Enables ITU-T G.975.1 I.7 FEC. This is the default. Enables ITU-T G.975.1 I.4 FEC.
standard	Enables standard FEC mode.This is the default.
ci-bch	Continuously Interleaved BCH FEC
high-gain-hd-fec	7% HD FEC. The default is T100 staircase FEC.
high-gain-sd-fec	7% CISCO SD FEC.
long-haul-hd-fec	20% HD FEC. The default is T100 staircase FEC.
long-haul-sd-fec	20% CISCO SD FEC.

Command Default

Enhanced FEC mode is enabled by default. Standard FEC mode is enabled by default.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.
Release 5.3.1	The **ci-bch** keyword was introduced.
Release 5.3.2	The high-gain-sd-fec and long-haul-sd-fec keywords were introduced on the A9K-400G-DWDM-TR line card. The high-gain-hd-fec and long-haul-hd-fec keywords were introduced.

Usage Guidelines

Note The enhanced FEC mode supported on the Cisco CRS Router (ITU-T G.975.1 I.7) and the Cisco ASR 9000 Series Router (ITU-T G.975.1 I.4) are different and therefore, incompatible. To support interoperability of DWDM between these routers, standard FEC must be configured. The OC-768c/STM-256c DWDM PLIM on the Cisco CRS Router supports enhanced FEC mode only. Disabling FEC or enabling standard FEC is not supported.

The **g709 fec** command can be used only when the DWDM controller port is not operational. In Cisco IOS XR releases prior to Cisco IOS XR Release 3.9.0, you stop operation using the **shutdown (DWDM)** command. Beginning in Cisco IOS XR Release 3.9.0, you stop operation using the **admin-state out-of-service** command.

The G.709 wrapper must be enabled to enable forward error correction (FEC) mode on the controller.

Enhanced FEC is the default mode; therefore, if you use the **no g709 fec** command, enhanced FEC is used.

The **g709 fec** command can be used only when the DWDM controller port is in the out-of-service administrative state. You stop operation using the **admin-state out-of-service** command.

The G.709 wrapper must be enabled to enable forward error correction (FEC) mode on the controller.

Standard FEC is the default mode; therefore, if you use the **no g709 fec** command, standard FEC is used.

To display the FEC mode, use the **show controller dwdm** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

This example shows how to configure the FEC mode on a DWDM controller:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/6/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# admin-state out-of-service
RP/0/RP0RSP0/CPU0:router(config-dwdm)# commit
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 fec enhanced
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 fec standard
RP/0/RP0RSP0/CPU0:router(config-dwdm)# commit
RP/0/RP0RSP0/CPU0:router(config-dwdm)# admin-state in-service
RP/0/RP0RSP0/CPU0:router(config-dwdm)# commit
```

Related Commands

Command	Description
admin-state, on page 3	Configures the transport administration state on a DWDM port.
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.
g709 bdi-to-client-gais, on page 8	Inserts a GAIS pattern to client on the detection of a BDI.

g709 odu overhead tti

To configure the Trail Trace Identifier (TTI) level for an Optical Channel Data Unit (ODU), use the **g709 odu overhead tti** command in DWDM configuration mode. To return to the default, use the **no** form of this command.

g709 odu overhead tti {**expected** | **sent**} {**ascii** | **hex**}*tti-string*

Syntax Description

expected	Configures the expected TTI string.
sent	Configures the transmit TTI string.
ascii	Indicates that the string is in ASCII format.
hex	Indicates that the string is in hexidecimal format.
tti-string	The TTI level string. You can configure the TTI level string in ASCII string format or hexadecimal format. The ASCII text string can be a maximum of 64 characters. The hexadecimal string length must be an even number and can be a maximum of 128 bytes.

Command Default

No TTI level string is configured.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.6.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the expected TTI string:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 odu overhead tti expected test OTU 5678
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 odu report disable

To disable the logging of selected Optical Channel Data Unit (ODU) alarms to the console for a DWDM controller, use the **g709 odu report disable** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

g709 odu report {**ais** | **bdi** | **eoc** | **lck** | **oci** | **ptim** | **sd-ber** | **sf-ber** | **tim**} **disable**
g709 odu report {**ais** | **bdi** | **lck** | **oci** | **ptim** | **tim**} **disable**

Syntax Description

ais	Alarm indication signal reporting status.
bdi	Backward defect indication reporting status.
eoc	GCC end of channel failure reporting status.
lck	Upstream connection locked reporting status.
oci	Open connection indication error reporting status.
pm-tca	Path monitoring BER TCA reporting status.
ptim	Payload type identifier mismatch reporting status.
sd-ber	Set SM BER in excess of SD threshold reporting status.
sf-ber	Set SM BER in excess of SF threshold reporting status.
tim	Set Trace Identifier Mismatch reporting status.

Command Default

Reporting is enabled for all keywords.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.6.0	The **tim** keyword was added.
Release 3.9.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

This example shows how to disable ODU reporting for OCI:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 odu report oci disable
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 otu overhead tti

To configure the OTU Trail Trace Identifier (TTI) buffer for a DWDM controller, use the **g709 otu overhead tti** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

Note ASR 9000 64-bit (eXR) does not support the **g709 otu overhead tti sent ascii LINE** and **g709 otu overhead tti sent hex LINE** commands.

g709 otu overhead tti {**expected** | **sent**} {**ascii** | **hex**} *tti-string*

Syntax Description

expected	Configures the expected TTI string.
sent	Configures the transmit TTI string.
ascii	Indicates that the string is in ASCII format.
hex	Indicates that the string is in hexidecimal format.
tti-string	The TTI string. A maximum of 64 characters is allowed.

Command Default

No TTI string is configured

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

To display the TTI strings, use the **show controller dwdm g709** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the expected TTI string:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 otu overhead tti expected test OTU 5678
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 otu report disable

To disable the logging of selected Optical Channel Transport Unit (OTU) alarms to the console for a DWDM controller, use the **g709 otu report disable** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

g709 otu report {**ais** | **bdi** | **eoc** | **fecmismatch** | **iae** | **lof** | **lom** | **los** | **sd-ber** | **sf-ber** | **tim**} **disable**
g709 otu report {**bdi** | **fecmismatch** | **iae** | **lof** | **lom** | **los** | **sd-ber** | **sf-ber** | **tim**} **disable**

Syntax Description

ais	Alarm indication signal reporting status.
bdi	Backward defect indication reporting status.
eoc	GCC end of channel failure reporting status.
fecmismatch	FEC mismatch alarm reporting status. **Note** FEC mismatch alarm is deprecated.
iae	Incoming alignment error reporting status.
lof	OTU loss of frame reporting status.
lom	Loss of multiple frame reporting status.
los	Loss of signal reporting status.
sd-ber	SM bit error rate (BER) is in excess of the signal degradation BER threshold.
sf-ber	SM BER is in excess of the signal failure BER threshold.
sm-tca	Section monitoring BER TCA reporting status.
tim	Trace Identifier Mismatch reporting status.

Command Default

Reporting is enabled for all keywords.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.6.0	The **tim** keyword was added.
Release 3.9.0	This command was introduced.

Usage Guidelines

Configuring two ends of an OTN link with different FEC modes is not supported. Even if different FEC modes are configured, the FEC mismatch alarm will not be raised. Interface may experience continuous port flap in addition to continuous bit interleaved parity (BIP) errors at both OTN and LAN level.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to disable OTU reporting for IAE:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 otu report iae disable
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 otu threshold

To configure thresholds for selected Optical Channel Transport Unit (OTU) bit error rate (BER) alarms, use the **g709 otu threshold** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

g709 otu threshold {**sd-ber** | **sf-ber**} **bit-error-rate**

Syntax Description

sd-ber *bit-error-rate*	Signal degradation bit error rate (BER) in the range 1 to 9, where *bit-error-rate* specifies a negative exponent of base 10 (10–*bit-error-rate*). The default is 6 (10–6).
sf-ber *bit-error-rate*	Signal failure BER above threshold in the range 1 to 9, where *bit-error-rate* specifies a negative exponent of base 10 (10–*bit-error-rate*). The default is 3 (10–3).

Command Default

The defalut bit error rate for **sd-ber** is 6.

The default bit error rate for **sf-ber** is 3.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

This example shows how to set the signal fail BER rate to be 5:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 otu threshold sf-ber 5
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 tim-to-client-gais

To insert a Generic Alarm Indication Signal (GAIS) on the client side when a Trace Identifier Mismatch (TIM) is detected, use the **g709 tim-to-client-gais** command in DWDM configuration mode. To disable this feature, use the **no** form of this command.

g709 tim-to-client-gais

Syntax Description

This command has no keywords or arguments.

Command Default

By default, no GAIS to client is inserted.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.6.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

Note The **g709 tim-to-client-gais** command is available on the 10-GE DWDM PLIM only.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure a GAIS to client when a TIM is received:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 tim-to-client-gais
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

g709 tti-processing

To enable Trace Identifier Mismatch (TIM) alarms, use the **g709 tti-processing** command in DWDM configuration mode. To disable TIM alarms, use the **no** form of this command.

Note ASR9000 64-bit (eXR) does not support the **g709 tti-processing** command.

g709 tti-processing

Syntax Description

This command has no keywords or arguments.

Command Default

By default, trace identifier mismatch (TIM) alarms are disabled.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.6.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

Note Trace identifier mismatch (TIM) alarms can be set only when TTI processing is enabled.

Task ID

Task ID	Operations
dwdm	read, write

Examples

This example shows how to configure the expected TTI string:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# g709 tti-processing
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

log signal

To enable 10 millisecond proactive monitoring of Forward Error Correction-Fast Re-Route (FEC-FRR), use the **log signal** command in DWDM configuration mode. To disable proactive monitoring, use the no form of this command.

log signal *file-name*

Syntax Description

file-name	Specifies the name of the log file.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

Note The **log signal** command is supported on the legacy line cards but does not function on the A9K-8X100GE-SE line cards though it is supported on them.

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to enable 10 millisecond proactive monitoring of Forward Error Correction-Fast Re-Route (FEC-FRR).

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# log signal LogFile1
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

loopback (DWDM)

To configure the DWDM controller for loopback mode, use the **loopback** command in DWDM configuration mode. To remove the loopback DWDM command from the configuration file, use the **no** form of this command.

Note ASR 9000 64-bit (eXR) does not support the **loopback** command.

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

Syntax Description

internal	Specifies that all the packets be looped back to the router.
line	Specifies that the incoming network packets be looped back to the DWDM network.

Command Default

This command is disabled by default.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

The DWDM controller supports two loopback operation modes for diagnostic purposes: internal and line. The terminal (internal) loopback mode allows the received data from the Layer 2 Framer (for example, a SONET/SDH framer for POS or Ethernet MAC for 10GE) of the PLIM to be looped back to the ingress side of the Framer. This allows the packets to be looped back to the PLIM. The line loopback mode allows the received trunk/DWDM line Rx to be connected to the trunk/DWDM line Tx towards the line. This is used for line diagnostics.

Task ID

Task ID	Operations
dwdm	read, write

Examples

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

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# loopback internal
```

maintenance disable

To provision a maintenance embargo flag, use the **maintenance disable** command in interface configuration mode. To remove a maintenance embargo flag, use the no form of this command.

maintenance disable

Syntax Description

This command has no keywords or arguments.

Command Default

Maintenance embargo flags are not provisioned.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

A maintenance embargo flag prevents maintenance activities from being performed on an interface.

To display the status of whether maintenance is enabled or disabled on an interface, use the **show interface pos** command or the **show interface tenGigE** command.

Task ID

Task ID	Operations
dwdm	read
interface	read, write

Examples

The following examples show how to provision a maintenance embargo flag:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface pos 1/0/1/1
RP/0/RP0/CPU0:Router(config-if)# maintenance disable
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:Router(config)# interface tengige 1/0/1/1
RP/0/RP0/CPU0:Router(config-if)# maintenance disable
```

Related Commands

Command	Description
admin-state, on page 3	Configures the transport administration state on a DWDM port.

network connection id

To configure a connection identifier for the Multi Service Transport Protocol (MSTP), use the **network connection id** command in DWDM configuration mode. To remove a connection identifier, use the no form of this command.

network connection id *id-number*

Syntax Description

id-number	Connection identifier.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure a connection identifier for the Multi Service Transport Protocol (MSTP).

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# network connection id 1/1/1/1
```

Related Commands

Command	Description
network srlg , on page 31	Configures a SRLG on a DWDM controller.
network port id, on page 30	Assigns an identifier number to a port for the MSTP.

network port id

To assign an identifier number to a port for the Multi Service Transport Protocol (MSTP), use the **network port id** command in DWDM configuration mode. To remove an identifier number from a port, use the no form of this command.

network port id *id-number*

Syntax Description

id-number	Port identifier.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to assign an identifier number to a port for the Multi Service Transport Protocol (MSTP):

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# network port id 1/0/1/1
```

Related Commands

Command	Description
network srlg , on page 31	Configures a SRLG on a DWDM controller.
network connection id, on page 29	Configures a connection identifier for the MSTP.

network srlg

To configure a Shared Risk Link Group (SRLG) on a DWDM controller, use the **network srlg** command in DWDM configuration mode. To remove an SRLG, use the no form of this command.

network srlg *value1 value2 value3*

Syntax Description

value1 value2 value3	Specifies the value.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

This example shows how to configure a Shared Risk Link Group (SRLG) on a DWDM controller:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0/CPU0:router(config-dwdm)# network srlg value1 value2 value3
```

Related Commands

Command	Description
network port id, on page 30	Assigns an identifier number to a port for the MSTP.
network connection id, on page 29	Configures a connection identifier for the MSTP.

pm fec report enable

To enable Threshold Crossing Alert (TCA) generation for FEC, use the **pm fec report enable** command in DWDM configuration mode. To disable TCAs, use the **no** form of this command.

pm {**15-min** | **24-hour**} **fec report** {**ec-bits** | **uc-words**} **enable**

Syntax Description

15-min	Configures the TCA generation for 15-minute intervals.
24-hour	Configures TCA generation for 24-hour intervals.
ec-bits	Bit errors corrected (BIEC). Indicates the number of bit errors corrected in the DWDM trunk line during the performance monitoring time interval.
uc-words	Uncorrectable words. This is the number of uncorrectable words detected in the DWDM trunk line during the performance monitoring time interval.

Command Default

TCA is not enabled.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

To display FEC performance measurement information, use the **show controller dwdm pm fec** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to enable TCAs in FEC reporting for uncorrectable words:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# pm 15-min fec report uc-words enable
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

pm fec threshold

To configure performance monitoring thresholds on the FEC layer, use the **pm fec threshold** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

pm {**15-min** | **24-hour**} **fec threshold** {**ec-bits** | **uc-words**} *threshold*

Syntax Description

15-min	Configures the performance monitoring thresholds for 15-minute intervals.
24-hour	Configures performance monitoring thresholds for 24-hour intervals.
ec-bits	Bit errors corrected (BIEC). Indicates the number of bit errors corrected in the DWDM trunk line during the performance monitoring time interval.
uc-words	Uncorrectable Words. This is the number of uncorrectable words detected in the DWDM trunk line during the performance monitoring time interval.
threshold	Threshold for the performance monitoring parameter in the range 1–4294967295.

Command Default

No threshold is configured.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

To display performance measurement information for the FEC layer, use the **show controller dwdm pm fec** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure an FEC layer performance monitoring threshold for uncorrectable words:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# pm 15-min fec threshold uc-words 2000000
```

Related Commands

Command	Description
show controller dwdm pm, on page 68	Displays performance monitoring information for a DWDM controller.

pm optics report enable

To enable Threshold Crossing Alert (TCA) generation on the optics layer, use the **pm optics report enable** command in DWDM configuration mode. To disable TCA reporting, use the **no** form of this command.

pm {**15-min** | **24-hour**} **optics report** {**lbc** | **opr** | **opt**} {**max-tca** | **min-tca**} **enable**

Syntax Description

15-min	Configures TCA generation for 15-minute intervals.
24-hour	Configures TCA generation for 24-hour intervals.
lbc	Laser bias current.
opr	Optical power on the unidirectional port.
opt	Transmit optical power in dBm.
max-tca	Indicates that the maximum value of the parameter is compared against the threshold to determine if a TCA should be generated.
min-tca	Indicates that the minimum value of the parameter is compared against the threshold to determine if a TCA should be generated.

Command Default

TCA reporting is not enabled.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

To display performance monitoring information for the optics, use the **show controller dwdm pm optics** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to enable TCA reporting on the optics layer reporting for the maximum OPT:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# pm 15-min optics report opt max-tca enable
```

Related Commands

Command	Description
show controller dwdm pm, on page 68	Displays performance monitoring information for a DWDM controller.

pm optics threshold

To configure performance monitoring thresholds on the optics layer, use the **pm optics threshold** command in DWDM configuration mode. To return to the default state, use the **no** form of this command.

pm {**15-min** | **24-hour**} **optics threshold** {**lbc** | **opr** | **opt**}{**max** | **min**} *threshold*

Syntax Description

15-min	Configures the performance monitoring thresholds for 15-minute intervals.
24-hour	Configures performance monitoring thresholds for 24-hour intervals.
lbc	Laser bias current.
opr	Optical power on the unidirectional port.
opt	Transmit optical power in dBm.
max	Indicates that the *threshold* is for the maximum value of the parameter.
min	Indicates that the *threshold* is for the minimum value of the parameter.
threshold	Threshold for the performance monitoring parameter.

Command Default

No thresholds are configured.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

To display performance monitoring information for the optics layer, use the **show controller dwdm pm optics** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure an optics layer performance monitoring threshold for maximum OPT:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# pm 15-min optics threshold opt max 2000000
```

Related Commands

Command	Description
show controller dwdm pm, on page 68	Displays performance monitoring information for a DWDM controller.

pm otn report enable

To enable Threshold Crossing Alert (TCA) generation on the Optical Transport Network (OTN) layer, use the **pm otn report enable** command in DWDM configuration mode. To disable TCA reporting, use the **no** form of this command.

pm {**15-min** | **24-hour**} **otn report** *otn-parameter* **enable**

Syntax Description

15-min	Configures TCA generation for 15-minute intervals.
24-hour	Configures TCA generation for 24-hour intervals.
otn-parameter	Specific parameter for which to configure the threshold. OTN parameters can be as follows: • **bbe-pm-fe**—Far-end path monitoring background block errors (BBE-PM). Indicates the number of background block errors recorded in the optical transport network (OTN) path during the performance monitoring time interval. • **bbe-pm-ne**—Near-end path monitoring background block errors (BBE-PM). • **bbe-sm-fe**—Far-end section monitoring background block errors (BBE-SM). Indicates the number of background block errors recorded in the OTN section during the performance monitoring time interval. • **bbe-sm-ne**—Near-end section monitoring background block errors (BBE-SM). • **bber-pm-fe**—Far-end path monitoring background block errors ratio (BBER-PM). Indicates the background block errors ratio recorded in the OTN path during the performance monitoring time interval. • **bber-pm-ne**—Near-end path monitoring background block errors ratio (BBER-PM). • **bber-sm-fe**—Far-end section monitoring background block errors ratio (BBER-SM). Indicates the background block errors ratio recorded in the OTN section during the performance monitoring time interval. • **bber-sm-ne**—Near-end section monitoring background block errors ratio (BBER-SM) • **es-pm-fe**—Far-end path monitoring errored seconds (ES-PM). Indicates the errored seconds recorded in the OTN path during the performance monitoring time interval. • **es-pm-ne**—Near-end path monitoring errored seconds (ES-PM). • **es-sm-fe**—Far-end section monitoring errored seconds (ES-SM). Indicates the errored seconds recorded in the OTN section during the performance monitoring time interval. • **es-sm-ne**—Near-end section monitoring errored seconds (ES-SM). • **esr-pm-fe**—Far-end path monitoring errored seconds ratio (ESR-PM). Indicates the errored seconds ratio recorded in the OTN path during the performance monitoring time interval.

- **esr-pm-ne**—Near-end path monitoring errored seconds ratio (ESR-PM).
- **esr-sm-fe**—Far-end section monitoring errored seconds ratio (ESR-SM). Indicates the errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
- **esr-sm-ne**—Near-end section monitoring errored seconds ratio (ESR-SM).
- **fc-pm-fe**—Far-end path monitoring failure counts (FC-PM). Indicates the failure counts recorded in the OTN path during the performance monitoring time interval.
- **fc-pm-ne**—Near-end path monitoring failure counts (FC-PM).
- **fc-sm-fe**—Far-end section monitoring failure counts (FC-SM). Indicates the failure counts recorded in the OTN section during the performance monitoring time interval.
- **fc-sm-ne**—Near-end section monitoring failure counts (FC-SM).
- **ses-pm-fe**—Far-end path monitoring severely errored seconds (SES-PM). Indicates the severely errored seconds recorded in the OTN path during the performance monitoring time interval.
- **ses-pm-ne**—Far-end path monitoring severely errored seconds (SES-PM).
- **ses-sm-fe**—Far-end section monitoring severely errored seconds (SES-SM). Indicates the severely errored seconds recorded in the OTN section during the performance monitoring time interval.
- **ses-sm-ne**—Near-end section monitoring severely errored seconds (SES-SM).
- **sesr-pm-fe**—Far-end path monitoring severely errored seconds ratio (SESR-PM). Indicates the severely errored seconds ratio recorded in the OTN path during the performance monitoring time interval.
- **sesr-pm-ne**—Near-end path monitoring severely errored seconds ratio (SESR-PM).
- **sesr-sm-fe**—Far-end section monitoring severely errored seconds ratio (SESR-SM). Indicates the severely errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
- **sesr-sm-ne**—Near-end section monitoring severely errored seconds ratio (SESR-SM).
- **uas-pm-fe**—Far-end path monitoring unavailable seconds (UAS-PM). Indicates the unavailable seconds recorded in the OTN path during the performance monitoring time interval.
- **uas-pm-ne**—Near-end path monitoring unavailable seconds (UAS-PM).
- **uas-sm-fe**—Far-end section monitoring unavailable seconds (UAS-SM). Indicates the unavailable seconds recorded in the OTN section during the performance monitoring time interval.
- **uas-sm-ne**—Near-end section monitoring unavailable seconds (UAS-SM).

Command Default

TCA generation is not enabled.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

To display performance measurement information for the OTN layer, use the **show controller dwdm pm otn** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to enable TCA generation on the OTN layer reporting for the path monitoring errored seconds ratio (ESR-PM):

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# pm 15-min otn report esr-pm-fe enable
```

Related Commands

Command	Description
show controller dwdm pm, on page 68	Displays performance monitoring information for a DWDM controller.

pm otn threshold

To configure performance monitoring thresholds on the optical transport network (OTN) layer, use the **pm otn threshold** command in DWDM configuration mode. To disable TCA reporting, use the **no** form of this command.

pm {**15-min** | **24-hour**} **otn threshold** *otn-paramter* **enable**

Syntax Description

15-min	Configures performance monitoring thresholds for 15-minute intervals.
24-hour	Configures performance monitoring thresholds for 24-hour intervals.
otn-parameter	Specific parameter for which to configure the threshold. OTN parameters can be as follows: • **bbe-pm-fe**—Far-end path monitoring background block errors (BBE-PM). Indicates the number of background block errors recorded in the optical transport network (OTN) path during the performance monitoring time interval. • **bbe-pm-ne**—Near-end path monitoring background block errors (BBE-PM). • **bbe-sm-fe**—Far-end section monitoring background block errors (BBE-SM). Indicates the number of background block errors recorded in the OTN section during the performance monitoring time interval. • **bbe-sm-ne**—Near-end section monitoring background block errors (BBE-SM). • **bber-pm-fe**—Far-end path monitoring background block errors ratio (BBER-PM). Indicates the background block errors ratio recorded in the OTN path during the performance monitoring time interval. • **bber-pm-ne**—Near-end path monitoring background block errors ratio (BBER-PM). • **bber-sm-fe**—Far-end section monitoring background block errors ratio (BBER-SM). Indicates the background block errors ratio recorded in the OTN section during the performance monitoring time interval. • **bber-sm-ne**—Near-end section monitoring background block errors ratio (BBER-SM) • **es-pm-fe**—Far-end path monitoring errored seconds (ES-PM). Indicates the errored seconds recorded in the OTN path during the performance monitoring time interval. • **es-pm-ne**—Near-end path monitoring errored seconds (ES-PM). • **es-sm-fe**—Far-end section monitoring errored seconds (ES-SM). Indicates the errored seconds recorded in the OTN section during the performance monitoring time interval. • **es-sm-ne**—Near-end section monitoring errored seconds (ES-SM).

	• **esr-pm-fe**—Far-end path monitoring errored seconds ratio (ESR-PM). Indicates the errored seconds ratio recorded in the OTN path during the performance monitoring time interval. • **esr-pm-ne**—Near-end path monitoring errored seconds ratio (ESR-PM). • **esr-sm-fe**—Far-end section monitoring errored seconds ratio (ESR-SM). Indicates the errored seconds ratio recorded in the OTN section during the performance monitoring time interval. • **esr-sm-ne**—Near-end section monitoring errored seconds ratio (ESR-SM). • **fc-pm-fe**—Far-end path monitoring failure counts (FC-PM). Indicates the failure counts recorded in the OTN path during the performance monitoring time interval. • **fc-pm-ne**—Near-end path monitoring failure counts (FC-PM). • **fc-sm-fe**—Far-end section monitoring failure counts (FC-SM). Indicates the failure counts recorded in the OTN section during the performance monitoring time interval. • **fc-sm-ne**—Near-end section monitoring failure counts (FC-SM). • **ses-pm-fe**—Far-end path monitoring severely errored seconds (SES-PM). Indicates the severely errored seconds recorded in the OTN path during the performance monitoring time interval. • **ses-pm-ne**—Far-end path monitoring severely errored seconds (SES-PM). • **ses-sm-fe**—Far-end section monitoring severely errored seconds (SES-SM). Indicates the severely errored seconds recorded in the OTN section during the performance monitoring time interval. • **ses-sm-ne**—Near-end section monitoring severely errored seconds (SES-SM). • **sesr-pm-fe**—Far-end path monitoring severely errored seconds ratio (SESR-PM). Indicates the severely errored seconds ratio recorded in the OTN path during the performance monitoring time interval. • **sesr-pm-ne**—Near-end path monitoring severely errored seconds ratio (SESR-PM). • **sesr-sm-fe**—Far-end section monitoring severely errored seconds ratio (SESR-SM). Indicates the severely errored seconds ratio recorded in the OTN section during the performance monitoring time interval. • **sesr-sm-ne**—Near-end section monitoring severely errored seconds ratio (SESR-SM). • **uas-pm-fe**—Far-end path monitoring unavailable seconds (UAS-PM). Indicates the unavailable seconds recorded in the OTN path during the performance monitoring time interval. • **uas-pm-ne**—Near-end path monitoring unavailable seconds (UAS-PM).
	• **uas-sm-fe**—Far-end section monitoring unavailable seconds (UAS-SM). Indicates the unavailable seconds recorded in the OTN section during the performance monitoring time interval. • **uas-sm-ne**—Near-end section monitoring unavailable seconds (UAS-SM).
threshold	Threshold for the performance monitoring parameter.

Command Default No thresholds are configured.

Command Modes DWDM configuration

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

To display performance measurement information for the OTN layer, use the **show controller dwdm pm otn** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure an OTN layer performance monitoring threshold for path monitoring errored seconds ratio (ESR-PM):

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# pm 15-min otn threshold esr-pm-ne 500000
```

Related Commands

Command	Description
show controller dwdm pm, on page 68	Displays performance monitoring information for a DWDM controller.

proactive

To enable automatic triggering of Forward Error Correction-Fast Re-Route (FEC-FRR), use the **proactive** command in DWDM configuration mode. To disable automatic triggering, use the no form of this command.

Note ASR 9000 64-bit (eXR) does not support the **proactive** command.

proactive

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.2.3	Support for Proactive protection feature was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

Note The **proactive** command is supported on the legacy line cards but does not function on the A9K-8X100GE-SE line cards though it is supported on them.

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to enable automatic triggering of Forward Error Correction-Fast Re-Route (FEC-FRR):

```
RP/0/RP0RSP0/CPU0:router# config
```

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# proactive
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

proactive revert threshold

To configure the revert threshold to trigger reverting from the Forward Error Correction-Fast Re-Route (FEC-FRR) route back to the original route, use the **proactive revert threshold** command in DWDM configuration mode. To remove the revert threshold, use the no form of this command.

Note ASR 9000 64-bit (eXR) does not support the **proactive revert threshold <1-9> <3-10>** command.

proactive revert threshold *x-coefficient y-power*

Syntax Description

x-coefficient	Bit error rate coefficient (x of xE-y) . The range is 1 to 9. Default is 1.
y-power	Bit error rate exponent (y of xE-y). The range is 3 to 9.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.2.3	Support for **proactive revert threshold** command was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

Note The **proactive revert threshold** command is supported on the legacy line cards but does not function on the A9K-8X100GE-SE line cards though it is supported on them.

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the revert threshold for FEC-FRR:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# proactive revert threshold 1 9
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

proactive revert window

To configure the revert window in which reverting from the Forward Error Correction-Fast Re-Route (FEC-FRR) route back to the original route is triggered, use the **proactive revert window** command in DWDM configuration mode. To remove the revert window, use the **no** form of this command.

Note ASR 9000 64-bit (eXR) does not support the **proactive revert window <500-100000>** command.

proactive revert window *window*

Syntax Description

window	The length of time (in milliseconds) of the window in which reverting from FEC-FRR may be triggered. The range is 2000 to 100000.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.2.3	Support for proactive protection was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

Note The **proactive revert window** command is supported on the legacy line cards but does not function on the A9K-8X100GE-SE line cards though it is supported on them.

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the window in which reverting from FEC-FRR may be triggered:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# proactive revert window 100000
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

proactive trigger threshold

To configure the trigger threshold of Forward Error Correction-Fast Re-Route (FEC-FRR), use the **proactive trigger threshold** command in DWDM configuration mode. To remove the trigger threshold, use the no form of this command.

Note ASR 9000 64-bit (eXR) does not support the **proactive trigger threshold <1-9> <2-9>** command.

proactive trigger threshold *x-coefficient y-power*

Syntax Description

x-coefficient	Bit error rate coefficient (x of xE-y) . The range is 1 to 9. Default is 1.
y-power	Bit error rate exponent (y of xE-y). The range is 3 to 9.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.2.3	Support for **proactive trigger threshold** command was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

Note The **proactive trigger threshold** command is supported on the legacy line cards but does not function on the A9K-8X100GE-SE line cards though it is supported on them.

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the trigger threshold of Forward Error Correction-Fast Re-Route (FEC-FRR)

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# proactive trigger threshold 1 9
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

proactive trigger window

To configure the trigger window (in milliseconds) in which Fast Re-Route may be triggered, use the **proactive trigger window** command in DWDM configuration mode. To remove the trigger window, use the no form of this command.

Note ASR 9000 64-bit (eXR) does not support the **proactive trigger window <10-10000>** command.

proactive trigger window *window*

Syntax Description

window	The length of time (in milliseconds) of the window in which FEC-FRR may be triggered. The range is 10 to 10000.

Command Default

No default behavior or values

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.2.3	Support for **proactive trigger window** command was included on these Modular Port Adaptors(MPAs): • A9K-MPA-2X40GE • A9K-MPA-1X40GE

Usage Guidelines

The proactive feature is used to trigger Forward Error Correction-Fast Re-Route (FEC-FRR).

Note The **proactive trigger window** command is supported on the legacy line cards but does not function on the A9K-8X100GE-SE line cards though it is supported on them.

To see the proactive status, use the **show controller dwdm proactive status** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the trigger window (in milliseconds) in which triggering of Fast Re-Route may happen:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-dwdm)# proactive trigger window 10000
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

rx-los-threshold

To configure the transponder receive power threshold on a DWDM controller, use the **rx-los-threshold** command in DWDM configuration mode. To return the transponder receive power threshold to its default value, use the **no** form of this command.

rx-los-threshold power-level

Syntax Description

power-level	Receive power level in units of 0.1 dBm. Values can range from -350 to 50, which corresponds to a LOS threshold range of -35 dBm to 5 dBm.

Command Default

The default *power-level* is-19.5 dBm.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced. It is supported only on the OC-768c/STM-256c DWDM PLIM.
Release 3.6.0	The value for the *power-level* argument was changed from -200 to 0, to -350 to 50.
Release 5.2.3	This command was introduced.

Usage Guidelines

The **rx-los-threshold** command can be used only when the DWDM controller port is not operational. In Cisco IOS XR releases prior to Cisco IOS XR Release 3.9.0, you stop operation using the **shutdown (DWDM)** command. Beginning in Cisco IOS XR Release 3.9.0, you stop operation using the **admin-state out-of-service** command.

The **rx-los-threshold** command is applicable only to the OC-768c/STM-256c DWDM PLIM.

Task ID

Task ID	Operations
dwdm	read, write

Examples

This example shows how to configure the receive power threshold to -10 dBm:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# rx-los-threshold -100
```

Related Commands

Command	Description
admin-state, on page 3	Configures the transport administration state on a DWDM port.

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.
transmit-power, on page 78	Configures the DWDM optics transmit laser power on a DWDM controller.

show controller dwdm

To display optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller, use the **show controller dwdm** command in EXEC modeXR EXEC mode.

show controller dwdm interface-path-id [{**g709** [**registers**] | **log** | **optics** [**registers**] | **proactive status srlg tdc** | **wavelength-map**}]

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.
g709	(Optional) Displays the G.709 Optical Transport Network (OTN) protocol alarms and counters for bit errors, along with the FEC statistics and threshold-based alerts. g709 mode and g709 fec set to enhanced by default.
log	(Optional) Displays information about signal logging.
optics	(Optional) Displays optical related information about the interface, such as output power level and wavelength.
registers	(Optional) For **g709**, displays platform-specific OTN framer registers; for **optics**, displays transponder registers.
proactive status	(Optional) Displays proactive status information.
srlg	(Optional) Displays Shared Risk Link Group (SRLG) information.
tdc	(Optional) Displays tunable dispersion compensator (TDC) information.
wavelength-map	(Optional) Displays the wavelength information.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.4.0	The display of the TTI strings was added.
Release 3.6.0	Tunable dispersion compensator (TDC) information was added.
Release 3.9.0	The Transport Admin State output field was added, and the output for the FEC Mode field was modified to display the type of Enhanced FEC configured.
Release 3.9.1	The **srlg** and **proactive status** keywords were added.

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.2.3	This command was introduced.
Release 5.3.0	The command output was enhanced to capture whether VTXP is enabled on an interface or not.
Release 5.3.1	g709 standard FEC mode is enabled by default.

Usage Guidelines

DWDM interfaces with g709 capability(enabled) and FEC(enabled) would report with Threshold Crossing Alerts (TCA) for Error Correction based PREFEC version of SD and SF BER. The thresholds act independent of FRR thresholds. If FRR is also enabled, then PREFEC thresholds are expected to be manually tuned to provide an early warning before the protection is triggered. The information regarding PREFEC_SD and PREFEC_SF are made available for the **show controller dwdm interface-path-id g709** command. 10 GigE and 40 GigE DWDM interfaces support standard FEC and enhanced i.4 and i.7 FEC modes while 100GigE supports standard FEC.

Task ID

Task ID	Operations
dwdm	read
interface	read
sonet-sdh	read

Examples

This example shows the output from the **show controllers dwdm** command on a 10-GE DWDM PLIM (prior to Cisco IOS XR Release 3.9.0):

```
RP/0/RP0/CPU0:Router# show controller dwdm 0/6/0/0

Port dwdm 0/6/0/0

Controller State: up

Loopback: None

G709 Status


OTU
         LOS  = 0           LOF  = 0           LOM  = 0
         BDI  = 0           IAE  = 0           BIP  = 0
         BEI  = 0           TIM  = 0

ODU
         AIS  = 0           BDI  = 0           OCI  = 0
         LCK  = 0           BIP  = 0           BEI  = 0
         PTIM = 0           TIM  = 0

FEC Mode: Enhanced FEC(default)
         EC(current second) = 0          EC   = 0          UC   = 0
         pre-FEC BER < 2.35E-11          Q > 6.66          Q Margin > 7.52 dBQ
```

```
Remote FEC Mode: Unknown
         FECMISMATCH = 0

Detected Alarms: LOS
Asserted Alarms: LOS
Alarm Reporting Enabled for: LOS LOF LOM IAE OTU-BDI OTU-TIM OTU_SF_BER OTU_SD_BER ODU-AIS
 ODU-BDI OCI LCK PTIM ODU-TIM FECMISMATCH
BER Thresholds: OTU-SF = 10e-3  OTU-SD = 10e-6

OTU TTI Sent     String ASCII: Tx TTI Not Configured
OTU TTI Received String ASCII: Rx TTI Not Recieved
OTU TTI Expected String ASCII: Exp TTI Not Configured

ODU TTI Sent     String ASCII: Tx TTI Not Configured
ODU TTI Received String ASCII: Rx TTI Not Recieved
ODU TTI Expected String ASCII: Exp TTI Not Configured

Optics Status

         Optics Type:  DWDM
         Wavelength Info: C-Band, MSA ITU Channel=1, Frequency=196.10THz,
Wavelength=1528.773nm
         TX Power = 0.07 dBm
         RX Power = -43.35 dBm
         RX LOS Threshold = -17.00 dBm
TDC Info

        TDC Not Supported on the Plim
```

This example shows the output from the **show controllers dwdm** command on a OC-768c/STM-256c DWDM PLIM (prior to Cisco IOS XR Release 3.9.0):

```
RP/0/RP0/CPU0:Router# show controller dwdm 0/4/0/0

Port dwdm 0/4/0/0

Controller State: admin-down

Loopback: None

G709 Status


OTU
         LOS  = 0           LOF  = 0           LOM  = 0
         BDI  = 0           IAE  = 0           BIP  = 0
         BEI  = 0           TIM  = 0

ODU
         AIS  = 0           BDI  = 0           OCI  = 0
         LCK  = 0           BIP  = 0           BEI  = 0
         PTIM = 0           TIM  = 0

FEC Mode: Enhanced FEC(default)
         EC(current second) = 0           EC   = 0           UC   = 0
         pre-FEC BER < 2.35E-11           Q > 6.66           Q Margin > 7.52 dBQ

Remote FEC Mode: Unknown
         FECMISMATCH = 0

Detected Alarms: None
Asserted Alarms: None
Alarm Reporting Enabled for: LOS LOF LOM IAE OTU-BDI OTU-TIM OTU_SF_BER OTU_SD_BER ODU-AIS
```

```
 ODU-BDI OCI LCK PTIM ODU-TIM FECMISMATCH
BER Thresholds: OTU-SF = 10e-3  OTU-SD = 10e-6

OTU TTI Sent     String ASCII: Tx TTI Not Configured
OTU TTI Received String ASCII: Rx TTI Not Recieved
OTU TTI Expected String ASCII: Exp TTI Not Configured

ODU TTI Sent     String ASCII: Tx TTI Not Configured
ODU TTI Received String ASCII: Rx TTI Not Recieved
ODU TTI Expected String ASCII: Exp TTI Not Configured

Optics Status

         Optics Type:  DWDM
         Wavelength Info: C-Band, MSA ITU Channel=1, Frequency=196.10THz,
Wavelength=1528.773nm
         TX Power = 1.01 dBm
         RX Power = -99.99 dBm
         RX LOS Threshold = -17.00 dBm
TDC Info

        Operational Mode: AUTO
        Status :          AQUIRING
        Dispersion Setting : 0 ps/nm
```

The following example shows updated output from the **show controllers dwdm** command on a Cisco CRS-1 router in Cisco IOS XR Release 3.9.0:

```
RP/0/RP0/CPU0:Router(config-dwdm)# show controllers dwdm 0/0/0/0
Mon Aug  3 10:29:09.799 UTC

Port dwdm0/0/0/0

Controller State: up

Transport Admin State: OOS (Out-of-Service)

Loopback: None

G709 Status


OTU
         LOS  = 0           LOF  = 0           LOM  = 0
         BDI  = 0           IAE  = 0           BIP  = 0
         BEI  = 0           TIM  = 0

ODU
         AIS  = 0           BDI  = 0           OCI  = 0
         LCK  = 0           BIP  = 0           BEI  = 0
         PTIM = 0           TIM  = 0

FEC Mode: Enhanced FEC G.975.1 1.7 (Default)
         EC(current second) = 0           EC   = 0           UC   = 0
         pre-FEC BER < 9.00E-11           Q > 6.45           Q Margin > 7.25

Remote FEC Mode: Unknown
         FECMISMATCH = 0

Detected Alarms: None
Asserted Alarms: None
Alarm Reporting Enabled for: LOS LOF LOM IAE OTU-BDI OTU-TIM OTU_SF_BER OTU_SD_BER ODU-AIS
 ODU-BDI OCI LCK PTIM ODU-TIM FECMISMATCH
```

```
BER Thresholds: OTU-SF = E-3  OTU-SD = E-6

Connectivity Info

               Network Port ID:  Unavailable
               Network Connection ID:  Unavailable


OTU TTI Sent     String ASCII: Tx TTI Not Configured
OTU TTI Received String ASCII: Rx TTI Not Recieved
OTU TTI Expected String ASCII: Exp TTI Not Configured

ODU TTI Sent     String ASCII: Tx TTI Not Configured
ODU TTI Received String ASCII: Rx TTI Not Recieved
ODU TTI Expected String ASCII: Exp TTI Not Configured

Optics Status

         Optics Type:  10Gb MSA WDM (65km)
         Wavelength Info: C-Band, MSA ITU Channel=3, Frequency=196.00THz,
Wavelength=1529.553nm
         TX Power = -50.00 dBm
         RX Power = -47.19 dBm
TDC Info

        TDC Not Supported on the Plim

Network SRLG values:

        Not Configured
```

This example shows sample output from the **show controllers dwdm g709** command when FEC and g709 are both active:

```
RP/0/RSP0/CPU0:Router# show controller dwdm 0/5/0/0 g709
Mon Feb 10 13:12:00.268 IST

G709 Status


OTU
         LOS  = 0           LOF  = 0           LOM  = 0
         BDI  = 0           IAE  = 1           BIP  = 0
         BEI  = 0           TIM  = 0

ODU
         AIS  = 0           BDI  = 0           OCI  = 0
         LCK  = 0           BIP  = 0           BEI  = 0
         PTIM = 0           TIM  = 0

FEC Mode: Enhanced  (Default)
         EC(current second) = 0          EC   = 0          UC   = 0
         PREFEC BER < 9.01E-11          Q > 6.46          Q Margin > 7.26


Detected Alarms: None
Asserted Alarms: None
Alarm Reporting Enabled for: LOS LOF LOM IAE OTU-BDI OTU-TIM OTU_SD_BER PREFEC_SD_BER
PREFEC_SF_BER ODU-AIS ODU-BDI OCI LCK PTIM ODU-TIM ODU_SF_BER ODU_SD_BER
 FECMISMATCH
BER Thresholds: preFEC-SF = E-9     preFEC-SD = E-11
                OTU-SF    = E-3     OTU-SD    = E-6
                ODU-SF    = E-3     ODU-SD    = E-6
```

```
Connectivity Info
               Network Port ID:  Not Configured
               Network Connection ID:  Not Configured

OTU TTI Sent     String ASCII  : Tx TTI Not Configured
OTU TTI Received String ASCII  : Rx TTI Not Received
OTU TTI Expected String ASCII  : Exp TTI Not Configured

ODU TTI Sent     String ASCII  : Tx TTI Not Configured
ODU TTI Received String ASCII  : Rx TTI Not Received
ODU TTI Expected String ASCII  : Exp TTI Not Configured
```

This table describes selected fields from the **show controllers dwdm** command output.

Table 2: show controllers dwdm Command Output Field Descriptions

Field	Description
AIS	Number of alarm indication signal (AIS) alarms. AIS is a signal sent downstream as an indication that an upstream defect has been detected.
Alarm reporting enabled for	Lists the alarms that are enabled for reporting.
Asserted Alarms	Alarms indicated to be reported by the user.
BDI	Number of backward defect indication (BDI) alarms. The BDI is a single bit that conveys information regarding signal failure in the upstream direction.
BER thresholds	Values of the configured bit error rate thresholds.
BIP	Number of bit interleaved parity alarms. The BIP is comprised of one byte and is used for error detection. It is computed over the entire optical channel payload unit (OPU).
Controller State	Status of the controller.
Detected Alarms	Alarms detected by the hardware.
EC	Corrected code words. This is the number of words corrected by the FEC and is displayed as a per second rate.
FEC Mode	Indicates the forward error correction (FEC) mode for the controller. This can be Disabled, Enhanced FEC G.975.1 1.7 (Default), or Standard FEC. This can be Disabled, Enhanced FEC G.975.1 1.4, or Standard FEC (Default).
IAE	Number of incoming alignment errors (IAE).
LCK	Number of upstream connection locked alarms. LCK is a signal sent downstream as an indication that upstream the connection is locked, and no signal is passed through.
LOF	Number of OTU loss of frame (LOF) alarms.
LOM	Number of OTU loss of multiframe (LOM) alarms.

Field	Description
Loopback	Loopback status. Indicates whether or not loopback is enabled and the type of loopback enabled.
LOS	Number of OTU loss of signal (LOS) alarms. The LOS threshold is set using the **rx-los-threshold** command. If the receive optical power is less than or equal to this defined threshold, the optical LOS alarm is raised.
OCI	Number of open connection indication alarms. OCI is a signal sent downstream as an indication that upstream the signal is not connected to a trail termination source.
ODU	Optical channel data unit alarms.
OTU	Optical transport unit overhead alarms.
OTU TTI Expected	Value of the expected TTI.
OTU TTI Received	Value of the received TTI.
OTU TTI Sent	Value of the transmit trail trace identifier (TTI).
PTIM	Number of payload type identifier mismatch alarms. This occurs when there is a mismatch between the way the ITU-T G.709 option is configured on the PLIM at each end of the optical span.
TDC Info	Tunable Dispersion Compensator (TDC) information.
Transport Admin State	Current status of the port as set by the **admin-state** command. Possible values are: IS (In-Service) and OOS (Out-of-Service).
UC	Uncorrectable code words. This is a raw counter.
Pre-FEC BER	Pre - bit error rate (BER) forward error correction (FEC). The pre-FEC BER is calculated using pre-forward error correction (FEC) error counts.
Q	The general signal quality bit error rate (BER) per voltage. The Q and Q margin are calculated using the Pre-FEC BER.
Q Margin	The general signal quality bit error rate (BER) per voltage. The Q and Q margin are calculated using the Pre-FEC BER.
Operational Mode	Indicates whether the tunable dispersion compensator (TDC) operational mode option is set to Auto or Manual.
Status	Indicates whether the tunable dispersion compensator (TDC) is in the acquiring state or locked state. The status is invalid if there is a major alarm.
Dispersion Setting	Indicates a value between –700 and +700 packets per second (pps). The dispersion setting is read from the optics module after the tunable dispersion compensator (TDC) has locked.
Reroute Control	Not used.

Field	Description
Reroute BER	Not used.

See Table 3: show controllers dwdm optics Command Output Field Descriptions, on page 65 for a description of the optics fields.

The following example shows the output from the show controllers dwdm command with the **g709 registers** keywords:

```
RP/0/RP0RSP0/CPU0:router# show controller dwdm 0/3/0/0 g709 registers

Addr          Name                  Value
 0x00800030    Serial[0]             0x30303130
 0x00800034    Serial[1]             0x30353934
 0x00800038    Serial[2]             0x0
 0x0080003c    PartNum[0]            0x38303030
 0x00800040    PartNum[1]            0x3034312d
 0x00800044    PartNum[2]            0x30300010
 0x00800048    PartNum[3]            0x0
 0x0080004c    Version[0]            0x312e3041
 0x00800050    Version[1]            0x6c706861
 0x00800054    Version[2]            0x28423133
 0x00800058    Version[3]            0x35290000
 0x0080005c    Version[4]            0x0
 0x00800060    Version[5]            0x0
 0x0080002c    Band                  0x0
 0x0080001c    RefClock              0x0
 0x00800020    Loopback              0x0
 0x00800000    IntfStatus            0x5000000
 0x00800004    ModEnable             0x1
 0x0080000c    ModStatus             0x34010000
 0x00800010    ModIntrMask           0x7c000000
 0x00800014    ModIntr               0x0
 0x00800100    TxLineStat            0x80
 0x00800104    TxLineEvent           0x0
 0x00800108    TxLineIntrMask        0xc1
 0x00800114    TxOpticChan           0x1
 0x00800118    Wavelength            0x1753c5
 0x00800200    RxLineStat            0x8000
 0x00800208    RxLineEventMask       0xffe3
 0x00800204    RxLineEvent           0x0
```

The following example shows the output from the **show controllers dwdm** command with the **optics** keyword on a 10-GE PLIM:

```
RP/0/RP0RSP0/CPU0:router# show controller dwdm 0/3/0/0 optics

Optics Status

         Optics Type:  10Gb MSA WDM (65km)
         Clock Source: Internal
        Wavelength Band: C-Band, MSA ITU Channel = 3, Frequency = 196.00 THz,
Wavelength = 1529.553 nm
         TX Power = 3.79 dBm
         RX Power = -8.83 dBm
```

The following example shows the output from the **show controllers dwdm** command with the **optics** keyword:

```
RP/0/RP0RSP0/CPU0:router# show controllers dwdm 0/2/0/0 optics
Mon Jul 12 21:04:29.254 UTC

Optics Status

         Optics Type:  10GBASE-ZR,
        Wavelength Info: C-Band, MSA ITU Channel= N/A, Frequency=192THz, Wavelength=1558nm

         TX Power = 1.50 dBm
         RX Power = -11.86 dBm

RP/0/RP0RSP0/CPU0:router#show controllers dwdm 0/1/0/11 optics
Thu Dec  4 22:17:41.790 UTC

Optics Status

         Optics Type:  10GBASE-TUNABLE
         Wavelength Info: C-Band, MSA ITU Channel=50, Frequency=193.65THz,
Wavelength=1548.115nm
         Wavelength Owner: Configuration, ITU Channel: GMPLS Signaled=None, Configured=50,
 Hardware Default=96
         TX Power = 0.00 dBm
         RX Power = -17.95 dBm
```

This table describes selected fields from the **show controllers dwdm** command output with the **optics** keyword.

Table 3: show controllers dwdm optics Command Output Field Descriptions

Field	Description
Optics Type	Indicates the optics type: GE or OC-768c/STM-256c DWDM.
Clock Source	Indicates whether the clock is internal or line.
Wavelength Band	Indicates the wavelength band: C-band or L-band.
MSA ITU Channel	Multi Source Agreement (MSA) ITU channel number.
Frequency	Frequency of the channel in terahertz.
Wavelength	Wavelength corresponding to the channel number in nanometers.
TX power	Value of the transmit power level. This is user configurable on the OC-768c/STM-256c DWDM PLIM using the **transmit-power** command.
RX Power	Actual optical power at the RX port.
RX LOS Threshold	Receive loss of signal threshold. This is user configurable on the OC-768c/STM-256c DWDM PLIM using the **rx-los-threshold** command. If the receive optical power is less than or equal to this defined threshold, the optical LOS alarm is raised.

This example shows sample output from the **show controllers dwdm** command with the **wavelength-map** keyword on a Gigabit Ethernet controller:

```
RP/0/RP0RSP0/CPU0:router# show controller dwdm 0/5/0/3 wavelength-map
```

```
Wavelength band: C-band
MSA ITU channel range supported: 3~84

Wavelength map table
 ---------------------------------------
 Channel Frequency       Wavelength
  Num      (THz)            (nm)
 ---------------------------------------
 03       196.00          1529.553
 ---------------------------------------
 04       195.95          1529.944
 ---------------------------------------
 05       195.90          1530.334
 ---------------------------------------
 06       195.85          1530.725
 ---------------------------------------
 07       195.80          1531.116
 ---------------------------------------
 08       195.75          1531.507
 ---------------------------------------
 09       195.70          1531.898
 ---------------------------------------
 10       195.65          1532.290
 ---------------------------------------
 11       195.60          1532.681
 ---------------------------------------
 12       195.55          1533.073
 ---------------------------------------
 13       195.50          1533.465
 ---------------------------------------
 14       195.45          1533.858
 ---------------------------------------
 15       195.40          1534.250
 ---------------------------------------
 16       195.35          1534.643
 ---------------------------------------
 17       195.30          1535.036
 ---------------------------------------
 18       195.25          1535.429
 ---------------------------------------
 19       195.20          1535.822
 .
 .
 .
```

This example shows sample output from the **show controllers dwdm** command with the **wavelength-map** keyword on a tunable SFP:

```
RP/0/RP0RSP0/CPU0:router#show controllers dwdm 0/1/0/11 wavelength-map
Thu Dec  4 22:18:23.415 UTC
Wavelength band: C-Band
MSA ITU channel range supported: 1~100

Wavelength map table
-----------------------------------------------------
ITU Ch   G.694.1         Frequency       Wavelength
 Num     Ch Num           (THz)            (nm)
-----------------------------------------------------
     1    60              196.10          1528.773
-----------------------------------------------------
     2    59              196.05          1529.163
-----------------------------------------------------
     3    58              196.00          1529.553
-----------------------------------------------------
```

```
     4    57              195.95          1529.944
-----------------------------------------------------
     5    56              195.90          1530.334
-----------------------------------------------------
     6    55              195.85          1530.725
-----------------------------------------------------
     7    54              195.80          1531.116
-----------------------------------------------------
     8    53              195.75          1531.507
-----------------------------------------------------
     9    52              195.70          1531.898
-----------------------------------------------------
    10    51              195.65          1532.290
-----------------------------------------------------
    11    50              195.60          1532.681
-----------------------------------------------------
    12    49              195.55          1533.073
-----------------------------------------------------
    13    48              195.50          1533.465
-----------------------------------------------------
    14    47              195.45          1533.858
-----------------------------------------------------
    15    46              195.40          1534.250
-----------------------------------------------------
    16    45              195.35          1534.643
-----------------------------------------------------
    17    44              195.30          1535.036
-----------------------------------------------------
    18    43              195.25          1535.429
-----------------------------------------------------
    19    42              195.20          1535.822

...
...
```

This table describes selected fields from the **show controllers dwdm** command output with the **wavelength-map** keyword.

Table 4: show controllers dwdm wavelength Command Output Field Descriptions

Field	Description
channel Num	Channel number.
frequency (THz)	Frequency of the wavelength in terahertz.
wavelength (nm)	Wavelength in nanometers.

Related Commands

Command	Description
admin-state, on page 3	Configures the transport administration state on a DWDM port.
rx-los-threshold, on page 55	Configures the transponder receive power threshold on a DWDM controller.
transmit-power, on page 78	Configures the DWDM optics transmit laser power on a DWDM controller.

show controller dwdm pm

To display performance monitoring information for a DWDM controller, use the **show controller dwdm pm** command in EXEC modeXR EXEC mode.

show controller dwdm *instance* **pm history** [{**15-min** | **24-hour** | **fec** | **optics** | **otn**}]
show controller dwdm *instance* **pm interval** [{**15-min** | **24-hour**}][{**fec** | **optics** | **otn**}] *index*

Syntax Description

instance	Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number. • *port*: Physical port number of the interface. For more information about the syntax for the router, use the question mark (?) online help function.
history	Displays all performance monitoring data.
interval	Displays specific performance monitoring data in a particular interval.
15-min	Displays performance monitoring data in a 15-minute interval.
24-hour	Displays performance monitoring data in a 24-hour interval.
fec	Displays FEC performance parameters, such as bit errors corrected (BIEC) and uncorrectable words.
optics	Displays optics performance parameters, such as optical power.
otn	Displays OTN performance parameters, such as path monitoring failure counts (FC-PM) and section monitoring unavailable seconds (UAS-SM).
index	Interval for which to display the performance monitoring information.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.4.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
dwdm	read
interface	read
sonet-sdh	read

Examples

The following example shows the output from the **show controllers dwdm pm** command on a 10-GE DWDM PLIM:

```
RP/0/RP1/CPU0:Router# show controllers dwdm 0/2/0/0 pm interval 24-hour 0

g709 OTN in the current interval [00:00:00 - 08:05:58 Tue Jul 11 2006]
    ES-SM-NE    : 0         Threshold : -1       TCA(enable)  : NO
    ESR-SM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    SES-SM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    SESR-SM-NE  : 0         Threshold : -1       TCA(enable)  : NO
    UAS-SM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    BBE-SM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    BBER-SM-NE  : 0         Threshold : -1       TCA(enable)  : NO
    FC-SM-NE    : 0         Threshold : -1       TCA(enable)  : NO
    ES-PM-NE    : 0         Threshold : -1       TCA(enable)  : NO
    ESR-PM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    SES-PM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    SESR-PM-NE  : 0         Threshold : -1       TCA(enable)  : NO
    UAS-PM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    BBE-PM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    BBER-PM-NE  : 0         Threshold : -1       TCA(enable)  : NO
    FC-PM-NE    : 0         Threshold : -1       TCA(enable)  : NO
    ES-SM-FE    : 0         Threshold : -1       TCA(enable)  : NO
    ESR-SM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    SES-SM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    SESR-SM-FE  : 0         Threshold : -1       TCA(enable)  : NO
    UAS-SM-FE   : 106       Threshold : -1       TCA(enable)  : NO
    BBE-SM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    BBER-SM-FE  : 0         Threshold : -1       TCA(enable)  : NO
    FC-SM-FE    : 0         Threshold : -1       TCA(enable)  : NO
    ES-PM-FE    : 0         Threshold : -1       TCA(enable)  : NO
    ESR-PM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    SES-PM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    SESR-PM-FE  : 0         Threshold : -1       TCA(enable)  : NO
    UAS-PM-FE   : 32327     Threshold : -1       TCA(enable)  : NO
    BBE-PM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    BBER-PM-FE  : 0         Threshold : -1       TCA(enable)  : NO
    FC-PM-FE    : 0         Threshold : -1       TCA(enable)  : NO

g709 FEC in the current interval [00:00:00 - 08:05:58 Tue Jul 11 2006]
    EC-BITS   : 0               Threshold : 0              TCA(enable)  : NO
    UC-WORDS  : 0               Threshold : 0             TCA(enable)  : NO

Optics in the current interval [00:00:00 - 08:05:58 Tue Jul 11 2006]
             MIN     AVG     MAX  Threshold  TCA  Threshold  TCA
                                   (min)  (enable) (max)  (enable)
LBC[mA ] :  1163    4336    8487    -1         NO      -1       NO
OPT[uW]  :  2593    2593    2593    -1         NO      -1       NO
OPR[uW]  :  69      69      70      -1         NO      -1       NO
```

The following examples show sample output for a DWDM controller:

```
RP/0/RSP0/CPU0:Router# show controller dwdm 0/5/0/0 pm interval 15-min fec 0
Thu Jul  1 18:58:09.353 UTC

g709 FEC in the current interval [18:45:00 - 18:58:09 Thu Jul 1 2010]
    EC-BITS   : 0              Threshold : 0             TCA(enable)  : NO
    UC-WORDS  : 0              Threshold : 0            TCA(enable)  : NO

RP/0/RSP0/CPU0:Router# show controller dwdm 0/5/0/0 pm history 15-min
Thu Jul  1 18:59:04.585 UTC

g709 OTN in the current interval [18:45:00 - 18:59:04 Thu Jul 1 2010]
    ES-SM-NE    : 0         Threshold : -1       TCA(enable)  : NO
    ESR-SM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    SES-SM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    SESR-SM-NE  : 0         Threshold : -1       TCA(enable)  : NO
    UAS-SM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    BBE-SM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    BBER-SM-NE  : 0         Threshold : -1       TCA(enable)  : NO
    FC-SM-NE    : 0         Threshold : -1       TCA(enable)  : NO
    ES-PM-NE    : 0         Threshold : -1       TCA(enable)  : NO
    ESR-PM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    SES-PM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    SESR-PM-NE  : 0         Threshold : -1       TCA(enable)  : NO
    UAS-PM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    BBE-PM-NE   : 0         Threshold : -1       TCA(enable)  : NO
    BBER-PM-NE  : 0         Threshold : -1       TCA(enable)  : NO
    FC-PM-NE    : 0         Threshold : -1       TCA(enable)  : NO

    ES-SM-FE    : 0         Threshold : -1       TCA(enable)  : NO
    ESR-SM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    SES-SM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    SESR-SM-FE  : 0         Threshold : -1       TCA(enable)  : NO
    UAS-SM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    BBE-SM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    BBER-SM-FE  : 0         Threshold : -1       TCA(enable)  : NO
    FC-SM-FE    : 0         Threshold : -1       TCA(enable)  : NO
    ES-PM-FE    : 0         Threshold : -1       TCA(enable)  : NO
    ESR-PM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    SES-PM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    SESR-PM-FE  : 0         Threshold : -1       TCA(enable)  : NO
    UAS-PM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    BBE-PM-FE   : 0         Threshold : -1       TCA(enable)  : NO
    BBER-PM-FE  : 0         Threshold : -1       TCA(enable)  : NO
    FC-PM-FE    : 0         Threshold : -1       TCA(enable)  : NO


g709 FEC in the current interval [18:45:00 - 18:59:04 Thu Jul 1 2010]
    EC-BITS   : 0              Threshold : 0             TCA(enable)  : NO
    UC-WORDS  : 0              Threshold : 0            TCA(enable)  : NO


Optics in the current interval [18:45:00 - 18:59:04 Thu Jul 1 2010]
             MIN     AVG     MAX  Threshold  TCA  Threshold    TCA
                                   (min)  (enable) (max)    (enable)
LBC[mA ] :  17210   17542   17662   0          NO      0        NO
OPT[dBm] :  -1.46   -1.46   -1.46   0.00       NO      0.00     NO
OPR[dBm] :  -31.67   -31.66   -31.65   0.00       NO      0.00     NO


g709 OTN in interval 1 [18:30:00 - 18:45:00 Thu Jul 1 2010]
    ES-SM-NE    : 0             ES-SM-FE    : 0
    ESR-SM-NE   : 0             ESR-SM-FE   : 0
    SES-SM-NE   : 0             SES-SM-FE   : 0
```

```
    SESR-SM-NE  : 0             SESR-SM-FE  : 0
    UAS-SM-NE   : 0             UAS-SM-FE   : 0
    BBE-SM-NE   : 0             BBE-SM-FE   : 0
    BBER-SM-NE  : 0             BBER-SM-FE  : 0
    FC-SM-NE    : 0             FC-SM-FE    : 0
    ES-PM-NE    : 0             ES-PM-FE    : 0
    ESR-PM-NE   : 0             ESR-PM-FE   : 0
    SES-PM-NE   : 0             SES-PM-FE   : 0
    SESR-PM-NE  : 0             SESR-PM-FE  : 0
    UAS-PM-NE   : 0             UAS-PM-FE   : 0
    BBE-PM-NE   : 0             BBE-PM-FE   : 0
    BBER-PM-NE  : 0             BBER-PM-FE  : 0
    FC-PM-NE    : 0             FC-PM-FE    : 0


g709 FEC in interval 1 [18:30:00 - 18:45:00 Thu Jul 1 2010]
    EC-BITS   : 0                UC-WORDS  : 0

Optics in interval 1 [18:30:00 - 18:45:00 Thu Jul 1 2010]
             MIN       AVG       MAX
LBC[mA ] :   17210     17526     17662
OPT[dBm] :   -1.46     -1.46     -1.46
OPR[dBm] :   -31.67    -31.67    -31.66

g709 OTN in interval 2 [18:15:00 - 18:30:00 Thu Jul 1 2010]
    ES-SM-NE    : 0             ES-SM-FE    : 0
    ESR-SM-NE   : 0             ESR-SM-FE   : 0
    SES-SM-NE   : 0             SES-SM-FE   : 0
    SESR-SM-NE  : 0             SESR-SM-FE  : 0
    UAS-SM-NE   : 0             UAS-SM-FE   : 0
    BBE-SM-NE   : 0             BBE-SM-FE   : 0
    BBER-SM-NE  : 0             BBER-SM-FE  : 0
.
.
.
```

This table describes selected fields from the **show controllers dwdm pm** command output.

Table 5: show controllers dwdm pm Command Output Field Descriptions

Field	Description
EC-BITS	Bit errors corrected (BIEC). Indicates the number of bit errors corrected in the DWDM trunk line during the performance monitoring time interval.
UC-WORDS	Uncorrectable words. This is the number of uncorrectable words detected in the DWDM trunk line during the performance monitoring time interval.
LBC	Laser bias current.
OPR	Optical power on the unidirectional port.
OPT	Transmit optical power in dBm.
MAX	Indicates the maximum value of the parameter.
AVG	Indicates the average value of the parameter
MIN	Indicates the minimum value of the parameter.
THRESHOLD	Indicates the parameter's configured threshold.

Field	Description
TCA	Indicates if TCA reporting is enabled or not.
BBE-PM-FE	Far-end path monitoring background block errors (BBE-PM)—Indicates the number of background block errors recorded in the optical transport network (OTN) path during the performance monitoring time interval.
BBE-PM-NE	Near-end path monitoring background block errors (BBE-PM).
BBE-SM-FE	Far-end section monitoring background block errors (BBE-SM)—Indicates the number of background block errors recorded in the OTN section during the performance monitoring time interval.
BBE-SM-NE	Near-end section monitoring background block errors (BBE-SM).
BBER-PM-FE	Far-end path monitoring background block errors ratio (BBER-PM)—Indicates the background block errors ratio recorded in the OTN path during the performance monitoring time interval.
BBER-PM-NE	Near-end path monitoring background block errors ratio (BBER-PM).
BBER-SM-FE	Far-end section monitoring background block errors ratio (BBER-SM)—Indicates the background block errors ratio recorded in the OTN section during the performance monitoring time interval.
BBER-SM-NE	Near-end section monitoring background block errors ratio (BBER-SM).
ES-PM-FE	Far-end path monitoring errored seconds (ES-PM)—Indicates the errored seconds recorded in the OTN path during the performance monitoring time interval.
ES-PM-NE	Near-end path monitoring errored seconds (ES-PM).
ES-SM-FE	Far-end section monitoring errored seconds (ES-SM)—Indicates the errored seconds recorded in the OTN section during the performance monitoring time interval.
ES-SM-NE	Near-end section monitoring errored seconds (ES-SM).
ESR-PM-FE	Far-end path monitoring errored seconds ratio (ESR-PM)—Indicates the errored seconds ratio recorded in the OTN path during the performance monitoring time interval.
ESR-PM-NE	Near-end path monitoring errored seconds ratio (ESR-PM).
ESR-SM-FE	Far-end section monitoring errored seconds ratio (ESR-SM)—Indicates the errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
ESR-SM-NE	Near-end section monitoring errored seconds ratio (ESR-SM).
FC-PM-FE	Far-end path monitoring failure counts (FC-PM)—Indicates the failure counts recorded in the OTN path during the performance monitoring time interval.
FC-PM-NE	Near-end path monitoring failure counts (FC-PM).
FC-SM-FE	Far-end section monitoring failure counts (FC-SM)—Indicates the failure counts recorded in the OTN section during the performance monitoring time interval.

Field	Description
FC-SM-NE	Near-end section monitoring failure counts (FC-SM).
SES-PM-FE	Far-end path monitoring severely errored seconds (SES-PM)—Indicates the severely errored seconds recorded in the OTN path during the performance monitoring time interval.
SES-PM-NE	Near-end path monitoring severely errored seconds (SES-PM).
SES-SM-FE	Far-end section monitoring severely errored seconds (SES-SM)—Indicates the severely errored seconds recorded in the OTN section during the performance monitoring time interval.
SES-SM-NE	Near-end section monitoring severely errored seconds (SES-SM).
SESR-PM-FE	Far-end path monitoring severely errored seconds ratio (SESR-PM)—Indicates the severely errored seconds ratio recorded in the OTN path during the performance monitoring time interval.
SESR-PM-NE	Near-end path monitoring severely errored seconds ratio (SESR-PM).
SESR-SM-FE	Far-end section monitoring severely errored seconds ratio (SESR-SM)—Indicates the severely errored seconds ratio recorded in the OTN section during the performance monitoring time interval.
SESR-SM-NE	Near-end section monitoring severely errored seconds ratio (SESR-SM).
UAS-PM-FE	Far-end path monitoring unavailable seconds (UAS-PM)—Indicates the unavailable seconds recorded in the OTN path during the performance monitoring time interval.
UAS-PM-NE	Near-end path monitoring unavailable seconds (UAS-PM).
UAS-SM-FE	Far-end section monitoring unavailable seconds (UAS-SM)—Indicates the unavailable seconds recorded in the OTN section during the performance monitoring time interval.
UAS-SM-NE	Near-end section monitoring unavailable seconds (UAS-SM).

show vtxp-monitored ports

To display the list of DWDM controller interfaces on which VTXP attribute is enabled, use the use the **show vtxp-monitored ports** command in Global Configuration modeXR Config mode.

show vtxp-monitored ports

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 5.3.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

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

Examples

The following example shows how to view the interfaces on which the VTXP attribute is enabled:

```
RP/0/RP0RSP0/CPU0:router# show vtxp-monitored ports

Thu Jan  8 17:01:29.931 IST
dwdm ifName : dwdm0/1/0/0
dwdm ifName : dwdm0/1/0/1
dwdm ifName : dwdm0/1/0/2
```

Related Commands

Command	Description
controller dwdm, on page 5	Configures a DWDM controller.

transport-mode (WAN/OTN)

To specify the transport mode for a 10-Gigabit Ethernet interface, use the **transport-mode** command in interface configuration mode. To return to the default mode, use the **no** form of this command.

transport-mode {**wan** | **otn bit-transparent** {**opu1e** | **opu2e**}}

Syntax Description

wan	Configures the interface for 10GBASE-W WAN SONET/SDH (9.95328Gb/s) transport.
otn bit-transparent	Configures the interface for 10-Gigabit Ethernet over Optical Transport Network (ITU-T G.709) with 10GBASE-R transparently mapped into OTU-2.
opu1e	Configures the interface for 10GBASE-R over OPU1e without fixed stuffing (11.0491Gb/s).
opu2e	Configures the interface for 10GBASE-R over OPU2e with fixed stuffing (11.0957Gb/s)

Command Default

The interface is in LAN mode. Neither WAN mode or OTN mode is configured.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Three modes are supported for a 10-Gigabit Ethernet interface: LAN, WAN, or OTN on these Ethernet line cards and Modular Port Adaptors (MPAs):

- 2-Port 10-Gigabit Ethernet, 20-Port Gigabit Ethernet Combination line card (A9K-2T20GE-B and A9K-2T20GE-L)
- 8-Port 10-Gigabit Ethernet line card (A9K-8T-L, -B, or -E)
- 16-Port 10-Gigabit Ethernet SFP+ line card (A9K-16T/8-B and A9K-16T/8-B+AIP)
- 24-Port 10-Gigabit Ethernet line card (A9K-24X10GE-SE/TR)
- 36-Port 10-Gigabit Ethernet line card (A9K-36X10GE-SE/TR)
- 2-Port 10-Gigabit Ethernet Modular Port Adaptor (A9K-MPA-2x10GE)
- 4-Port 10-Gigabit Ethernet Modular Port Adaptor (A9K-MPA-4x10GE)
- 8-Port 10-Gigabit Ethernet Modular Port Adaptor (A9K-MPA-8x10GE)

Limitation:

On TenGig breakout interface of Cisco ASR 9000 High Density 100GE Ethernet (8x100G and 4x100G) line cards, configure same transport mode (OPU1E or OPU2E) on both ends of the interface. Different transport modes at both ends results in flapping of the interface status and the router console displays continuous interface UP/DOWN messages.

If you want to configure the interface for DWDM support, configure the 10-Gigabit Ethernet interface for OTN transport mode.

These 40GE MPAs support LAN and OTU3 modes:

- A9K-MPA-1x40GE
- A9K-MPA-2x40GE

Note Before Cisco IOS XR Software Release 4.2.0, only **transport-mode wan** was used under the interface configuration mode to set WAN PHY controller. Then, both Operational Mode and Configuration Mode would be changed to WAN Mode.

After Cisco IOS XR Software Release 4.2.0, you can use **transport-mode wan** under the interface configuration mode to use basic function of WAN PHY. In addition, we can use **wanmode on** under the wanphy controller mode to use alarm function and BIP counter.

Note On the Cisco A9K-4T16GE-TR and Cisco A9K-4T16GE-SE line cards, mixed use of LAN and WAN transport modes is not supported due to hardware limitation. In other words, WAN PHY is configured on all the four 10GigE ports to be operated either in LAN mode or WAN mode for 10 GigE ports 16, 17, 18 and 19.

On applying the configuration change from LAN to WAN or back on port 16, the same configuration shall be applied on all the other 10 GigE ports 17, 18, and 19. The ports 17, 18 or 19 cannot be used to make configuration changes using the **transport-mode** command. Also, the running configuration shows the configuration change only on port 16.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure the interface for WAN PHY mode:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface 10gigabitethernet 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# transport-mode wan
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

The following configuration is needed to operate in WAN PHY mode:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller wanphy <>
RP/0/RP0RSP0/CPU0:router(config)# wanmode on
RP/0/RP0RSP0/CPU0:router(config)# commit
```

This example shows how to configure a DWDM interface using OTN transport:

```
RP/0/RP0RSP0/CPU0:router# config
```

```
RP/0/RP0RSP0/CPU0:router(config)# interface 10gigabitethernet 0/5/0/7/0
RP/0/RP0RSP0/CPU0:router(config-if)# transport-mode otn bit-transparent opu1e
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

The following additional configuration is also needed:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm <>
RP/0/RP0RSP0/CPU0:router(config)# admin-state in-service
RP/0/RP0RSP0/CPU0:router(config)# commit
```

This example shows how to return the interface configuration to its default LAN mode from OTN or WAN PHY mode:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface 10gigabitethernet 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# no transport-mode
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

This configuration example shows how to configure the interface for OTU3 mode:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm <>
RP/0/RP0RSP0/CPU0:router(config)# g709 enable
RP/0/RP0RSP0/CPU0:router(config)# commit
```

Note The following QSFP+ Optics is required to support OTU3 mode:

- QSFP-40GE-LR4

Related Commands

Command	Description
controller wanphy, on page 699	Enters WAN physical controller configuration mode in which you can configure a 10-Gigabit Ethernet WAN PHY controller.

transmit-power

To configure the DWDM optics transmit laser power on a DWDM controller, use the **transmit-power** command in DWDM configuration mode. To return the transponder transmit power to its default value, use the **no** form of this command.

transmit-power power-level

Syntax Description

power-level	Transmit power level in units of 0.1 dBm. Values can range from -190 to +10, which corresponds to a power level range of -19 dBm to +1 dBm.

Command Default

power-level: 0 dBm

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced on the OC-768c/STM-256c DWDM PLIM.
Release 5.2.3	This command was introduced.

Usage Guidelines

The controller must be in the shutdown state before you can use the **transmit-power** command. You can configure the transponder transmit power only on the OC-768c/STM-256c DWDM PLIM.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to configure the receive power threshold to -10 dBm:

```
RP/0/RP0RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-dwdm)# transmit-power -100
```

Related Commands

Command	Description
rx-los-threshold, on page 55	Configures the transponder receive power threshold on a DWDM controller.
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

wavelength

To set the wavelength on a DWDM controller to a specific ITU channel or to define a specific frequency or wavelength to a DWDM controller, use the **wavelength** command in DWDM configuration mode. To return the wavelength to its default value, use the **no** form of this command.

Note ASR 9000 64-bit (eXR) does not support the **wavelength 100MHz-Grid frequency** command.

wavelength {**50GHz-grid** {*channel-number* | **frequency** *frequency* | **update** *wavelength*} } | {**100MHz-grid frequency** *frequency*}

Syntax Description

50GHz-grid	Specifies 50-GHz frequency grid.
100MHz-grid	Specifies 100-GHz frequency grid.
channel-number	ITU channel number. ITU channel numbers have predefined frequencies as defined by Multi Source Agreement (MSA) International Telecommunication Union (ITU) grid. • The range is 1 to 8996100 for conventional band (C-band) • The range is 106 to 185 for long band (L-band).
frequency *frequency*	Keyword that specifies the frequency for the DWDM controller. Enter the 5-digit frequency value in the range of 191701913519115 to 19610 GHz. For example, enter **frequency 19580** to specify 195.8 THz.
update *wavelength*	Keyword that defines a specific wavelength for the DWDM controller. Enter the 7-digit frequency value in the range of 1528773-1563863 micrometers (mm). For example, enter **update 1532290** to specifiy 1532.29 nanometers (nm).

Command Default

The default for OC-768c/STM-256c DWDM PLIM, C-band is 1.

The default for 10-GE PLIM, C-band is 3.

The default for 10-GE PLIM, L-band is 106.

The default channel is 96.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 4.3.0	This command was introduced.
Release 5.2.3	This command was introduced.
Release 5.3.2	50 GHZ or 100 GHz options were introduced.

Usage Guidelines

You can set the wavelength to a specific ITU channel, that is represented by a channel number in the Multi Source Agreement (MSA) ITU grid.

- The default channel number for the 10-GE PLIM, C-band is 3, which corresponds to a frequency of 196.00 THz and wavelength of 1529.553 nm.
- The default channel number for the 10-GE PLIM, L-band is 106, which corresponds to a frequency of 190.85 THz and wavelength of 1570.83 nm.
- The default channel number for the OC-768c/STM-256c DWDM PLIM, C-band is 1, which corresponds to a frequency of 196.10 and a wavelength of 1528.773.

The spacing between wavelengths is 50 GHZ or 100 GHz. Use the **show controllers dwdm** command with the **wavelength-map** keyword to view the channel numbers and wavelengths that are supported for a particular controller.

The controller must be in the out-of-service state before you can use the **wavelength** command.

Task ID

Task ID	Operations
dwdm	read, write

Examples

The following example shows how to set the DWDM wavelength to ITU channel 10.

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0/CPU0:router(config-dwdm)# wavelength 50GHz-grid 10
```

The following example shows how to set the frequency of ITU channel 10 to 195.8 THz.

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0/CPU0:router(config-dwdm)# wavelength 50GHz-grid frequency 19580
```

The following example shows how to set the wavelength of ITU channel 10 to 1532.29 nm.

```
RP/0/RP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RP0/CPU0:router(config-dwdm)# wavelength 10 update 1532290
```

Related Commands

Command	Description
show controller dwdm, on page 57	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.

Ethernet Interface Commands

This module provides command line interface (CLI) commands for configuring Ethernet interfaces on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 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.

carrier-delay

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

Note

- The **carrier-delay** command is active only when both **up** and **down** are configured from the host.
- The range of carrier-delay on access port of CRS is 0 to 2147483648 msec.
- If this configuration is not used, the default value is determined by the underlying driver, and may vary depending on whether auto-negotiation is enabled. The default value is chosen to provide enough time for the hardware link to stabilize after state change and to protect the system from excessive link flaps.
- If a value of 0 is set, carrier-delay is disabled in that direction.
- The range of carrier-delay on access port of ASR 9000v is 1 to 60000 msec. If a value of 0 is set, the default value of 100 msec is applied. A value greater than 60000 msec will be ignored and **show interfaces** output will display the previously configured msec.

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 2147483648.
up *milliseconds*	Length of time, in milliseconds, to delay the processing of hardware link up notifications. Range is from 0 through 2147483648.

Command Default

No carrier-delay is used, and the upper layer protocols are notified as quickly as possible when a physical link goes down.

No carrier-delay is manually configured, there is a default carrier-delay setting of 10 msec up and 0 msec down.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.9.0	The default value used when there is no carrier-delay configuration changed from 0 to being defined by each driver.
Release 4.2.0	The range for both down and up was increased to 0 through 2147483648.
Release 3.4.0	The **msec** keyword was replaced by the **down** keyword, and the value of the *milliseconds* argument was increased to 0 through 60000. The **up** keyword was added, and the value of the *milliseconds* argument was set at 0 through 60000.
Release 3.7.2	This command was introduced.

Release	Modification
Release 5.0.0	This command was introduced.

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.

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.

Enter the **show interface** command to see the current state of the carrier-delay operation for an interface. When no carrier-delay is manually configured, carrier-delay displays the default information of 10 msec up.

Task ID

Task ID	Operations
interface	read, write

Examples

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

```
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router(config-if)# carrier-delay up 100 down 100
```

Related Commands

Command	Description
dampening, on page 474	Turns on event dampening.

clear lldp

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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	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/RP0RSP0/CPU0:router# clear lldp counters
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router# clear lldp table
RP/0/RP0RSP0/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
```

Related Commands

Command	Description
show lldp neighbors, on page 191	Displays information about LLDP neighbors.
show lldp traffic, on page 194	Displays statistics for LLDP traffic.

clear mac-accounting (Ethernet)

To clear Media Access Control (MAC) accounting statistics, use the **clear mac-accounting** command in EXEC modeXR EXEC mode.

clear mac-accounting {**GigabitEthernet** | **TenGigE**} *interface-path-id* [**location** *node-id*]
clear mac-accounting {**GigabitEthernet** | **TenGigE**} *interface-path-id* [**location** *node-id*]
clear mac-accounting {**GigabitEthernet** | **TenGigE**} *interface-path-id* [**location** *node-id*]

Syntax Description

{**GigabitEthernet** | **TenGigE**}	Type of Ethernet interface whose MAC accounting statistics you want to clear. Enter **GigabitEthernet**, **TenGigE**.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
location *node-id*	(Optional) Clears MAC accounting statistics for the designated node. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 4.1.1	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

Task ID

Task ID	Operations
interface	read, write
basic-services	read, write

Examples

This example shows how to clear all MAC accounting statistics for the TenGigE port at 1/0/0/1:

```
RP/0/RP0RSP0/CPU0:router# clear mac-accounting TenGigE 0/1/5/0 location 1/0/0/1
```

Related Commands

Command	Description
mac-accounting, on page 103	Generates accounting information for IP traffic based on the source and destination MAC addresses on LAN interfaces.
show mac-accounting (Ethernet), on page 196	Displays MAC accounting statistics for an interface.

crc-ber auto-recover

To enable Cyclic Redundancy Check (CRC) Bit Error Rate (BER) auto recover, use the **crc-ber auto-recover** command in wanphy configuration mode.

crc-ber auto-recover

Syntax Description

This command has no keywords or arguments.

Command Default

Cyclic Redundancy Check (CRC) Bit Error Rate (BER) auto recover is disabled by default.

Command Modes

Wanphy configuration

Command History

Release	Modification
Release 7.4.2	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 enable Cyclic Redundancy Check (CRC) Bit Error Rate (BER) reporting.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/1/0/3
RP/0/RP0RSP0/CPU0:router(config-wanphy)# crc-ber auto-recover
RP/0/RP0RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sf-ber disable, on page 704	Disables SF BER reporting.
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.
threshold sf-ber, on page 712	Configures the threshold of the SF BER that is used to trigger a link state change.
report crc-ber	

flow-control

To enable the sending of flow-control pause frames, use the **flow-control** command in interface configuration mode. To disable flow control, use the **no** form of this command.

flow-control {**bidirectional** | **egress** | **ingress**}

Syntax Description

bidirectional	Enables flow-control for egress and ingress direction.
egress	Pauses egress traffic if IEEE 802.3x PAUSE frames are received.
ingress	Sends IEEE 802.3x PAUSE frames in case of congestion with ingress traffic.

Command Default

If auto-negotiate is enabled on the interface, then the default is negotiated.

If auto-negotiate is disabled on the interface, then the sending of flow-control pause frames is disabled for both egress and ingress traffic.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 3.7.2	This command was first introduced.
Release 4.2.3	This command was supported on 1 Gigabit Ethernet optical and copper SFPs.
Release 5.0.0	This command was introduced.

Usage Guidelines

Note When you explicitly enable the sending of flow-control pause frames, the value you configured with the **flow-control** command overrides any auto-negotiated value. This prevents a link from coming up if the value you set with the **flow-control** command conflicts with the allowable settings on the other end of the connection.

Note The **flow-control** command is supported on Gigabit Ethernet, TenGigE interfaces only; the **flow-control** command is not supported on Management Ethernet Interfaces.

Note The **flow-control** command syntax options may vary, depending on the type of PLIM or SPA that is installed in your router.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable the sending of flow-control pause frames for ingress traffic on the TenGigE interface 0/3/0/0:

```
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# flow-control ingress
```

Related Commands

Command	Description
show interfaces, on page 489	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.

interface (Ethernet)

To specify or create an Ethernet interface and enter interface configuration mode, use the **interface (Ethernet)** command in Global Configuration modeXR Config mode. Use the **no** form of the command to remove the configuration.

interface {**GigabitEthernet** | **TenGigE**} *interface-path-id*
interface {**GigabitEthernet** | **HundredGigE** | **TenGigE**} *interface-path-id*
interface {**GigabitEthernet** | **HundredGigE** | **TenGigE**} *interface-path-id*

Syntax Description

GigabitEthernet	Specifies or creates a Gigabit Ethernet (1000 Mbps) interface.
HundredGigE	Specifies or creates a Hundred Gigabit Ethernet (100 Gbps) interface.
TenGigE	Specifies or creates a Ten Gigabit Ethernet (10 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 Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.2	This command was modified. The **TenGigE** keyword was added.
Release 4.0.1	This command was modified. The **HundredGigE** keyword was added.
Release 3.7.2	This command was introduced.
Release 5.0.0	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. A physical layer interface module (PLIM) is always 0.

- *port*: Physical port number of the interface.

Note Ten GigE interfaces will not show egress statistics when loopback line is configured because the loopback is closed at the interface controller level, before the Network Processor (NP). But on One GigE interfaces the line loopback is closed in the NP.

Task ID

Task ID	Operation
interface	read, write

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

```
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/4/0/0
RP/0/RP0RSP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
interface (Ethernet), on page 92	Specifies or creates an Ethernet interface and enters interface configuration mode.

lldp

To enable the Link Layer Discovery Protocol (LLDP) globally for both transmit and receive operation on the system, use the **lldp** command in Global Configuration modeXR 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

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	This command was introduced.
Release 5.3.1	The **lldp subinterfaces enable** 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/RP0RSP0/CPU0:router(config)# lldp
```

This example shows how to enable LLDP on subinterfaces:

```
RP/0/RP0RSP0/CPU0:router(config)# lldp subinterfaces enable
```

Related Commands

Command	Description
show lldp, on page 184	Displays the global LLDP operational characteristics on the system.

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 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	This command was introduced.

Usage Guidelines

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/RP0RSP0/CPU0:router(config)# interface GigabitEthernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# lldp
RP/0/RP0RSP0/CPU0:router(config-lldp)#
```

Related Commands

Command	Description
interface (Ethernet), on page 92	Specifies or creates an Ethernet interface and enters interface configuration mode.
lldp, on page 94	Enables LLDP globally for both transmit and receive operation on the system.

lldp enable (per-interface)

When LLDP is enabled globally, all interfaces that support LLDP are automatically enabled for both transmit and receive operations. However, if you want to enable LLDP per interface, use `lldp enable` command in interface configuration mode.

lldp enable

Command Default

None

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 6.5.1	This command was introduced.

Task ID

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

To enable LLDP per interface:

```
RP/0/RSP0/CPU0:ios(config)# int gigabitEthernet 0/2/0/0
RP/0/RSP0/CPU0:ios(config-if)# no sh
RP/0/RSP0/CPU0:ios(config-if)#commit
RP/0/RSP0/CPU0:ios(config-if)#lldp ?
RP/0/RSP0/CPU0:ios(config-if)#lldp enable
RP/0/RSP0/CPU0:ios(config-if)#commit
```

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 Global Configuration modeXR 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

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	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/RP0RSP0/CPU0:router(config)# lldp holdtime 60
```

Related Commands

Command	Description
lldp, on page 94	Enables LLDP globally for both transmit and receive operation on the system.
show lldp, on page 184	Displays the global LLDP operational characteristics on the system.

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 Global Configuration modeXR 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

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	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/RP0RSP0/CPU0:router(config)# lldp reinit 4
```

Related Commands

Command	Description
lldp, on page 94	Enables LLDP globally for both transmit and receive operation on the system.
show lldp, on page 184	Displays the global LLDP operational characteristics on the system.

lldp timer

To specify the Link Layer Discovery Protocol (LLDP) packet rate, use the **lldp timer** command in Global Configuration modeXR 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

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	This command was introduced.

Usage Guidelines

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/RP0RSP0/CPU0:router(config)# lldp timer 60
```

Related Commands

Command	Description
lldp, on page 94	Enables LLDP globally for both transmit and receive operation on the system.
show lldp, on page 184	Displays the global LLDP operational characteristics 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 Global Configuration modeXR 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

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	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/RP0RSP0/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 3.0	This command was introduced.
Release 3.7.2	This command was first introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **loopback** command is available for all Ethernet interface types (Gigabit Ethernet, 10-Gigabit Ethernet).

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/RP0RSP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# loopback internal
```

mac-accounting

To generate accounting information for IP traffic based on the source and destination Media Access Control (MAC) addresses on LAN interfaces, use the **mac-accounting** command in interface configuration mode. To disable MAC accounting, use the **no** form of this command.

mac-accounting {**egress** | **ingress**}

Syntax Description

egress	Generates accounting information for IP traffic based on the destination MAC addresses (egress direction).
ingress	Generates accounting information for IP traffic based on the source MAC addresses (ingress direction).

Command Default

MAC accounting is disabled

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.0	This command was first introduced.
Release 4.1.1	This command was introduced.
Release 5.0.0	This command was introduced.
Release 4.3.2	The mac-accounting egress command was supported on Bundle Ethernet interfaces.

Usage Guidelines

The **mac-accounting** command calculates the total packet and byte counts for a LAN interface that receives or sends IPv4 packets to or from a unique MAC address.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable MAC accounting for the source MAC address on the ingress direction:

```
RP/0/RP0RSP0/CPU0:routerconfigure
RP/0/RP0RSP0/CPU0:routerinterface bundle-ether <bundle-id>
RP/0/RP0RSP0/CPU0:router(config-if)# mac-accounting ingress
```

This example shows how to enable MAC accounting for the source MAC address on the egress direction:

```
RP/0/RP0RSP0/CPU0:routerconfigure
RP/0/RP0RSP0/CPU0:routerinterface bundle-ether <bundle-id>
RP/0/RP0RSP0/CPU0:router(config-if)# mac-accounting egress
```

Note In order to view the mac-accounting statistics for the configured bundle interface, use the **show mac-accounting bundle-ether <bundle id>** command.

Related Commands

Command	Description
clear mac-accounting (Ethernet), on page 87	Clears MAC accounting statistics for an interface.
show mac-accounting (Ethernet), on page 196	Displays MAC accounting statistics for an interface.

mac-address (Ethernet)

To set the MAC layer address of an Ethernet interface, use the **mac-address** command in interface configuration mode. To return the device to its default MAC address, use the **no** form of this command.

mac-address *value1.value2.value3*

Syntax Description

value1.	High 2 bytes of the MAC address in hexadecimal format. 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 2.0	This command was introduced.
Release 3.7.2	This command was first introduced.
Release 5.0.0	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).

The **mac-address** command is available for all types of line card Ethernet interfaces (Gigabit Ethernet, 10-Gigabit Ethernet) and for the Management Ethernet interface.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to set the MAC address of a Ten Gigabit Ethernet interface located at 0/3/0/0:

```
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# mac-address 0001.2468.ABCD
```

mtu (interface)

To configure maximum transmission unit (MTU) size on an Ethernet interface, use the **mtu** command in interface configuration mode.

mtu *size in bytes*

Syntax Description

size in bytes	Specify the MTU size that you want to configure.

Command Default

None

Command Modes

Interface configuration

Command History

Release	Modification
Release 7.6.2	This command is a generic command.

Usage Guidelines

None

Example

This example shows how to configure the MTU size on an interface. *Bundle-Ether1* is the interface name.

```
Router(config)#interface Bundle-Ether1
Router(config-if)#mtu 9646
Router(config-if)#commit
```

negotiation auto

To enable link autonegotiation on Gigabit Ethernet interfaces, use the **negotiation auto** command in interface configuration mode. To disable link autonegotiation, use the **no** form of this command.

negotiation auto

Syntax Description

This command has no keywords or arguments.

Command Default

Link auto-negotiation is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.7.2	This command was first introduced.
Release 4.2.3	The **negotiation auto** command was supported on 1 Gigabit Ethernet interfaces.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **negotiation auto** command is available on Gigabit Ethernet interfaces only.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable link autonegotiation on an interface:

```
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/0/2/0
RP/0/RP0RSP0/CPU0:router(config-if)# negotiation auto
```

This example shows how to disable link autonegotiation on an interface:

```
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/0/2/0
RP/0/RP0RSP0/CPU0:router(config-if)# no negotiation auto
```

packet-gap non-standard

To change the packet interval for traffic on an interface for improved interoperability with Cisco Catalyst 6000 series switches, 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 3.0	This command was first introduced.
Release 3.7.2	This command was first introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

An interface that is connected to a Cisco Catalyst 6000 series switch may experience packet loss problems that can be resolved by changing the packet interval of traffic from standard (as defined by the IEEE 802.ae specification) to nonstandard using the **packet-gap non-standard** command.

Note The **packet-gap non-standard** command is available on 10-Gigabit Ethernet interfaces only.

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/RP0RSP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# packet-gap non-standard
```

report crc-ber

To enable Cyclic Redundancy Check (CRC) Bit Error Rate (BER) reporting, use the **report crc-ber** command in wanphy configuration mode.

report crc-ber

Syntax Description

This command has no keywords or arguments.

Command Default

Cyclic Redundancy Check (CRC) Bit Error Rate (BER) reporting is disabled by default.

Command Modes

Wanphy configuration

Command History

Release	Modification
Release 7.4.2	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 enable Cyclic Redundancy Check (CRC) Bit Error Rate (BER) reporting.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/1/0/3
RP/0/RP0RSP0/CPU0:router(config-wanphy)# report crc-ber
RP/0/RP0RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sf-ber disable, on page 704	Disables SF BER reporting.
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.
threshold sf-ber, on page 712	Configures the threshold of the SF BER that is used to trigger a link state change.
crc-ber auto-recover	

show controllers (Ethernet)

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

show controllers { **GigabitEthernet** | **GigabitEthCtrlr** | **HundredGigE** | **HundredGigECtrlr** | **TenGigE** | **TenGigECtrlr** | **FortyGigE** } *interface-path-id* [{ **all** | **bert** | **control** | **internal** | **mac** | **periodic** | **phy** | **pm** | **priority-flow-control** | **regs** | **stats** | **xgxs** }]
show controllers {**GigabitEthernet** | **GigabitEthCtrlr** | **HundredGigE** | **HundredGigECtrlr** | **TenGigE** | **TenGigECtrlr**} *interface-path-id* [{**all** | **bert** | **control** | **internal** | **mac** | **periodic** | **phy** | **pm** | **regs** | **stats** | **xgxs**}]

Syntax Description

{**GigabitEthernet** | **GigabitEthCtrlr** | **HundredGigE** | **HundredGigECtrlr** | **TenGigE** | **TenGigECtrlr**|**FortyGigE**} {**GigabitEthernet** | **GigabitEthCtrlr** | **HundredGigE** | **HundredGigECtrlr** | **TenGigE** | **TenGigECtrlr**}	Specifies the type of Ethernet interface or controller whose status and configuration information you want to display. Enter GigabitEthernet, GigabitEthernetCtrlr, HundredGigE, HundredGigeCtrlr, TenGigE, or TenGigeCtrlr.
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. **Note** Not supported on the Cisco CRS 14-Port or Cisco CRS 20-Port or 10-Gigabit or 1-Port 100-Gigabit Ethernet LAN/WAN-PHY Interface Module.
control	Displays configuration and control information.
internal	Displays internal information for the interface.
mac	Displays mac address information for the interface.
periodic	Displays performance monitoring data periodically.
phy	Displays physical information for the interface.
pm	Displays Ethernet performance monitoring.
priority-flow-control	Displays priority flow control information.

regs	Displays register information.
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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 3.5.0	This command was modified. The **GigabitEthernet** and **TenGigE** keywords were added.
Release 3.7.2	This command was first introduced.
Release 4.0.1	This command was modified. The **HundredGigE** keyword was added.
Release 6.0.x	This command was modified. The **GigabitCtrlr**, **TenGigECtrlr**, and **HundredGigECtrlr** keywords were added. keywords were added.
Release 6.0.x	This command was modified. The **GigabitCtrlr**, **TenGigECtrlr**, and **HundredGigECtrlr** keywords were added.
Release 5.0.0	This command was introduced.
Release 6.2.1	The command was updated to display receiving optical power threshold value configured, and the minimum and maximum threshold values, as part of Early Indication of Link Loss Change feature.
Release 7.1.3	This command was modified. The **FortyGE** keyword was added.

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 a virtual interface, the number range varies, depending on interface type.

For controllers, use the following keywords only.

- all
- periodic

- pm
- stats

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	

The port speed on QSFP-40/100G-SRBD dual-mode optic was changed from 100Gps to 40Gps. This example shows the QSFP-40/100G-SRBD dual-mode optic status on FortyGigE 0/0/0/21/0:

```
RP/0/RP0RSP0/CPU0:router#show controllers FortyGigE0/0/0/21/0 internal

Wed Nov 11 06:34:26.861 UTC

Internal data for interface: FortyGigE0/0/0/21/0
Subport Number : 0
Port Number : 21
Bay Number : 0
Ifinst : 6
Ifinst Subport : 21
Board Type : 0x003d1013
Port Type : 40GE
Bandwidth(Kbps) : 40000000
Transport mode : LAN
BIA MAC addr : badb.ad03.a84d
Oper. MAC addr : badb.ad03.a84d
Egress MAC addr : badb.ad03.a84d
Port Available : true
Status polling is : enabled
Status events are : enabled
I/F Handle : 0x04001300
Cfg Link Enabled : tx/rx enabled
H/W Tx Enable : yes
MTU : 1514
H/W Speed : 40 Gbps
H/W Loopback Type : None
FEC : Disable
H/W FlowCtrl Type : None
H/W AutoNeg Enable : Off
Rx OPD : Not Supported
H/W Link Defects : (0x0000000000000000) none
H/W Raw Link Defects : (0x0000000000000000) none
Link Up : yes
Link Led Status : Link up -- Green/Amber
Serdes fw version : 100.0
Pluggable Present : yes
Pluggable Type : 100/40G SRBD
Pluggable PID : QSFP-40/100-SRBD
Pluggable Compl. : Compliant
Pluggable Type Supp.: Supported
```

```
Pluggable PID Supp. : Supported
```

This example shows the receiving optical power alarm status on HuGigE0/1/2/3:

```
RP/0/RP0RSP0/CPU0:router#show controllers GigabitEthernet0/0/0/4
Operational data for interface HuGigE0/1/2/3:

State:
    Administrative state: Enabled
    Operational state: Up,
    LED state: Green On

Phy:
    Media type: 100GBASE-LR4, fiber over 4 Lane optics (long reach),
    Optics:
        Vendor: CISCO-AVAGO
        Part number: 10-2134-01 (ver.: V01)
        Serial number: IPUIALJRAA

    Digital Optical Monitoring:
        Transceiver Temp: 98.781 C
        Transceiver Voltage: 3.283 V

        Alarms key: (H) Alarm high, (h) Warning high
                    (L) Alarm low, (l) Warning low
           Wavelength    Tx Power          Rx Power      Laser Bias
        Lane  (nm)     (dBm)     (mW)      (dBm)      (mW)       (mA)
        --   -----    ------    ------    ------    ------     ------
        01    1270      -1.6    0.699h     -37.0   0.0002L     9.408
        02    1290      -1.6     0.493     -37.0   0.0003L     9.406
        03    1310      -1.6    0.501h     -37.0   0.0002L     9.407
        04    1330      -1.6     0.400     -37.0   0.0003L     9.399

        DOM alarms:
           Transceiver Temp: Alarm high
           Transmit Power: Warning high
           Receive Power: Alarm low

        Alarm                     Alarm    Warning   Warning    Alarm
        Thresholds                High      High       Low       Low
                                 -------   -------   -------   -------
        Transceiver Temp (C):     90.000    85.000    -5.000   -10.000
        Transceiver Voltage (V):   3.630     3.470     3.140     2.970
        Laser Bias (mA):          15.000    15.000     2.000     2.000
        Transmit Power (mW):       1.000     0.501     0.112     0.045
        Receive Power (mW):        1.995     1.000     0.020     0.008

    Alarms:
        Current:
            SD-BER
            SF-BER
        Previous:
            No alarms

    Statistics:
        Sync Header Error Count: <count>
        PCS BIP Error count: <count>
        FEC:
            Corrected Codeword Count: <count>
            Uncorrected Codeword Count: <count>

MAC address information:
```

```
    Operational address: 0003.6cff.0c00
    Burnt-in address: 0003.6cff.0c00
    1 unicast address(es) in filter:
        0012.3456.7890
    Operating in multicast promiscuous mode

Autonegotiation disabled

Priority Flow Control:
    Total Rx PFC Frames: 1030
    Total Tx PFC Frames: 4440
    CoS  Status  Rx Frames   Tx Frames
    ---  ------  ----------  ----------
      0  off             15         125
      1  on             115         115
      2  on             125        1225
      3  on             135         135
      4  off            145        1245
      5  off            155         155
      6  off            165        1265
      7  off            175         175

Operational values:
    Speed: 10 Gbps,
    Bandwidth utilization: 19.73%,
    Duplex: Full Duplex,
    Flowcontrol: None,
    Priority flow control: On,
    Loopback: None (or external),
    MTU: 1514 bytes,
    MRU: 1514 bytes,
    Inter-packet gap: standard (12),
    Forward error correction: Standard (Reed-Solomon)
```

Note A higher count of Bit Interleaved Parity (BIP) errors lead to Bit Error Rate (BER) errors. Ethernet interfaces must be continuously monitored in order to detect any link that is not working due to BER errors (bit error rate) and to bring down the interface connected to that link. BER informs you of the number of bit errors per unit time and helps you test cables and diagnose signal problems in the field. For more information on BER, see the *Interface and Hardware Component Configuration Guide for Cisco CRS RoutersInterface and Hardware Component Configuration Guide for Cisco ASR 9000 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 6000 Series Routers*.

This example shows the receiving optical power degrade threshold value configured on GigabitEther interface location 0/0/0/4:

```
RP/0/RP0RSP0/CPU0:router#show controllers GigabitEthernet0/0/0/4 control
Management information for interface GigabitEthernet0/0/0/4:

Port number: 4
Interface handle: 0x08000400

Config:
    Auto-negotiation: Off
    Carrier delay (up): None
    Carrier delay (down): None
    Duplex: Not configured
    Flow Control: None
    Priority Flow Control: None
    Forward Error Correction: Standard (Reed-Solomon)
```

```
    IPG: Standard (12)
    Loopback: None
    MTU: Not configured
    Speed: Not configured
    Soft BW: Not configured
    MAC Address: Not configured
    Rx Optical Power Degrade Threshold: -10db

Driver constraints:
    Min MTU: 64 bytes
    Max MTU: 9000 bytes
    Max speed: 1Gbps
    Interface type: Gigabit Ethernet
    Mgmt interface: No
    Allowed config mask: 0x26f

Cached driver state:
    MTU: 1514 bytes
    Burnt-in MAC Address: 0001.0203.0404

Not a member of a bundle interface.

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 up
    Port disabled
    Port tx disabled
    HW 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:
```

Examples

This example shows sample output from the **show controllers gigabitethernet** command:

```
RP/0/RP0RSP0/CPU0:router# show controllers GigabitEthernet 0/1/0/1
Statistics for interface GigabitEthernet0/1/0/0 (cached values):
Ingress:
    Input total bytes         = 64000
    Input good bytes        = 64000
    Input total packets         = 1000
    Input 802.1Q frames         = 0
    Input pause frames         = 0
    Input pkts 64 bytes         = 1000
    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        = 1000
```

```
    Input unicast pkts         = 0
    Input multicast pkts         = 1000
    Input broadcast pkts         = 0
    Input drop overrun         = 0
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers GigabitEthernet 0/0/0/1
Operational data for interface GigabitEthernet0/0/0/1:

State:
    Administrative state: enabled
    Operational state: Up
    LED state: Green On

Media:
    Media type: X fiber over short-wl laser PMD, full duplex
    Optics:
        Vendor: CISCO-FINISAR
        Part number: FTLF8519P2BNL-C6
        Serial number: FNS120304T9

MAC address information:
    Operational address: 001d.e5eb.88e1
    Burnt-in address: 001d.e5eb.88e1
    No unicast addresses in filter
    No multicast addresses in filter
Autonegotiation enabled:
    No restricted parameters

Operational values:
    Speed: 1Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    MTU: 1526
    MRU: 1526
    Inter-packet gap: standard (12)
```

The following example shows sample output from the **show controllers TenGigE** command for the Cisco 8-Port 10-Gigabit Ethernet physical layer interface module (PLIM):

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/3/0/0

PHY:
XENPAK device registers:
========================

Vendor Name: CISCO-SUMITOMO
Vendor PN: SXP3101NV-C1
Vendor Rev: A1
Vendor SN: ECL120701L2

Package OUI: 0041f426
Vendor OUI: 00137b11
Vendor Date Code: 2004071200
nvr_control_status = 0x0007
nvr_version = 0x1e
nvr_size0 = 0x01
nvr_size1 = 0x00
mem_used0 = 0x01
mem_used1 = 0x00
basic_addr = 0x0b
cust_addr = 0x77
```

```
vend_addr = 0xa7
ext_vend_addr0= 0x00
ext_vend_addr1= 0xff
reserved0 = 0x00
tcvr_type = 0x01
connector = 0x01
encoding = 0x01
bitrate0 = 0x27
bitrate1 = 0x10
protocol = 0x01
x_gbe_code_byte_0 = 0x02
x_gbe_code_byte_1 = 0x00
sonet_sdh_code_byte_0 = 0x00
sonet_sdh_code_byte_1 = 0x00
sonet_sdh_code_byte_2 = 0x00
sonet_sdh_code_byte_3 = 0x00
x_gfc_code_byte_0 = 0x00
x_gfc_code_byte_1 = 0x00
x_gfc_code_byte_2 = 0x00
x_gfc_code_byte_3 = 0x00
range0 = 0x03
range1 = 0xe8
fibre_type_byte_0 = 0x20
fibre_type_byte_1 = 0x00
Center Wavelength:
chan0 = 1310.00 nm

chan1 =  0.00 nm
chan2 =  0.00 nm
chan3 =  0.00 nm

basic_checksum = 0x00

Link Alarm Status Registers:
rx_alarm_control = 0x0019
tx_alarm_control = 0x0059
lasi_control = 0x0000
rx_alarm_status = 0x0018
tx_alarm_status = 0x0058
lasi_status = 0x0005

Digital Optical Monitoring:
Transceiver Temp: 34.246 C
Laser Bias Current:  4.8640 mA
Laser Output Power: 0.5059 mW, -3.0 dBm
Receive Optical Power: 0.0000 mW, -inf dBm

Quake: devid 0x0043a400
10GE PMA/PMD Registers:
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400 Speed Ability =
0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Control 2 = 0x0006 Status 2 = 0xb541 Tx
Disable = 0x0000 Rx Signal Detect = 0x0000 OUI 0 = 0x0041 OUI 1 = 0xf426

Quake (1.c001) = 0x0003

10GE PCS Registers:
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400 Speed Ability =
0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Control 2 = 0x0000 Status 2 = 0x8401 PKG ID 0

= 0x0000 PKG ID 1 = 0x0000 Base X Status = 0x0000 Base X Control = 0x0000 Base R Status 1
= 0x0004 Base R Status 2 = 0x0000 Base R jitter seed a0 = 0x0000 Base R jitter seed a1 =
0x0000 Base R jitter seed a2 = 0x0000 Base R jitter seed a3 = 0x0000 Base R jitter seed b0

= 0x0000 Base R jitter seed b1 = 0x0000 Base R jitter seed b2 = 0x0000 Base R jitter seed
```

```
b3 = 0x0000 Base R jitter test control = 0x0000 Base R jitter test counter = 0x0000
10GE XS/XS Registers:
Control = 0x2040 Status = 0x0002
Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Status 2 = 0x8000 PKG ID 0 =
0x0000 PKG ID 1 = 0x0000 Lane Status = 0x1c0f Test Control = 0x0000

DTE XGXS (BCM8011):
Control = 0x0000 Status = 0x801f
Dev ID 0 = 0x0040 Dev ID 1 = 0x6092
Control 2 = 0x202f
Status 2 = 0x8b01

Speed Ability = 0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Status 2 = 0x8000 PKG ID 0 =
0x0000 PKG ID 1 = 0x0000 Lane Status = 0x1c0f Test Control = 0x0000

DTE XGXS (BCM8011):
Control = 0x0000 Status = 0x801f
Dev ID 0 = 0x0040 Dev ID 1 = 0x6092
Control 2 = 0x202f
Status 2 = 0x8b01

MAC (PLA):
Unicast MAC Address entries = 0
MAC (PLA) device is enabled
MAC (PLA) device is in promiscuous mode
MAC (PLA) device loopback is disabled

MAC (PLA) device MTU = 8226

8x10GE PLIM Registers:
local_regs_id = 0xa6602000 local_regs_inter_stat = 0x00000000 local_regs_inter_stat_alias
= 0x00000000 local_regs_inter_enbl_woset = 0x0000ff00 local_regs_inter_enbl_woclr =
0x0000ff00 local_regs_chip_reset = 0x00000000 local_regs_reset = 0xff000000
local_regs_misc_io = 0x00010000 sn_link_framed = 0x00000001 sn_link_crc_errors =
0x00000000 sn_link_force_reframe = 0x00000000 sn_link_error_reframe = 0x00000001
sn_link_force_error = 0x00000000 sn_link_error_cause = 0x00000000
sn_link_error_interrupt_mask = 0x00000003 channel0_control = 0x000000a6 channel1_control =

0x000000a6 channel2_control = 0x0000008e channel3_control = 0x0000008e channel4_control =
0x0000008e channel5_control = 0x000000a6 channel6_control = 0x000000a6 channel7_control =
0x0000008e
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/3/0/0
PHY:
XENPAK device registers:
========================

Vendor Name: CISCO-SUMITOMO
Vendor PN: SXP3101NV-C1
Vendor Rev: A1
Vendor SN: ECL120701L2

Package OUI: 0041f426
Vendor OUI: 00137b11
Vendor Date Code: 2004071200
nvr_control_status = 0x0007
nvr_version = 0x1e
nvr_size0 = 0x01
nvr_size1 = 0x00
mem_used0 = 0x01
mem_used1 = 0x00
basic_addr = 0x0b
```

```
cust_addr = 0x77
vend_addr = 0xa7
ext_vend_addr0= 0x00
ext_vend_addr1= 0xff
reserved0 = 0x00
tcvr_type = 0x01
connector = 0x01
encoding = 0x01
bitrate0 = 0x27
bitrate1 = 0x10
protocol = 0x01
x_gbe_code_byte_0 = 0x02
x_gbe_code_byte_1 = 0x00
sonet_sdh_code_byte_0 = 0x00
sonet_sdh_code_byte_1 = 0x00
sonet_sdh_code_byte_2 = 0x00
sonet_sdh_code_byte_3 = 0x00
x_gfc_code_byte_0 = 0x00
x_gfc_code_byte_1 = 0x00
x_gfc_code_byte_2 = 0x00
x_gfc_code_byte_3 = 0x00
range0 = 0x03
range1 = 0xe8
fibre_type_byte_0 = 0x20
fibre_type_byte_1 = 0x00

Center Wavelength:
chan0 = 1310.00 nm

chan1 =  0.00 nm
chan2 =  0.00 nm
chan3 =  0.00 nm

basic_checksum = 0x00

Link Alarm Status Registers:
rx_alarm_control = 0x0019
tx_alarm_control = 0x0059
lasi_control = 0x0000
rx_alarm_status = 0x0018
tx_alarm_status = 0x0058
lasi_status = 0x0005

Digital Optical Monitoring:
Transceiver Temp: 34.246 C
Laser Bias Current:  4.8640 mA
Laser Output Power: 0.5059 mW, -3.0 dBm
Receive Optical Power: 0.0000 mW, -inf dBm

Quake: devid 0x0043a400
10GE PMA/PMD Registers:
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400 Speed Ability =
0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Control 2 = 0x0006 Status 2 = 0xb541 Tx
Disable = 0x0000 Rx Signal Detect = 0x0000 OUI 0 = 0x0041 OUI 1 = 0xf426
Quake (1.c001) = 0x0003

10GE PCS Registers:
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400 Speed Ability =
0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Control 2 = 0x0000 Status 2 = 0x8401 PKG ID 0

= 0x0000 PKG ID 1 = 0x0000 Base X Status = 0x0000 Base X Control = 0x0000 Base R Status 1
= 0x0004 Base R Status 2 = 0x0000 Base R jitter seed a0 = 0x0000 Base R jitter seed a1 =
0x0000 Base R jitter seed a2 = 0x0000 Base R jitter seed a3 = 0x0000 Base R jitter seed b0
```

```
= 0x0000 Base R jitter seed b1 = 0x0000 Base R jitter seed b2 = 0x0000 Base R jitter seed
b3 = 0x0000 Base R jitter test control = 0x0000 Base R jitter test counter = 0x0000

10GE XS/XS Registers:
Control = 0x2040 Status = 0x0002
Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Status 2 = 0x8000 PKG ID 0 =
0x0000 PKG ID 1 = 0x0000 Lane Status = 0x1c0f Test Control = 0x0000

DTE XGXS (BCM8011):
Control = 0x0000 Status = 0x801f
Dev ID 0 = 0x0040 Dev ID 1 = 0x6092
Control 2 = 0x202f
Status 2 = 0x8b01

Speed Ability = 0x0001 Devices 1 = 0x001a Devices 2 = 0x0000 Status 2 = 0x8000 PKG ID 0 =
0x0000 PKG ID 1 = 0x0000 Lane Status = 0x1c0f Test Control = 0x0000

DTE XGXS (BCM8011):
Control = 0x0000 Status = 0x801f
Dev ID 0 = 0x0040 Dev ID 1 = 0x6092
Control 2 = 0x202f
Status 2 = 0x8b01

MAC (PLA):
Unicast MAC Address entries = 0

MAC (PLA) device is enabled
MAC (PLA) device is in promiscuous mode
MAC (PLA) device loopback is disabled

MAC (PLA) device MTU = 8226

8x10GE PLIM Registers:
local_regs_id = 0xa6602000 local_regs_inter_stat = 0x00000000 local_regs_inter_stat_alias
= 0x00000000 local_regs_inter_enbl_woset = 0x0000ff00 local_regs_inter_enbl_woclr =
0x0000ff00 local_regs_chip_reset = 0x00000000 local_regs_reset = 0xff000000
local_regs_misc_io = 0x00010000 sn_link_framed = 0x00000001 sn_link_crc_errors =
0x00000000 sn_link_force_reframe = 0x00000000 sn_link_error_reframe = 0x00000001
sn_link_force_error = 0x00000000 sn_link_error_cause = 0x00000000
sn_link_error_interrupt_mask = 0x00000003 channel0_control = 0x000000a6 channel1_control =

0x000000a6 channel2_control = 0x0000008e channel3_control = 0x0000008e channel4_control =
0x0000008e channel5_control = 0x000000a6 channel6_control = 0x000000a6 channel7_control =
0x0000008e
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/7/0/0
Tue Mar 22 15:32:35.491 UTC
Operational data for interface TenGigE0/7/0/0:

State:
    Administrative state: enabled
    Operational state: Up
    LED state: Green On

Phy:
    Media type: R fiber over 1310nm optics
    Optics:
        Vendor: CISCO-SUMITOMO
        Part number: SFCT-7081Z-CS2
        Serial number: AGA1447N4JE

MAC address information:
```

```
    Operational address: 0021.a03a.4744
    Burnt-in address: 0021.a03a.4744
    No unicast addresses in filter
    Operating in multicast promiscuous mode

Autonegotiation disabled.

Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    MTU: 1522
    MRU: 1522
    Inter-packet gap: standard (12)
```

The following example shows sample output from the base form of the **show controllers TenGigE** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0
Thu Oct  7 16:18:32.348 EST
Operational data for interface TenGigE0/1/0/0:

State:
    Administrative state: disabled
    Operational state: Down (Reason: Link loss or low light, no loopback)
    LED state: Yellow On

Phy:
    Media type: R fiber over 1310nm optics
    Optics:
        Vendor: CISCO-SUMITOMO
        Part number: SXP3101NV-C1
        Serial number: ECL120701L2

MAC address information:
    Operational address: 0014.f294.6776
    Burnt-in address: 0014.f294.6776
    No unicast addresses in filter
    Operating in multicast promiscuous mode

Autonegotiation disabled.

Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    MTU: 1522
    MRU: 1522
    Inter-packet gap: standard (12)
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/6/0/2 all
Operational data for interface TenGigE0/6/0/2:

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 TenGigE0/6/0/2:
BERT State                      :       DISABLED
Test Pattern                    :       None test pattern
Time Remaining                  :       0
Time Interval                   :       0
Statistics for interface TenGigE0/6/0/2 (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 TenGigE0/6/0/2:

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:


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



MAC Registers for port: 2
 CONFIG1          (#1034): 0510081a
 CONFIG2          (#1035): 040c05f6
 CONTROL          (#1036): 00000000
 ADDRESS_LOW      (#1037): 353b975e
 ADDRESS_HIGH     (#1038): 0000001d
 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): 00000002
```

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/4/0/0 all

Operational data for interface TenGigE0/4/0/0:

State:
    Administrative state: enabled
    Operational state: Up
    LED state: Green On

Media:
    Media type: R fiber over 1310nm optics
    Optics:
        Vendor: CISCO-OPNEXT
```

```
        Part number: TRF5012AN-LA000
        Serial number: ONT1207108S

MAC address information:
    Operational address: 001b.53ff.a780
    Burnt-in address: 001b.53ff.a780
    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: 9112
    MRU: 9112
    Inter-packet gap: standard (12)

BERT status for TenGigE0/4/0/0:

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

Ingress:
    Input total bytes           = 9617267341
    Input good bytes            = 9617267341

    Input total packets         = 106745913
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 103938714
    Input pkts 65-127 bytes     = 2494947
    Input pkts 128-255 bytes    = 3411
    Input pkts 256-511 bytes    = 3407
    Input pkts 512-1023 bytes   = 2
    Input pkts 1024-1518 bytes  = 0
    Input pkts 1519-Max bytes   = 305432

    Input good pkts             = 106745913
    Input unicast pkts          = 105659161
    Input multicast pkts        = 1086750
    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             = 305432
    Input MIB jabber            = 0
```

```
    Input MIB CRC               = 0

Egress:
    Output total bytes          = 15207323765
    Output good bytes           = 15207323765

    Output total packets        = 107567467
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 103894198
    Output pkts 65-127 bytes    = 2448807
    Output pkts 128-255 bytes   = 308809
    Output pkts 256-511 bytes   = 6
    Output pkts 512-1023 bytes  = 13
    Output pkts 1024-1518 bytes = 0
    Output pkts 1519-Max bytes  = 915634

    Output good pkts            = 107567467
    Output unicast pkts         = 105353061
    Output multicast pkts       = 1298771
    Output broadcast pkts       = 1

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

    Output error other          = 0

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

Port number: 0
Bay number: 0
Interface handle: 0xc000040

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: 9100 bytes
    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: 9108 bytes
    Burnt-in MAC address: 001b.53ff.a780

Bundle settings:
    Aggregated: No
    Bundle MTU: 1514 bytes
    Bundle MAC address: 001b.53ff.a780
```

```
Port FSM state:
    Port is enabled, link is up
Complete FSM state:
    Admin up
    Bundle admin up
    Client admin up
    Client admin tx not disabled
    Port enabled
    Port tx enabled
    Hardware link up
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(03) Version      : 0003
Structure Version   : 2582
XAUI Interface      : B
MAC addr            : 00.1b.53.ff.a7.80
 RX enabled         : True
 TX enabled         : True
 Obey Pause Frames  : False
 TX Pause Frames    : False
 Pause Re-TX Period : 3000000
 Min Frame Len      : 60
 Max Frame Len      : 9112
 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       : 0
Port Type         : 10GE
Transport mode    : LAN
BIA MAC addr      : 001b.53ff.a780
Oper. MAC addr    : 001b.53ff.a780
Port Available    : true
Status polling is : enabled
Status events are : enabled
I/F Handle        : 0x0c000040
Cfg Link Enabled  : tx/rx enabled
```

```
H/W Tx Enable     : yes
MTU               : 9112
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  : (0x0000) None
Link Up           : yes
Link Led Status   : Link up
Symbol errors     : 255
Serdes version    : 14.42
Input good underflow          : 0
Input ucast underflow         : 0
Output ucast underflow        : 0
Input unknown opcode underflow: 0
Pluggable Present   : yes
Pluggable Type      : 10GBASE-LR
Pluggable Compl.    : Compliant
Pluggable Type Supp.:  Supported
Pluggable PID Supp. :  Supported
Pluggable Scan Flg: false



XFP EEPROM  port: 0
        Xcvr Type: XFP
        Ext Type: 2.5 W, CDR Supported, No Tx Ref Clk input req., CLEI present,
        Connector Type: LC
        Ethernet Xcvr Codes: 10GBASE-LR, 10GE-FC-1200-SM-LL-L,
        SONET Xcvr Codes: SDH_I_64.1
        Encodeing: 64B/66B, SONET Scrambled, NRZ,
        Bit Rate Min.: 9900 Mbit/s
        Bit Rate Max.: 11100 Mbit/s
        Link Reach 9u SM fiber: 10 Km
        Device Tech.: 1310 nm DFB, No wavelength ctrl, Uncooled Xmtr, PIN detec
        Vendor Name CISCO-OPNEXT
        CDR Support: 9.95 Gb/s, 10.3 Gb/s, 10.5 Gb/s,
        Vendor OUI: 00.0b.40
        Vendor Part Number TRF5012AN-LA000   (rev.: 01)
        Wavelength: 1310 nm
        Wavelength Tolerance: 20 nm
        Vendor Serial Number: ONT1207108S
        Date Code  (yy/mm/dd): 08/02/16  lot code:
        Diagnostic Monitoring: FEC BER not supported, average Rx power measured
        Enhanced Options: Soft TX disable,
        Extended Id: XFP (0x00 )
 MSA Data (Table 01)
0x0080: 06 58 07 40 40 00 00 40 : 00 00 00 b0 63 6f 0a 00
0x0090: 00 00 00 40 43 49 53 43 : 4f 2d 4f 50 4e 45 58 54
0x00a0: 20 20 20 20 e0 00 0b 40 : 54 52 46 35 30 31 32 41
0x00b0: 4e 2d 4c 41 30 30 30 20 : 30 31 66 58 0f a0 46 d9
0x00c0: 7d 96 06 00 4f 4e 54 31 : 32 30 37 31 30 38 53 20
0x00d0: 20 20 20 20 30 38 30 32 : 31 36 20 20 08 40 70 89

        CLEI Code: WMOTBEVAAB
        Part Number 10-1989-02  (ver.: V02 )
        Temp/Alarm/Power Flags: COM, commercial -5C to 70C
        Product ID: XFP-10GLR-OC192SR
 Cisco Specific Data (Table 02)
0x0100: 57 4d 4f 54 42 45 56 41 : 41 42 31 30 2d 31 39 38
0x0110: 39 2d 30 32 56 30 32 20 : 01 00 00 00 00 00 00 00
0x0120: 00 b9 00 00 00 00 00 00 : 00 00 58 af 60 61 70 8f
```

```
0x0130: 92 d5 00 00 1e 00 5a e0 : 11 ee 00 85 00 00 aa aa
0x0140: 58 46 50 2d 31 30 47 4c : 52 2d 4f 43 31 39 32 53
0x0150: 52 20 20 20 00 00 00 00 : 00 00 00 00 00 00 00 c1
0x0160: 32 35 35 34 36 36 35 30 : 00 a1 00 00 00 00 00 00
0x0170: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00

        Signal Condition Control: Normal Async REFCLK,
        Thresholds:                    Alarm High         Warning High         w
              Temperature:               90.000               85.000          0
                  Voltage:           0.000 Volt           0.000 Volt          t
                     Bias:        130.000 mAmps        120.000 mAmps          s
           Transmit Power:  1.585 mW (2.00 dBm)   1.000 mW (0.00 dBm)   0.200 m)
            Receive Power:  1.259 mW (1.00 dBm)   1.122 mW (0.50 dBm)   0.029 m)
        Temperature: 32.000
        Voltage: 0.000 Volt
        Tx Bias: 47.122 mAmps
        Tx Power:  0.459 mW (-3.38 dBm)
        Rx Power:  0.141 mW (-8.50 dBm)
        Control Status:
 Digital Diagnostics Data (Lower Memory)
0x0000: 06 00 5a 00 f6 00 55 00 : fb 00 00 00 00 00 00 00
0x0010: 00 00 fd e8 13 88 ea 60 : 17 70 3d e8 04 ea 27 10
0x0020: 07 cb 31 2d 00 b5 2b d4 : 01 20 89 ee 77 e2 87 5a
0x0030: 7a 75 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0040: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0050: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0060: 20 00 00 00 5c 09 11 ee : 05 86 80 29 00 00 04 00
0x0070: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 02


Serdes Registers and info port: 0
  EDC Status    : 000000070 - EDC tracking
  Rx detected   : Yes
  Block lock    : Yes
  Tx aligned    : Yes


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 TenGigE all** form of the command:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/7/0/0 all
ue Mar 22 15:32:45.685 UTC
Operational data for interface TenGigE0/7/0/0:

State:
```

```
    Administrative state: enabled
    Operational state: Up
    LED state: Green On

Phy:
    Media type: R fiber over 1310nm optics
    Optics:
        Vendor: CISCO-SUMITOMO
        Part number: SXP3101NV-C1
        Serial number: ECL120701L2

MAC address information:
    Operational address: 0021.a03a.4744
    Burnt-in address: 0021.a03a.4744
    No unicast addresses in filter
    Operating in multicast promiscuous mode

Autonegotiation disabled.

Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    MTU: 1522
    MRU: 1522
    Inter-packet gap: standard (12)

Statistics for interface TenGigE0/7/0/0 (cached values):

Ingress:
    Input total bytes           = 60
    Input good bytes            = 60

    Input total packets         = 1
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 1
    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             = 1
    Input unicast pkts          = 0
    Input multicast pkts        = 0
    Input broadcast pkts        = 1

    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 TenGigE0/7/0/0:

Port number: 0
Bay number: 0
Interface handle: 0x1780200

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
    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: 9600 bytes
    Max speed: 10Gbps
    Interface type: TenGigE
    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
    Allowed config mask: 0x27b

Cached driver state:
    MTU: 1522 bytes
    Burnt-in MAC address: 0021.a03a.4744

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

Bundle settings:
    Aggregated: No
    Bundle MTU: 1514 bytes
    Bundle MAC address: 0021.a03a.4744

Port FSM state:
    Port is enabled, link is up
Complete FSM state:
    Admin up
    Bundle admin up
    Client admin up
    Client admin tx not disabled
    Port enabled
    Port tx enabled
    Hardware link up
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:


Operational address: 0021.a03a.4744
Burnt-in address: 0021.a03a.4744

PLA 0 port 0  MAC enabled  Rx MAC enabled
Administrative state: Up
Operational state: Up

0 HSRP/VRRP MAC addresses

VLAN Ethertype: 0x8100
QinQ Ethertype: 0x88a8
MTP  Ethertype: 0x88e7

4 VLAN UIDB entries
VLAN1   VLAN2      Packet Type Flags      UIDB Result Flags
   0        0          VLAN                  1 VLAN
   0        0               ARPA             1 ARPA
   0        0                    SAP         1 SAP
   0        0                                1 SNAP


Total Power Available on PLIM for XFP's: 35000 mW
```

```
  Power used by Inserted XFP's: 1500 mW
  Power Available: 33500 mW

     Port        Power Used       State
      00          1500 mW         XFP Inserted and Powered On
      01          0000 mW         No XFP Inserted
      02          0000 mW         No XFP Inserted
      03          0000 mW         No XFP Inserted
      04          0000 mW         No XFP Inserted
      05          0000 mW         No XFP Inserted
      06          0000 mW         No XFP Inserted
      07          0000 mW         No XFP Inserted
      08          0000 mW         No XFP Inserted
      09          0000 mW         No XFP Inserted
      10          0000 mW         No XFP Inserted
      11          0000 mW         No XFP Inserted
      12          0000 mW         No XFP Inserted
      13          0000 mW         No XFP Inserted

802.3ae Sections
================

PMA/PMD
  Previous Alarm Status:
    PMA/PMD NOT Locked to Local Signal
  Current Alarm Status:
    PMA/PMD Locked to Local Signal
    SR Ability
    Loopback Ability

PCS
  Previous Alarm Status:
    PCS Rx Link DOWN
    PCS Rx NOT Block Locked
    PCS Rx Link Status DOWN
    PCS Error'd Block Counts: 0
    PCS BER Counts: 0
    PCS has NO Block Lock
  Current Alarm Status:
    PCS Rx Link UP
    PCS Rx Block Locked
    PCS Rx Link Status UP
    PCS Error'd Block Counts: 0
    PCS BER Counts: 0
    PCS has Block Lock

WIS: HW In LAN Mode - No Info


XFP General Info:
=================

PHY/XFP Status:  XFP is Working as expected


XFP Info:
=========
Max Power Dissipation: 1500 mW

XFP Type: 10GBASE-LR
Vendor Name: CISCO-SUMITOMO
Vendor Part Number: SFCT-7081Z-CS2
Vendor OUI: 0x00-0x17-0x6a
Vendor Hardware Revision: 01
```

```
Vendor Serial number: AGA1447N4JE
Date Code (yy/mm/dd): 10/11/27
Lot Code: 01

Cisco PID: XFP10GLR-192SR-L
Cisco VID: V01
Cisco PN: 10-2542-01

ID: XFP
Extended ID: 0x18
  TX ref clock input is not required
  CDP is supported
  Power Level 1 (1.5W max. power)
Minimum bit rate is 9900 MBits/s.
Maximum bit rate is 11100 MBits/s.


XFP Detail Info:
================

Temp: 30.119
Tx bias: 35.178 mA
Tx power: 0.5141 mW ( -2.9 dBm)
Rx power: 0.4612 mW ( -3.4 dBm)
AUX 1: Laser Temperature: 0x40
AUX 2: +3.3V Supply Voltage: 0x7

XFP Status: enabled.
 laser is enabled
 MOD NR is ready
 is powered on
 has interrupt(s)
 has no LOS
 data is ready
 TX path is ready
 TX laser is not in fault condition
 TX path CDR is locked
 RX path is ready
 RX path CDR is locked

Alarms:
  Low RX power alarm

Warnings:
  Low TX bias warning
  Low TX power warning
  Low RX power warning

THRESHOLDS
                        High Alarm     Low Alarm     High Warning      Low Warning
   Temperature     C       78.0          0.0            73.0             5.0
   Voltage         V     000.0000       000.0000       000.0000         000.0000
   Bias Current   mA     090.0000       005.0000       075.0000         015.0000
   Transmit power mW     022.3870       000.7580       011.2200         001.5130
   Receive power  mW     022.3870       000.1810       011.2200         000.3630
DTE XGXS
  Current Alarm Status:
    XGXS Lanes All Synchronized
    XGXS Lanes Aligned
PHY XGXS
  Previous Alarm Status:
    NO XGXS Local Fault
    TX Link Down
  Current Alarm Status:
```

```
    NO XGXS Local Fault
    TX Link UP

LASI 802.3ae Registers:
=======================
Previous: LASI Status = 0x0001 Rx Alarm Status = 0x0004 Tx Alarm Status = 0x0020
Current: LASI Status = 0x0000 Rx Alarm Status = 0x0000 Tx Alarm Status = 0x0000

PMA/PMD 802.3ae Registers:
==========================
Control = 0x2040 Status = 0x0006 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0007 Status 2 = 0xb181
Tx Disable = 0x0000 Rx Signal Detect = 0x0001
OUI 0 = 0x0000 OUI 1 = 0x0000
Current: Status = 0x0006 Status 2 = 0xb181

WIS 802.3ae Registers:
======================
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8003 Status 3 = 0x0008
Test Pattern Error Counter = 0x0000 Far End BLock Error Counter = 0x0000
J1 TX 1 = 0x0000 J1 TX 2 = 0x0000 J1 TX 3 = 0x0000 J1 TX 4 = 0x0000
J1 TX 5 = 0x0000 J1 TX 6 = 0x0000 J1 TX 7 = 0x0000 J1 TX 8 = 0x8900
J1 RX 1 = 0x0000 J1 RX 2 = 0x0000 J1 RX 3 = 0x0000 J1 RX 4 = 0x0000
J1 RX 5 = 0x0000 J1 RX 6 = 0x0000 J1 RX 7 = 0x0000 J1 RX 8 = 0x0000
Far End BIP Error 0 = 0x0000 Far End BIP Error 1 = 0x0000
Line BIP Error 0 = 0x0000 Line BIP Error 1 = 0x0000
Path BIP Error Count = 0x0000 Section BIP Error Count = 0x0000
J0 Tx 1 = 0x0000 J0 Tx 2 = 0x0000 J0 Tx 3 = 0x0000 J0 Tx 4 = 0x0000
J0 Tx 5 = 0x0000 J0 Tx 6 = 0x0000 J0 Tx 7 = 0x0000 J0 Tx 8 = 0x8900
J0 Rx 1 = 0x0000 J0 Rx 2 = 0x0000 J0 Rx 3 = 0x0000 J0 Rx 4 = 0x0000
J0 Rx 5 = 0x0000 J0 Rx 6 = 0x0000 J0 Rx 7 = 0x0000 J0 Rx 8 = 0x0000
Current: Status = 0x0082 Status 2 = 0x8003 Status 3 = 0x0008

PCS 802.3ae Registers:
======================
Control = 0x2040 Status = 0x0006 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8005
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base X Status = 0x0000 Base X Control = 0x0000
Base R Status 1 = 0x1005 Base R Status 2 = 0x8000
Base R jitter seed a0 = 0x0000 Base R jitter seed a1 = 0x0000
Base R jitter seed a2 = 0x0000 Base R jitter seed a3 = 0x0000
Base R jitter seed b0 = 0x0000 Base R jitter seed b1 = 0x0000
Base R jitter seed b2 = 0x0000 Base R jitter seed b3 = 0x0000
Base R jitter test control = 0x0000 Base R jitter test counter = 0x0000
Current: Status = 0x0006 Status 2 = 0x8005 Base R 1 = 0x1005 Base R 2 = 0x8000

PHY XS 802.3ae Registers:
=========================
Control = 0x2040 Status = 0x0006
Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Status 2 = 0x8000 PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Lane Status = 0x1c0f Test Control = 0x0000
Current: Status = 0x0006 Status 2 = 0x8000 Lane Status = 0x1c0f

XFP Register Info (MSA):
========================
(Reg 000 = 0x06)  (Reg 001 = 0x00)  (Reg 002 = 0x4e)  (Reg 003 = 0x00)
(Reg 004 = 0x00)  (Reg 005 = 0x00)  (Reg 006 = 0x49)  (Reg 007 = 0x00)
```

```
(Reg 008 = 0x05)  (Reg 009 = 0x00)  (Reg 010 = 0x00)  (Reg 011 = 0x00)
(Reg 012 = 0x00)  (Reg 013 = 0x00)  (Reg 014 = 0x00)  (Reg 015 = 0x00)
(Reg 016 = 0x00)  (Reg 017 = 0x00)  (Reg 018 = 0xaf)  (Reg 019 = 0xc8)
(Reg 020 = 0x09)  (Reg 021 = 0xc4)  (Reg 022 = 0x92)  (Reg 023 = 0x7c)
(Reg 024 = 0x1d)  (Reg 025 = 0x4c)  (Reg 026 = 0x57)  (Reg 027 = 0x73)
(Reg 028 = 0x02)  (Reg 029 = 0xf6)  (Reg 030 = 0x2b)  (Reg 031 = 0xd4)
(Reg 032 = 0x05)  (Reg 033 = 0xe9)  (Reg 034 = 0x57)  (Reg 035 = 0x73)
(Reg 036 = 0x00)  (Reg 037 = 0xb5)  (Reg 038 = 0x2b)  (Reg 039 = 0xd4)
(Reg 040 = 0x01)  (Reg 041 = 0x6b)  (Reg 042 = 0x5d)  (Reg 043 = 0x00)
(Reg 044 = 0x00)  (Reg 045 = 0x00)  (Reg 046 = 0x58)  (Reg 047 = 0x00)
(Reg 048 = 0x05)  (Reg 049 = 0x00)  (Reg 050 = 0x8d)  (Reg 051 = 0xcc)
(Reg 052 = 0x74)  (Reg 053 = 0x04)  (Reg 054 = 0x87)  (Reg 055 = 0x8c)
(Reg 056 = 0x7a)  (Reg 057 = 0x44)  (Reg 058 = 0x00)  (Reg 059 = 0x00)
(Reg 060 = 0x00)  (Reg 061 = 0x00)  (Reg 062 = 0x00)  (Reg 063 = 0x00)
(Reg 064 = 0x00)  (Reg 065 = 0x00)  (Reg 066 = 0x00)  (Reg 067 = 0x00)
(Reg 068 = 0x00)  (Reg 069 = 0x00)  (Reg 070 = 0x00)  (Reg 071 = 0x00)
(Reg 072 = 0x00)  (Reg 073 = 0x00)  (Reg 074 = 0x00)  (Reg 075 = 0x00)
(Reg 076 = 0x00)  (Reg 077 = 0x00)  (Reg 078 = 0x00)  (Reg 079 = 0x00)
(Reg 080 = 0x00)  (Reg 081 = 0x00)  (Reg 082 = 0x00)  (Reg 083 = 0x00)
(Reg 084 = 0x00)  (Reg 085 = 0x00)  (Reg 086 = 0x00)  (Reg 087 = 0x00)
(Reg 088 = 0x00)  (Reg 089 = 0x00)  (Reg 090 = 0x00)  (Reg 091 = 0x00)
(Reg 092 = 0x00)  (Reg 093 = 0x00)  (Reg 094 = 0x00)  (Reg 095 = 0x00)
(Reg 096 = 0x1e)  (Reg 097 = 0x77)  (Reg 098 = 0x00)  (Reg 099 = 0x00)
(Reg 100 = 0x44)  (Reg 101 = 0xb5)  (Reg 102 = 0x14)  (Reg 103 = 0x38)
(Reg 104 = 0x12)  (Reg 105 = 0x04)  (Reg 106 = 0x26)  (Reg 107 = 0xda)
(Reg 108 = 0x7e)  (Reg 109 = 0x32)  (Reg 110 = 0x04)  (Reg 111 = 0x00)
(Reg 112 = 0x00)  (Reg 113 = 0x00)  (Reg 114 = 0x00)  (Reg 115 = 0x00)
(Reg 116 = 0x00)  (Reg 117 = 0x00)  (Reg 118 = 0x00)  (Reg 119 = 0x00)
(Reg 120 = 0x00)  (Reg 121 = 0x00)  (Reg 122 = 0x00)  (Reg 123 = 0x00)
(Reg 124 = 0x00)  (Reg 125 = 0x00)  (Reg 126 = 0x00)  (Reg 127 = 0x01)

(Reg 128 = 0x06)  (Reg 129 = 0x18)  (Reg 130 = 0x07)  (Reg 131 = 0x40)
(Reg 132 = 0x00)  (Reg 133 = 0x00)  (Reg 134 = 0x00)  (Reg 135 = 0x40)
(Reg 136 = 0x00)  (Reg 137 = 0x00)  (Reg 138 = 0x00)  (Reg 139 = 0xb0)
(Reg 140 = 0x63)  (Reg 141 = 0x6f)  (Reg 142 = 0x0a)  (Reg 143 = 0x00)
(Reg 144 = 0x00)  (Reg 145 = 0x00)  (Reg 146 = 0x00)  (Reg 147 = 0x40)
(Reg 148 = 0x43)  (Reg 149 = 0x49)  (Reg 150 = 0x53)  (Reg 151 = 0x43)
(Reg 152 = 0x4f)  (Reg 153 = 0x2d)  (Reg 154 = 0x41)  (Reg 155 = 0x56)
(Reg 156 = 0x41)  (Reg 157 = 0x47)  (Reg 158 = 0x4f)  (Reg 159 = 0x20)
(Reg 160 = 0x20)  (Reg 161 = 0x20)  (Reg 162 = 0x20)  (Reg 163 = 0x20)
(Reg 164 = 0xf9)  (Reg 165 = 0x00)  (Reg 166 = 0x17)  (Reg 167 = 0x6a)
(Reg 168 = 0x53)  (Reg 169 = 0x46)  (Reg 170 = 0x43)  (Reg 171 = 0x54)
(Reg 172 = 0x2d)  (Reg 173 = 0x37)  (Reg 174 = 0x30)  (Reg 175 = 0x38)
(Reg 176 = 0x31)  (Reg 177 = 0x5a)  (Reg 178 = 0x2d)  (Reg 179 = 0x43)
(Reg 180 = 0x53)  (Reg 181 = 0x32)  (Reg 182 = 0x20)  (Reg 183 = 0x20)
(Reg 184 = 0x30)  (Reg 185 = 0x31)  (Reg 186 = 0x66)  (Reg 187 = 0x58)
(Reg 188 = 0x0f)  (Reg 189 = 0xa0)  (Reg 190 = 0x46)  (Reg 191 = 0x67)
(Reg 192 = 0x4b)  (Reg 193 = 0x1e)  (Reg 194 = 0x05)  (Reg 195 = 0x00)
(Reg 196 = 0x41)  (Reg 197 = 0x47)  (Reg 198 = 0x41)  (Reg 199 = 0x31)
(Reg 200 = 0x34)  (Reg 201 = 0x34)  (Reg 202 = 0x37)  (Reg 203 = 0x4e)
(Reg 204 = 0x34)  (Reg 205 = 0x4a)  (Reg 206 = 0x45)  (Reg 207 = 0x20)
(Reg 208 = 0x20)  (Reg 209 = 0x20)  (Reg 210 = 0x20)  (Reg 211 = 0x20)
(Reg 212 = 0x31)  (Reg 213 = 0x30)  (Reg 214 = 0x31)  (Reg 215 = 0x31)
(Reg 216 = 0x32)  (Reg 217 = 0x37)  (Reg 218 = 0x30)  (Reg 219 = 0x31)
(Reg 220 = 0x08)  (Reg 221 = 0x60)  (Reg 222 = 0x47)  (Reg 223 = 0xf4)
(Reg 224 = 0x00)  (Reg 225 = 0x00)  (Reg 226 = 0x06)  (Reg 227 = 0xef)
(Reg 228 = 0xfa)  (Reg 229 = 0xc9)  (Reg 230 = 0x9a)  (Reg 231 = 0x6c)
(Reg 232 = 0x5b)  (Reg 233 = 0x06)  (Reg 234 = 0x70)  (Reg 235 = 0xc5)
(Reg 236 = 0x2d)  (Reg 237 = 0xa5)  (Reg 238 = 0x7f)  (Reg 239 = 0xdf)
(Reg 240 = 0x9a)  (Reg 241 = 0x03)  (Reg 242 = 0xf6)  (Reg 243 = 0x00)
(Reg 244 = 0x00)  (Reg 245 = 0x00)  (Reg 246 = 0x00)  (Reg 247 = 0x00)
(Reg 248 = 0x00)  (Reg 249 = 0x00)  (Reg 250 = 0x00)  (Reg 251 = 0x00)
(Reg 252 = 0xf8)  (Reg 253 = 0x68)  (Reg 254 = 0x92)  (Reg 255 = 0xd1)
```

The following example shows sample output from the **show controllers TenGigE all** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0 all

Thu Oct  7 18:23:49.231 EST
Operational data for interface TenGigE0/1/0/0:

State:
    Administrative state: disabled
    Operational state: Down (Reason: Link loss or low light, no loopback)
    LED state: Yellow On

Phy:
    Media type: R fiber over 1310nm optics
    Optics:
        Vendor: CISCO-SUMITOMO
        Part number: SXP3101NV-C1
        Serial number: ECL120701L2

MAC address information:
    Operational address: 0014.f294.6776
    Burnt-in address: 0014.f294.6776
    No unicast addresses in filter
    Operating in multicast promiscuous mode

Autonegotiation disabled.

Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    MTU: 1522
    MRU: 1522
    Inter-packet gap: standard (12)

Statistics for interface TenGigE0/1/0/0 (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 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 TenGigE0/1/0/0:

Port number: 0
Bay number: 0
Interface handle: 0x1180200

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
    Bandwidth: Not configured --> This output field is changed
    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: 9600 bytes
    Max speed: 10Gbps
    Interface type: TenGigE
    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
    Allowed config mask: 0x27b

Cached driver state:
    MTU: 1522 bytes
    Burnt-in MAC address: 0014.f294.6776

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

Bundle settings:
    Aggregated: No
    Bundle MTU: 1514 bytes
    Bundle MAC address: 0014.f294.6776

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:


Operational address: 0014.f294.6776
Burnt-in address: 0014.f294.6776

PLA 0 port 0  MAC enabled  Rx MAC disabled
Administrative state: Forced Remote fault
Operational state: Remote fault

0 HSRP/VRRP MAC addresses

VLAN Ethertype: 0x8100
QinQ Ethertype: 0x88a8
MTP  Ethertype: 0x88e7

4 VLAN UIDB entries
```

```
VLAN1   VLAN2      Packet Type Flags      UIDB Result Flags
   0        0          VLAN                  1 VLAN
   0        0               ARPA             1 ARPA
   0        0                    SAP         1 SAP
   0        0                                1 SNAP


Total Power Available on PLIM for XFP's: 35000 mW
  Power used by Inserted XFP's: 33000 mW
  Power Available: 2000 mW

     Port        Power Used       State
      00          2500 mW         XFP Inserted and Powered On
      01          2500 mW         XFP Inserted and Powered On
      02          1500 mW         XFP Inserted and Powered On
      03          2500 mW         XFP Inserted and Powered On
      04          2500 mW         XFP Inserted and Powered On
      05          1500 mW         XFP Inserted and Powered On
      06          2500 mW         XFP Inserted and Powered On
      07          2500 mW         XFP Inserted and Powered On
      09          2500 mW         XFP Inserted and Powered On
      10          2500 mW         XFP Inserted and Powered On
      11          2500 mW         XFP Inserted and Powered On
      12          2500 mW         XFP Inserted and Powered On
      13          2500 mW         XFP Inserted and Powered On

802.3ae Sections
================

PMA/PMD
  Previous Alarm Status:
    PMA/PMD NOT Locked to Local Signal
  Current Alarm Status:
    PMA/PMD NOT Locked to Local Signal
    PMA/PMD Local Fault
    SR Ability
    Loopback Ability
    Rx Local Fault

PCS
  Previous Alarm Status:
    PCS Rx Link DOWN
    PCS Rx NOT Block Locked
    PCS Rx Link Status DOWN
    PCS Error'd Block Counts: 0
    PCS BER Counts: 0
    PCS has NO Block Lock
  Current Alarm Status:
    PCS Rx Link DOWN
    PCS Local Fault Detected
    PCS Rx Local Fault Detected
    PCS Rx NOT Block Locked
    PCS Rx Link Status DOWN
    PCS Error'd Block Counts: 0
    PCS BER Counts: 0
    PCS has NO Block Lock

WIS: HW In LAN Mode - No Info


XFP General Info:
=================

UDI Checking: Disabled
```

```
PHY/XFP Status: XFP Not UDI Compliant
 XFP is Working as expected


XFP Info:
=========
Max Power Dissipation: 2500 mW

XFP Type: 10GBASE-LR
Vendor Name: CISCO-SUMITOMO
Vendor Part Number: SXP3101NV-C1
Vendor OUI: 0x00-0x00-0x5f
Vendor Hardware Revision: C
Vendor Serial number: ECL120701L2
Date Code (yy/mm/dd): 08/02/27
Lot Code: D0

Cisco PID: XFP-10GLR-OC192SR
Cisco VID: V02
Cisco PN: 10-1989-02

ID: XFP
Extended ID: 0x58
  TX ref clock input is not required
  CDP is supported
  Power Level 2 (2.5W max. power)
Minimum bit rate is 9900 MBits/s.
Maximum bit rate is 10300 MBits/s.


XFP Detail Info:
================

Temp: 32.223
Tx bias: 0.0 mA
Tx power: 0.0 mW (-40 dBm)
Rx power: 0.33 mW (-24 dBm)
AUX 1: +3.3V Supply Voltage: 0x70
AUX 2: Auxiliary monitoring not implemented: 0x0

XFP Status: enabled.
 laser is enabled
 MOD NR is not ready
 is powered off
 doesn't have interrupt(s)
 has LOS
 data is ready
 TX path is ready
 TX laser is not in fault condition
 TX path CDR is locked
 RX path is not ready
 RX path CDR is not locked

Alarms:
  Low RX power alarm

Warnings:
  Low RX power warning

THRESHOLDS
                        High Alarm     Low Alarm     High Warning      Low Warng
   Temperature     C       80.0          -15.0           75.0           -10.0
   Voltage         V     000.0000        000.0000        000.0000       000.000
   Bias Current   mA     100.0000        000.0000        080.0000       000.000
```

```
   Transmit power mW     015.8480        001.2580        010.0000        001.990
   Receive power  mW     022.3870        000.1810        014.1250        000.280
DTE XGXS
  Current Alarm Status:
    XGXS Lanes All Synchronized
    XGXS Lanes Aligned
PHY XGXS
  Previous Alarm Status:
    NO XGXS Local Fault
    TX Link Down
  Current Alarm Status:
    NO XGXS Local Fault
    TX Link UP

LASI 802.3ae Registers:
=======================
Previous: LASI Status = 0x000d Rx Alarm Status = 0x0018 Tx Alarm Status = 0x0020
Current: LASI Status = 0x000c Rx Alarm Status = 0x0018 Tx Alarm Status = 0x0000

PMA/PMD 802.3ae Registers:
==========================
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0007 Status 2 = 0xb581
Tx Disable = 0x0000 Rx Signal Detect = 0x0000
OUI 0 = 0x0000 OUI 1 = 0x0000
Current: Status = 0x0082 Status 2 = 0xb581

WIS 802.3ae Registers:
======================
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8003 Status 3 = 0x0048
Test Pattern Error Counter = 0x0000 Far End BLock Error Counter = 0x0000
J1 TX 1 = 0x0000 J1 TX 2 = 0x0000 J1 TX 3 = 0x0000 J1 TX 4 = 0x0000
J1 TX 5 = 0x0000 J1 TX 6 = 0x0000 J1 TX 7 = 0x0000 J1 TX 8 = 0x8900
J1 RX 1 = 0x0000 J1 RX 2 = 0x0000 J1 RX 3 = 0x0000 J1 RX 4 = 0x0000
J1 RX 5 = 0x0000 J1 RX 6 = 0x0000 J1 RX 7 = 0x0000 J1 RX 8 = 0x0000
Far End BIP Error 0 = 0x0000 Far End BIP Error 1 = 0x0000
Line BIP Error 0 = 0x0000 Line BIP Error 1 = 0x0000
Path BIP Error Count = 0x0000 Section BIP Error Count = 0x0000
J0 Tx 1 = 0x0000 J0 Tx 2 = 0x0000 J0 Tx 3 = 0x0000 J0 Tx 4 = 0x0000
J0 Tx 5 = 0x0000 J0 Tx 6 = 0x0000 J0 Tx 7 = 0x0000 J0 Tx 8 = 0x8900
J0 Rx 1 = 0x0000 J0 Rx 2 = 0x0000 J0 Rx 3 = 0x0000 J0 Rx 4 = 0x0000
J0 Rx 5 = 0x0000 J0 Rx 6 = 0x0000 J0 Rx 7 = 0x0000 J0 Rx 8 = 0x0000
Current: Status = 0x0082 Status 2 = 0x8003 Status 3 = 0x0048

PCS 802.3ae Registers:
======================
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8405
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base X Status = 0x0000 Base X Control = 0x0000
Base R Status 1 = 0x0004 Base R Status 2 = 0x0000
Base R jitter seed a0 = 0x0000 Base R jitter seed a1 = 0x0000
Base R jitter seed a2 = 0x0000 Base R jitter seed a3 = 0x0000
Base R jitter seed b0 = 0x0000 Base R jitter seed b1 = 0x0000
Base R jitter seed b2 = 0x0000 Base R jitter seed b3 = 0x0000
Base R jitter test control = 0x0000 Base R jitter test counter = 0x0000
Current: Status = 0x0082 Status 2 = 0x8405 Base R 1 = 0x0004 Base R 2 = 0x0000

PHY XS 802.3ae Registers:
=========================
```

```
Control = 0x2040 Status = 0x0006
Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Status 2 = 0x8000 PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Lane Status = 0x1c0f Test Control = 0x0000
Current: Status = 0x0006 Status 2 = 0x8000 Lane Status = 0x1c0f

XFP Register Info (MSA):
========================
(Reg 000 = 0x06)  (Reg 001 = 0x00)  (Reg 002 = 0x50)  (Reg 003 = 0x00)
(Reg 004 = 0xf1)  (Reg 005 = 0x00)  (Reg 006 = 0x4b)  (Reg 007 = 0x00)
(Reg 008 = 0xf6)  (Reg 009 = 0x00)  (Reg 010 = 0x00)  (Reg 011 = 0x00)
(Reg 012 = 0x00)  (Reg 013 = 0x00)  (Reg 014 = 0x00)  (Reg 015 = 0x00)
(Reg 016 = 0x00)  (Reg 017 = 0x00)  (Reg 018 = 0xc3)  (Reg 019 = 0x50)
(Reg 020 = 0x00)  (Reg 021 = 0x00)  (Reg 022 = 0x9c)  (Reg 023 = 0x40)
(Reg 024 = 0x00)  (Reg 025 = 0x00)  (Reg 026 = 0x3d)  (Reg 027 = 0xe8)
(Reg 028 = 0x04)  (Reg 029 = 0xea)  (Reg 030 = 0x27)  (Reg 031 = 0x10)
(Reg 032 = 0x07)  (Reg 033 = 0xcb)  (Reg 034 = 0x57)  (Reg 035 = 0x73)
(Reg 036 = 0x00)  (Reg 037 = 0xb5)  (Reg 038 = 0x37)  (Reg 039 = 0x2d)
(Reg 040 = 0x01)  (Reg 041 = 0x20)  (Reg 042 = 0x00)  (Reg 043 = 0x00)
(Reg 044 = 0x00)  (Reg 045 = 0x00)  (Reg 046 = 0x00)  (Reg 047 = 0x00)
(Reg 048 = 0x00)  (Reg 049 = 0x00)  (Reg 050 = 0x00)  (Reg 051 = 0x00)
(Reg 052 = 0x00)  (Reg 053 = 0x00)  (Reg 054 = 0x00)  (Reg 055 = 0x00)
(Reg 056 = 0x00)  (Reg 057 = 0x00)  (Reg 058 = 0x00)  (Reg 059 = 0x00)
(Reg 060 = 0x00)  (Reg 061 = 0x00)  (Reg 062 = 0x00)  (Reg 063 = 0x00)
(Reg 064 = 0x00)  (Reg 065 = 0x00)  (Reg 066 = 0x00)  (Reg 067 = 0x00)
(Reg 068 = 0x00)  (Reg 069 = 0x00)  (Reg 070 = 0x00)  (Reg 071 = 0x00)
(Reg 072 = 0x00)  (Reg 073 = 0x00)  (Reg 074 = 0x00)  (Reg 075 = 0x00)
(Reg 076 = 0x00)  (Reg 077 = 0x00)  (Reg 078 = 0x00)  (Reg 079 = 0x00)
(Reg 080 = 0x00)  (Reg 081 = 0x40)  (Reg 082 = 0x00)  (Reg 083 = 0x40)
(Reg 084 = 0x1e)  (Reg 085 = 0x00)  (Reg 086 = 0x00)  (Reg 087 = 0x00)
(Reg 088 = 0x00)  (Reg 089 = 0x00)  (Reg 090 = 0x00)  (Reg 091 = 0x00)
(Reg 092 = 0x00)  (Reg 093 = 0x00)  (Reg 094 = 0x00)  (Reg 095 = 0x00)
(Reg 096 = 0x20)  (Reg 097 = 0xdf)  (Reg 098 = 0x00)  (Reg 099 = 0x00)
(Reg 100 = 0x00)  (Reg 101 = 0x00)  (Reg 102 = 0x00)  (Reg 103 = 0x00)
(Reg 104 = 0x00)  (Reg 105 = 0x21)  (Reg 106 = 0x7e)  (Reg 107 = 0x44)
(Reg 108 = 0x00)  (Reg 109 = 0x00)  (Reg 110 = 0x32)  (Reg 111 = 0x18)
(Reg 112 = 0x00)  (Reg 113 = 0x00)  (Reg 114 = 0x00)  (Reg 115 = 0x00)
(Reg 116 = 0x00)  (Reg 117 = 0x00)  (Reg 118 = 0x00)  (Reg 119 = 0x00)
(Reg 120 = 0x00)  (Reg 121 = 0x00)  (Reg 122 = 0x00)  (Reg 123 = 0x00)
(Reg 124 = 0x00)  (Reg 125 = 0x00)  (Reg 126 = 0x00)  (Reg 127 = 0x01)

(Reg 128 = 0x06)  (Reg 129 = 0x58)  (Reg 130 = 0x07)  (Reg 131 = 0x40)
(Reg 132 = 0x00)  (Reg 133 = 0x00)  (Reg 134 = 0x00)  (Reg 135 = 0x40)
(Reg 136 = 0x00)  (Reg 137 = 0x00)  (Reg 138 = 0x00)  (Reg 139 = 0xb0)
(Reg 140 = 0x63)  (Reg 141 = 0x67)  (Reg 142 = 0x0a)  (Reg 143 = 0x00)
(Reg 144 = 0x00)  (Reg 145 = 0x00)  (Reg 146 = 0x00)  (Reg 147 = 0x40)
(Reg 148 = 0x43)  (Reg 149 = 0x49)  (Reg 150 = 0x53)  (Reg 151 = 0x43)
(Reg 152 = 0x4f)  (Reg 153 = 0x2d)  (Reg 154 = 0x53)  (Reg 155 = 0x55)
(Reg 156 = 0x4d)  (Reg 157 = 0x49)  (Reg 158 = 0x54)  (Reg 159 = 0x4f)
(Reg 160 = 0x4d)  (Reg 161 = 0x4f)  (Reg 162 = 0x20)  (Reg 163 = 0x20)
(Reg 164 = 0xc0)  (Reg 165 = 0x00)  (Reg 166 = 0x00)  (Reg 167 = 0x5f)
(Reg 168 = 0x53)  (Reg 169 = 0x58)  (Reg 170 = 0x50)  (Reg 171 = 0x33)
(Reg 172 = 0x31)  (Reg 173 = 0x30)  (Reg 174 = 0x31)  (Reg 175 = 0x4e)
(Reg 176 = 0x56)  (Reg 177 = 0x2d)  (Reg 178 = 0x43)  (Reg 179 = 0x31)
(Reg 180 = 0x20)  (Reg 181 = 0x20)  (Reg 182 = 0x20)  (Reg 183 = 0x20)
(Reg 184 = 0x43)  (Reg 185 = 0x20)  (Reg 186 = 0x66)  (Reg 187 = 0x58)
(Reg 188 = 0x0f)  (Reg 189 = 0xa0)  (Reg 190 = 0x46)  (Reg 191 = 0xbe)
(Reg 192 = 0x7d)  (Reg 193 = 0x96)  (Reg 194 = 0x08)  (Reg 195 = 0x00)
(Reg 196 = 0x45)  (Reg 197 = 0x43)  (Reg 198 = 0x4c)  (Reg 199 = 0x31)
(Reg 200 = 0x32)  (Reg 201 = 0x30)  (Reg 202 = 0x37)  (Reg 203 = 0x30)
(Reg 204 = 0x31)  (Reg 205 = 0x4c)  (Reg 206 = 0x32)  (Reg 207 = 0x20)
(Reg 208 = 0x20)  (Reg 209 = 0x20)  (Reg 210 = 0x20)  (Reg 211 = 0x20)
(Reg 212 = 0x30)  (Reg 213 = 0x38)  (Reg 214 = 0x30)  (Reg 215 = 0x32)
```

```
(Reg 216 = 0x32)  (Reg 217 = 0x37)  (Reg 218 = 0x44)  (Reg 219 = 0x30)
(Reg 220 = 0x08)  (Reg 221 = 0x60)  (Reg 222 = 0x70)  (Reg 223 = 0xb7)
(Reg 224 = 0x00)  (Reg 225 = 0x00)  (Reg 226 = 0x0b)  (Reg 227 = 0xd0)
(Reg 228 = 0xb4)  (Reg 229 = 0xd7)  (Reg 230 = 0x01)  (Reg 231 = 0x6d)
(Reg 232 = 0x35)  (Reg 233 = 0xbd)  (Reg 234 = 0x2c)  (Reg 235 = 0x22)
(Reg 236 = 0xe9)  (Reg 237 = 0xe2)  (Reg 238 = 0x49)  (Reg 239 = 0xc8)
(Reg 240 = 0xea)  (Reg 241 = 0x6a)  (Reg 242 = 0x2e)  (Reg 243 = 0x00)
(Reg 244 = 0x00)  (Reg 245 = 0x00)  (Reg 246 = 0x00)  (Reg 247 = 0x00)
(Reg 248 = 0x00)  (Reg 249 = 0x00)  (Reg 250 = 0x00)  (Reg 251 = 0x00)
(Reg 252 = 0xe6)  (Reg 253 = 0x39)  (Reg 254 = 0x8b)  (Reg 255 = 0x6e)
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/6/0/2 bert

BERT status for TenGigE0/6/0/2:

BERT State                      :       DISABLED
Test Pattern                    :       None test pattern
Time Remaining                  :       0
Time Interval                   :       0
```

The following example shows sample output from the **show controllers TenGigE bert** command that is unsupported on the Cisco CRS 14-Port or Cisco CRS 20-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0 bert
Thu Oct  7 18:26:01.108 EST
Command not supported on this interface
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/6/0/2 control
Management information for interface TenGigE0/6/0/2:

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:
```

The following example shows sample output from the **show controllers TenGigE control** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0 control

Thu Oct  7 18:26:11.815 EST
Management information for interface TenGigE0/1/0/0:

Port number: 0
Bay number: 0
Interface handle: 0x1180200

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
    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: 9600 bytes
    Max speed: 10Gbps
    Interface type: TenGigE
    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
    Allowed config mask: 0x27b

Cached driver state:
    MTU: 1522 bytes
    Burnt-in MAC address: 0014.f294.6776

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

Bundle settings:
    Aggregated: No
    Bundle MTU: 1514 bytes
    Bundle MAC address: 0014.f294.6776

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:
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/4/0/0 internal

Port Number       : 0
Port Type         : 10GE
Transport mode    : LAN
BIA MAC addr      : 001b.53ff.a780
Oper. MAC addr    : 001b.53ff.a780
Port Available    : true
Status polling is : enabled
Status events are : enabled
I/F Handle        : 0x0c000040
Cfg Link Enabled  : tx/rx enabled
H/W Tx Enable     : yes
MTU               : 9112
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  : (0x0000) None
```

```
Link Up           : yes
Link Led Status   : Link up
Symbol errors     : 255
Serdes version    : 14.42
Input good underflow          : 0
Input ucast underflow         : 0
Output ucast underflow        : 0
Input unknown opcode underflow: 0
Pluggable Present   : yes
Pluggable Type      : 10GBASE-LR
Pluggable Compl.    : Compliant
Pluggable Type Supp.:  Supported
Pluggable PID Supp. :  Supported
Pluggable Scan Flg: false
```

The following example shows sample output from the **show controllers TenGigE internal** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0 internal
Thu Oct  7 18:27:01.022 EST

Total Power Available on PLIM for XFP's: 35000 mW
  Power used by Inserted XFP's: 33000 mW
  Power Available: 2000 mW

     Port        Power Used       State
      00          2500 mW         XFP Inserted and Powered On
      01          2500 mW         XFP Inserted and Powered On
      02          1500 mW         XFP Inserted and Powered On
      03          2500 mW         XFP Inserted and Powered On
      04          2500 mW         XFP Inserted and Powered On
      05          1500 mW         XFP Inserted and Powered On
      06          2500 mW         XFP Inserted and Powered On
      07          2500 mW         XFP Inserted and Powered On
      08          2500 mW         XFP Inserted and Powered On
      09          2500 mW         XFP Inserted and Powered On
      10          2500 mW         XFP Inserted and Powered On
      11          2500 mW         XFP Inserted and Powered On
      12          2500 mW         XFP Inserted and Powered On
      13          2500 mW         XFP Inserted and Powered On
```

The following example shows sample output from the **show controllers TenGigE mac** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0 mac
Thu Oct  7 18:27:34.289 EST

Operational address: 0014.f294.6776
Burnt-in address: 0014.f294.6776

PLA 0 port 0  MAC enabled  Rx MAC disabled
Administrative state: Forced Remote fault
Operational state: Remote fault

0 HSRP/VRRP MAC addresses

VLAN Ethertype: 0x8100
QinQ Ethertype: 0x88a8
MTP  Ethertype: 0x88e7

4 VLAN UIDB entries
VLAN1   VLAN2      Packet Type Flags      UIDB Result Flags
   0        0          VLAN                  1 VLAN
   0        0               ARPA             1 ARPA
```

```
   0        0                    SAP         1 SAP
   0        0                                1 SNAP
```

The following example shows sample output from the **show controllers TenGigE phy** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0 phy
Thu Oct  7 18:27:51.884 EST

802.3ae Sections
================

PMA/PMD
  Previous Alarm Status:
    PMA/PMD NOT Locked to Local Signal
    PMA/PMD Local Fault
    SR Ability
    Loopback Ability
    Rx Local Fault
  Current Alarm Status:
    PMA/PMD NOT Locked to Local Signal
    PMA/PMD Local Fault
    SR Ability
    Loopback Ability
    Rx Local Fault

PCS
  Previous Alarm Status:
    PCS Rx Link DOWN
    PCS Local Fault Detected
    PCS Rx Local Fault Detected
    PCS Rx NOT Block Locked
    PCS Rx Link Status DOWN
    PCS Error'd Block Counts: 0
    PCS BER Counts: 0
    PCS has NO Block Lock
  Current Alarm Status:
    PCS Rx Link DOWN
    PCS Local Fault Detected
    PCS Rx Local Fault Detected
    PCS Rx NOT Block Locked
    PCS Rx Link Status DOWN
    PCS Error'd Block Counts: 0
    PCS BER Counts: 0
    PCS has NO Block Lock

WIS: HW In LAN Mode - No Info


XFP General Info:
=================

UDI Checking: Disabled
PHY/XFP Status: XFP Not UDI Compliant
 XFP is Working as expected


XFP Info:
=========
Max Power Dissipation: 2500 mW

XFP Type: 10GBASE-LR
Vendor Name: CISCO-SUMITOMO
Vendor Part Number: SXP3101NV-C1
```

```
Vendor OUI: 0x00-0x00-0x5f
Vendor Hardware Revision: C
Vendor Serial number: ECL120701L2
Date Code (yy/mm/dd): 08/02/27
Lot Code: D0

Cisco PID: XFP-10GLR-OC192SR
Cisco VID: V02
Cisco PN: 10-1989-02

ID: XFP
Extended ID: 0x58
  TX ref clock input is not required
  CDP is supported
  Power Level 2 (2.5W max. power)
Minimum bit rate is 9900 MBits/s.
Maximum bit rate is 10300 MBits/s.


XFP Detail Info:
================

Temp: 32.223
Tx bias: 0.0 mA
Tx power: 0.0 mW (-40 dBm)
Rx power: 0.33 mW (-24 dBm)
AUX 1: +3.3V Supply Voltage: 0x70
AUX 2: Auxiliary monitoring not implemented: 0x0

XFP Status: enabled.
 laser is enabled
 MOD NR is not ready
 is powered off
 doesn't have interrupt(s)
 has LOS
 data is ready
 TX path is ready
 TX laser is not in fault condition
 TX path CDR is locked
 RX path is not ready
 RX path CDR is not locked

Alarms:
  Low RX power alarm

Warnings:
  Low RX power warning

THRESHOLDS
                        High Alarm     Low Alarm     High Warning      Low Warng
   Temperature     C       80.0          -15.0           75.0            -10.0
   Voltage         V     000.0000        000.0000        000.0000        000.000
   Bias Current   mA     100.0000        000.0000        080.0000        000.000
   Transmit power mW     015.8480        001.2580        010.0000        001.990
   Receive power  mW     022.3870        000.1810        014.1250        000.280
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers GigabitEthernet 0/1/0/1 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/RP0RSP0/CPU0:router# show controllers GigabitEthernet 0/4/0/0 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 TenGigE regs** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0 regs
Thu Oct  7 18:28:22.640 EST

LASI 802.3ae Registers:
=======================
Previous: LASI Status = 0x000c Rx Alarm Status = 0x0018 Tx Alarm Status = 0x0000
Current: LASI Status = 0x000c Rx Alarm Status = 0x0018 Tx Alarm Status = 0x0000

PMA/PMD 802.3ae Registers:
==========================
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0007 Status 2 = 0xb581
Tx Disable = 0x0000 Rx Signal Detect = 0x0000
OUI 0 = 0x0000 OUI 1 = 0x0000
Current: Status = 0x0082 Status 2 = 0xb581

WIS 802.3ae Registers:
======================
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8003 Status 3 = 0x0048
Test Pattern Error Counter = 0x0000 Far End BLock Error Counter = 0x0000
J1 TX 1 = 0x0000 J1 TX 2 = 0x0000 J1 TX 3 = 0x0000 J1 TX 4 = 0x0000
J1 TX 5 = 0x0000 J1 TX 6 = 0x0000 J1 TX 7 = 0x0000 J1 TX 8 = 0x8900
J1 RX 1 = 0x0000 J1 RX 2 = 0x0000 J1 RX 3 = 0x0000 J1 RX 4 = 0x0000
J1 RX 5 = 0x0000 J1 RX 6 = 0x0000 J1 RX 7 = 0x0000 J1 RX 8 = 0x0000
Far End BIP Error 0 = 0x0000 Far End BIP Error 1 = 0x0000
Line BIP Error 0 = 0x0000 Line BIP Error 1 = 0x0000
Path BIP Error Count = 0x0000 Section BIP Error Count = 0x0000
J0 Tx 1 = 0x0000 J0 Tx 2 = 0x0000 J0 Tx 3 = 0x0000 J0 Tx 4 = 0x0000
J0 Tx 5 = 0x0000 J0 Tx 6 = 0x0000 J0 Tx 7 = 0x0000 J0 Tx 8 = 0x8900
J0 Rx 1 = 0x0000 J0 Rx 2 = 0x0000 J0 Rx 3 = 0x0000 J0 Rx 4 = 0x0000
J0 Rx 5 = 0x0000 J0 Rx 6 = 0x0000 J0 Rx 7 = 0x0000 J0 Rx 8 = 0x0000
Current: Status = 0x0082 Status 2 = 0x8003 Status 3 = 0x0048

PCS 802.3ae Registers:
======================
Control = 0x2040 Status = 0x0082 Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Control 2 = 0x0000 Status 2 = 0x8405
```

```
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base X Status = 0x0000 Base X Control = 0x0000
Base R Status 1 = 0x0004 Base R Status 2 = 0x0000
Base R jitter seed a0 = 0x0000 Base R jitter seed a1 = 0x0000
Base R jitter seed a2 = 0x0000 Base R jitter seed a3 = 0x0000
Base R jitter seed b0 = 0x0000 Base R jitter seed b1 = 0x0000
Base R jitter seed b2 = 0x0000 Base R jitter seed b3 = 0x0000
Base R jitter test control = 0x0000 Base R jitter test counter = 0x0000
Current: Status = 0x0082 Status 2 = 0x8405 Base R 1 = 0x0004 Base R 2 = 0x0000

PHY XS 802.3ae Registers:
=========================
Control = 0x2040 Status = 0x0006
Dev ID 0 = 0x0043 Dev ID 1 = 0xa400
Speed Ability = 0x0001 Devices 1 = 0x001e Devices 2 = 0x0000
Status 2 = 0x8000 PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Lane Status = 0x1c0f Test Control = 0x0000
Current: Status = 0x0006 Status 2 = 0x8000 Lane Status = 0x1c0f

XFP Register Info (MSA):
========================
(Reg 000 = 0x06)  (Reg 001 = 0x00)  (Reg 002 = 0x50)  (Reg 003 = 0x00)
(Reg 004 = 0xf1)  (Reg 005 = 0x00)  (Reg 006 = 0x4b)  (Reg 007 = 0x00)
(Reg 008 = 0xf6)  (Reg 009 = 0x00)  (Reg 010 = 0x00)  (Reg 011 = 0x00)
(Reg 012 = 0x00)  (Reg 013 = 0x00)  (Reg 014 = 0x00)  (Reg 015 = 0x00)
(Reg 016 = 0x00)  (Reg 017 = 0x00)  (Reg 018 = 0xc3)  (Reg 019 = 0x50)
(Reg 020 = 0x00)  (Reg 021 = 0x00)  (Reg 022 = 0x9c)  (Reg 023 = 0x40)
(Reg 024 = 0x00)  (Reg 025 = 0x00)  (Reg 026 = 0x3d)  (Reg 027 = 0xe8)
(Reg 028 = 0x04)  (Reg 029 = 0xea)  (Reg 030 = 0x27)  (Reg 031 = 0x10)
(Reg 032 = 0x07)  (Reg 033 = 0xcb)  (Reg 034 = 0x57)  (Reg 035 = 0x73)
(Reg 036 = 0x00)  (Reg 037 = 0xb5)  (Reg 038 = 0x37)  (Reg 039 = 0x2d)
(Reg 040 = 0x01)  (Reg 041 = 0x20)  (Reg 042 = 0x00)  (Reg 043 = 0x00)
(Reg 044 = 0x00)  (Reg 045 = 0x00)  (Reg 046 = 0x00)  (Reg 047 = 0x00)
(Reg 048 = 0x00)  (Reg 049 = 0x00)  (Reg 050 = 0x00)  (Reg 051 = 0x00)
(Reg 052 = 0x00)  (Reg 053 = 0x00)  (Reg 054 = 0x00)  (Reg 055 = 0x00)
(Reg 056 = 0x00)  (Reg 057 = 0x00)  (Reg 058 = 0x00)  (Reg 059 = 0x00)
(Reg 060 = 0x00)  (Reg 061 = 0x00)  (Reg 062 = 0x00)  (Reg 063 = 0x00)
(Reg 064 = 0x00)  (Reg 065 = 0x00)  (Reg 066 = 0x00)  (Reg 067 = 0x00)
(Reg 068 = 0x00)  (Reg 069 = 0x00)  (Reg 070 = 0x00)  (Reg 071 = 0x00)
(Reg 072 = 0x00)  (Reg 073 = 0x00)  (Reg 074 = 0x00)  (Reg 075 = 0x00)
(Reg 076 = 0x00)  (Reg 077 = 0x00)  (Reg 078 = 0x00)  (Reg 079 = 0x00)
(Reg 080 = 0x00)  (Reg 081 = 0x40)  (Reg 082 = 0x00)  (Reg 083 = 0x40)
(Reg 084 = 0x1e)  (Reg 085 = 0x00)  (Reg 086 = 0x00)  (Reg 087 = 0x00)
(Reg 088 = 0x00)  (Reg 089 = 0x00)  (Reg 090 = 0x00)  (Reg 091 = 0x00)
(Reg 092 = 0x00)  (Reg 093 = 0x00)  (Reg 094 = 0x00)  (Reg 095 = 0x00)
(Reg 096 = 0x20)  (Reg 097 = 0xdf)  (Reg 098 = 0x00)  (Reg 099 = 0x00)
(Reg 100 = 0x00)  (Reg 101 = 0x00)  (Reg 102 = 0x00)  (Reg 103 = 0x00)
(Reg 104 = 0x00)  (Reg 105 = 0x21)  (Reg 106 = 0x7e)  (Reg 107 = 0x44)
(Reg 108 = 0x00)  (Reg 109 = 0x00)  (Reg 110 = 0x32)  (Reg 111 = 0x18)
(Reg 112 = 0x00)  (Reg 113 = 0x00)  (Reg 114 = 0x00)  (Reg 115 = 0x00)
(Reg 116 = 0x00)  (Reg 117 = 0x00)  (Reg 118 = 0x00)  (Reg 119 = 0x00)
(Reg 120 = 0x00)  (Reg 121 = 0x00)  (Reg 122 = 0x00)  (Reg 123 = 0x00)
(Reg 124 = 0x00)  (Reg 125 = 0x00)  (Reg 126 = 0x00)  (Reg 127 = 0x01)

(Reg 128 = 0x06)  (Reg 129 = 0x58)  (Reg 130 = 0x07)  (Reg 131 = 0x40)
(Reg 132 = 0x00)  (Reg 133 = 0x00)  (Reg 134 = 0x00)  (Reg 135 = 0x40)
(Reg 136 = 0x00)  (Reg 137 = 0x00)  (Reg 138 = 0x00)  (Reg 139 = 0xb0)
(Reg 140 = 0x63)  (Reg 141 = 0x67)  (Reg 142 = 0x0a)  (Reg 143 = 0x00)
(Reg 144 = 0x00)  (Reg 145 = 0x00)  (Reg 146 = 0x00)  (Reg 147 = 0x40)
(Reg 148 = 0x43)  (Reg 149 = 0x49)  (Reg 150 = 0x53)  (Reg 151 = 0x43)
(Reg 152 = 0x4f)  (Reg 153 = 0x2d)  (Reg 154 = 0x53)  (Reg 155 = 0x55)
(Reg 156 = 0x4d)  (Reg 157 = 0x49)  (Reg 158 = 0x54)  (Reg 159 = 0x4f)
(Reg 160 = 0x4d)  (Reg 161 = 0x4f)  (Reg 162 = 0x20)  (Reg 163 = 0x20)
(Reg 164 = 0xc0)  (Reg 165 = 0x00)  (Reg 166 = 0x00)  (Reg 167 = 0x5f)
```

```
(Reg 168 = 0x53)  (Reg 169 = 0x58)  (Reg 170 = 0x50)  (Reg 171 = 0x33)
(Reg 172 = 0x31)  (Reg 173 = 0x30)  (Reg 174 = 0x31)  (Reg 175 = 0x4e)
(Reg 176 = 0x56)  (Reg 177 = 0x2d)  (Reg 178 = 0x43)  (Reg 179 = 0x31)
(Reg 180 = 0x20)  (Reg 181 = 0x20)  (Reg 182 = 0x20)  (Reg 183 = 0x20)
(Reg 184 = 0x43)  (Reg 185 = 0x20)  (Reg 186 = 0x66)  (Reg 187 = 0x58)
(Reg 188 = 0x0f)  (Reg 189 = 0xa0)  (Reg 190 = 0x46)  (Reg 191 = 0xbe)
(Reg 192 = 0x7d)  (Reg 193 = 0x96)  (Reg 194 = 0x08)  (Reg 195 = 0x00)
(Reg 196 = 0x45)  (Reg 197 = 0x43)  (Reg 198 = 0x4c)  (Reg 199 = 0x31)
(Reg 200 = 0x32)  (Reg 201 = 0x30)  (Reg 202 = 0x37)  (Reg 203 = 0x30)
(Reg 204 = 0x31)  (Reg 205 = 0x4c)  (Reg 206 = 0x32)  (Reg 207 = 0x20)
(Reg 208 = 0x20)  (Reg 209 = 0x20)  (Reg 210 = 0x20)  (Reg 211 = 0x20)
(Reg 212 = 0x30)  (Reg 213 = 0x38)  (Reg 214 = 0x30)  (Reg 215 = 0x32)
(Reg 216 = 0x32)  (Reg 217 = 0x37)  (Reg 218 = 0x44)  (Reg 219 = 0x30)
(Reg 220 = 0x08)  (Reg 221 = 0x60)  (Reg 222 = 0x70)  (Reg 223 = 0xb7)
(Reg 224 = 0x00)  (Reg 225 = 0x00)  (Reg 226 = 0x0b)  (Reg 227 = 0xd0)
(Reg 228 = 0xb4)  (Reg 229 = 0xd7)  (Reg 230 = 0x01)  (Reg 231 = 0x6d)
(Reg 232 = 0x35)  (Reg 233 = 0xbd)  (Reg 234 = 0x2c)  (Reg 235 = 0x22)
(Reg 236 = 0xe9)  (Reg 237 = 0xe2)  (Reg 238 = 0x49)  (Reg 239 = 0xc8)
(Reg 240 = 0xea)  (Reg 241 = 0x6a)  (Reg 242 = 0x2e)  (Reg 243 = 0x00)
(Reg 244 = 0x00)  (Reg 245 = 0x00)  (Reg 246 = 0x00)  (Reg 247 = 0x00)
(Reg 248 = 0x00)  (Reg 249 = 0x00)  (Reg 250 = 0x00)  (Reg 251 = 0x00)
(Reg 252 = 0xe6)  (Reg 253 = 0x39)  (Reg 254 = 0x8b)  (Reg 255 = 0x6e)
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/4/0/0 stats

Statistics for interface TenGigE0/4/0/0 (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
```

The following example shows sample output from the **show controllers TenGigE stats** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0 stats

Thu Oct  7 18:29:16.631 EST
Statistics for interface TenGigE0/1/0/0 (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
```

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

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/4/0/0 xgxs

Serdes Registers and info port: 0
  EDC Status    : 000000070 - EDC tracking
  Rx detected   : Yes
  Block lock    : Yes
  Tx aligned    : Yes
```

The following example shows sample output from the **show controllers TenGigE stats** command for the Cisco CRS 14-Port 10-Gigabit Ethernet LAN/WAN-PHY Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers TenGigE 0/1/0/0 xgxs

Thu Oct  7 18:30:03.732 EST
DTE XGXS
  Current Alarm Status:
    XGXS Lanes All Synchronized
    XGXS Lanes Aligned
PHY XGXS
  Previous Alarm Status:
    NO XGXS Local Fault
    TX Link UP
  Current Alarm Status:
    NO XGXS Local Fault
    TX Link UP
```

The following example shows sample output from the **show controllers HundredGigE** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0
Tue Mar 22 06:00:35.411 UTC
Operational data for interface HundredGigE0/3/0/0:

State:
    Administrative state: enabled
    Operational state: Up
    LED state: Green On

Phy:
    Media type: fiber over 4 Lane optics
    Optics:
        Vendor: CISCO-SUMITOMO
        Part number: SXP3101NV-C1
        Serial number: ECL120701L2

MAC address information:
    Operational address: 001d.70b6.6810
    Burnt-in address: 001d.70b6.6810
    No unicast addresses in filter
    Operating in multicast promiscuous mode

Autonegotiation disabled.

Operational values:
    Speed: 100Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    MTU: 9196
    MRU: 9196
    Inter-packet gap: standard (12)
```

The following example shows sample output from the **show controllers HundredGigE all** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0 all
Tue Mar 22 06:00:57.557 UTC
Operational data for interface HundredGigE0/3/0/0:

State:
    Administrative state: enabled
    Operational state: Up
    LED state: Green On

Phy:
    Media type: fiber over 4 Lane optics
    Optics:
        Vendor: CISCO-SUMITOMO
        Part number: FTLC1181RDNS-C1
        Serial number: C22CSLA

MAC address information:
    Operational address: 001d.70b6.6810
    Burnt-in address: 001d.70b6.6810
    No unicast addresses in filter
    Operating in multicast promiscuous mode

Autonegotiation disabled.
```

```
Operational values:
    Speed: 100Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    MTU: 9196
    MRU: 9196
    Inter-packet gap: standard (12)

Statistics for interface HundredGigE0/3/0/0 (cached values):

Ingress:
    Input total bytes           = 71105513310820
    Input good bytes            = 71074510205068

    Input total packets         = 7750770507
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 895
    Input pkts 65-127 bytes     = 5118
    Input pkts 128-255 bytes    = 57
    Input pkts 256-511 bytes    = 2
    Input pkts 512-1023 bytes   = 1
    Input pkts 1024-1518 bytes  = 4
    Input pkts 1519-Max bytes   = 7750764430

    Input good pkts             = 7750770506
    Input unicast pkts          = 7750765816
    Input multicast pkts        = 4689
    Input broadcast pkts        = 1

    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            = 6947

    Input error giant           = 0
    Input error runt            = 0
    Input error jabbers         = 0
    Input error fragments       = 0
    Input error CRC             = 1
    Input error collisions      = 0
    Input error symbol          = 3
    Input error other           = 0

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

Egress:
    Output total bytes          = 67727813126508
    Output good bytes           = 67698282738660

    Output total packets        = 7382593804
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 702
    Output pkts 65-127 bytes    = 10272
    Output pkts 128-255 bytes   = 267
    Output pkts 256-511 bytes   = 5
    Output pkts 512-1023 bytes  = 0
    Output pkts 1024-1518 bytes = 6
```

```
    Output pkts 1519-Max bytes  = 7382582552

    Output good pkts            = 7382593804
    Output unicast pkts         = 7382590409
    Output multicast pkts       = 3391
    Output broadcast pkts       = 6

    Output drop underrun        = 0
    Output drop abort           = 2
    Output drop other           = 2373

    Output error other          = 0

Management information for interface HundredGigE0/3/0/0:

Port number: 0
Bay number: 0
Interface handle: 0x1380040

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: Not configured (None)
    IPG: Configuration not supported (standard (12))
    Loopback: Not configured (None)
    MTU: 9188 bytes
    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: 9600 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
    Allowed config mask: 0x26b

Cached driver state:
    MTU: 9196 bytes
    Burnt-in MAC address: 001d.70b6.6810

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

Bundle settings:
    Aggregated: No
    Bundle MTU: 1514 bytes
    Bundle MAC address: 001d.70b6.6810

Port FSM state:
    Port is enabled, link is up
```

```
Complete FSM state:
    Admin up
    Bundle admin up
    Client admin up
    Client admin tx not disabled
    Port enabled
    Port tx enabled
    Hardware link up
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:


Operational address: 001d.70b6.6810
Burnt-in address: 001d.70b6.6810
MAC state for beluga 0 port 0

0 HSRP/VRRP MAC addresses

VLAN Ethertype: 0x8100
QinQ Ethertype: 0x88a8
MTP  Ethertype: 0x88e7

4 VLAN UIDB entries
VLAN1   VLAN2      Packet Type Flags      UIDB Result Flags
   0        0          VLAN                  1 VLAN
   0        0               ARPA             1 ARPA
   0        0                    SAP         1 SAP
   0        0                                1 SNAP

PLIM 1 Port HundredGigE Internal Information:
shmwin pointer: 0x581d4264
shmwin id     : 0x3c
shmwin initlization: complete
shmwin mac stats pointer: 0x603d3020
shmwin mac stats version: 0x1
shmwin ctx pointer: 0x603db07c
shmwin ctx version: 0x1
HW initilization: completed
Maximum CFP power class supported: 4
Maximum CFP power consumption supported: 30000 mW

802.3ba PCS
  Previous PCS Alarms:
    PCS Link had fault

  Current PCS Status:
    PCS is able to support 100GBASE-R
    PCS is Block Locked
    PCS Rx Link Status is UP
    PCS Errored Block Counts: 0
    PCS BER (Sync Header Error) Counts: 0

PCS detailed information:
```

```
RX Service Interface Lane Sync Header Lock Status:

  Lane-0 : Locked           Lane-10 : Locked
  Lane-1 : Locked           Lane-11 : Locked
  Lane-2 : Locked           Lane-12 : Locked
  Lane-3 : Locked           Lane-13 : Locked
  Lane-4 : Locked           Lane-14 : Locked
  Lane-5 : Locked           Lane-15 : Locked
  Lane-6 : Locked           Lane-16 : Locked
  Lane-7 : Locked           Lane-17 : Locked
  Lane-8 : Locked           Lane-18 : Locked
  Lane-9 : Locked           Lane-19 : Locked

RX Service Interface Lane Marker Lock Status:

  Lane-0 : Locked           Lane-10 : Locked
  Lane-1 : Locked           Lane-11 : Locked
  Lane-2 : Locked           Lane-12 : Locked
  Lane-3 : Locked           Lane-13 : Locked
  Lane-4 : Locked           Lane-14 : Locked
  Lane-5 : Locked           Lane-15 : Locked
  Lane-6 : Locked           Lane-16 : Locked
  Lane-7 : Locked           Lane-17 : Locked
  Lane-8 : Locked           Lane-18 : Locked
  Lane-9 : Locked           Lane-19 : Locked

Mapping of Service Interface Lane and RX PCS Lane:

  Rx Service Interface Lane 0 = PCS Lane 11
  Rx Service Interface Lane 1 = PCS Lane 1
  Rx Service Interface Lane 2 = PCS Lane 0
  Rx Service Interface Lane 3 = PCS Lane 12
  Rx Service Interface Lane 4 = PCS Lane 10
  Rx Service Interface Lane 5 = PCS Lane 3
  Rx Service Interface Lane 6 = PCS Lane 4
  Rx Service Interface Lane 7 = PCS Lane 14
  Rx Service Interface Lane 8 = PCS Lane 2
  Rx Service Interface Lane 9 = PCS Lane 13
  Rx Service Interface Lane 10 = PCS Lane 15
  Rx Service Interface Lane 11 = PCS Lane 7
  Rx Service Interface Lane 12 = PCS Lane 5
  Rx Service Interface Lane 13 = PCS Lane 16
  Rx Service Interface Lane 14 = PCS Lane 9
  Rx Service Interface Lane 15 = PCS Lane 6
  Rx Service Interface Lane 16 = PCS Lane 8
  Rx Service Interface Lane 17 = PCS Lane 17
  Rx Service Interface Lane 18 = PCS Lane 18
  Rx Service Interface Lane 19 = PCS Lane 19

PCS Lane BIP Error Counters:

  Lane-0 : 0                Lane-10 : 0
  Lane-1 : 0                Lane-11 : 0
  Lane-2 : 0                Lane-12 : 0
  Lane-3 : 0                Lane-13 : 0
  Lane-4 : 0                Lane-14 : 0
  Lane-5 : 0                Lane-15 : 0
  Lane-6 : 0                Lane-16 : 0
  Lane-7 : 0                Lane-17 : 0
  Lane-8 : 0                Lane-18 : 0
  Lane-9 : 0                Lane-19 : 0

Total PCS Lane BIP Error Count : 0
```

```
  Total PCS Lane Sync Header Error Count  : 0
  Total PCS Lane Bad 64/66 Code Count     : 3


Serdes section:
===============

None of 10 RX serial inputs detects loss of signal.
All of 10 Tx clock multiplication units are locked.
All of 10 Rx clock/data recovery units are locked.
None of 10 TX FIFO has underflow/overflow condition.
None of 10 RX FIFO has underflow/overflow condition.

CFP section:
==============

CFP General Information:

  Module Identifier:         CFP
  Ethernet Application Code: 100GBASE-LR4
  Module State:              Ready
  Power Class:               3
  Maximum Power Consumption: 23000 mW

CFP Vendor Information:

  Vendor Name:         CISCO-SUMITOMO CORP.
  Vendor PN:           FTLC1181RDNS-C1
  Vendor SN:           C22CSLA
  Vendor OUI:          0x0-0x90-0x65
  Lot Code:            00
  DATE CODE(YYYY/MM/DD): 2010/06/02
  CFP MSA Hardware Version:   1.0
  CFP MSA MDIO Version:       1.2
  Vendor Hardware Version:    1.2
  Vendor Firmware Version:    1.4

CFP UDI Information:

  UDI Compliant: Yes
  Cisco PID: CFP-100G-LR4
  Cisco VID: VES1

CFP Cisco Information:

  Vendor Name: CISCO
  Cisco PN   : 10-2549-01    Rev 01
  Cisco SN   : FNS14221PDX

CFP Detail Information:

  Number of lanes supoorted:

    Number of network lanes: 4
    Number of host lanes   : 10

  Time required by module:

    Maximum high-power-up time  :  15 s
    Maximum high-power-down time:   0 s
    Maximum tx-turn-on time     :   1 s
    Maximum tx-turn-off time    :   0 ms

  Module general control:
```

```
    Soft reset asserted     : No
    Soft low power asserted : No
    Soft tx disable asserted: No
    Soft program control 3 asserted: No
    Soft program control 2 asserted: No
    Soft program control 1 asserted: No
    Soft global alarm test asserted: No

    Tx disable pin asserted: No
    Low power pin asserted : No
    Program control 3 pin asserted: Yes
    Program control 2 pin asserted: Yes
    Program control 1 pin asserted: Yes

  Module Analog A/D value:

    Power supply voltage : 3.1939 V
    Temperature          : 38.5889 degC

  Network lane A/D value:

    Lane 0 Tx power: 1.2829 mW (  1.1 dBm)
    Lane 1 Tx power: 1.3931 mW (  1.4 dBm)
    Lane 2 Tx power: 1.4443 mW (  1.6 dBm)
    Lane 3 Tx power: 1.4791 mW (  1.7 dBm)

    Lane 0 Rx power: 1.1029 mW (  0.4 dBm)
    Lane 1 Rx power: 1.3673 mW (  1.4 dBm)
    Lane 2 Rx power: 1.3457 mW (  1.3 dBm)
    Lane 3 Rx power: 1.4423 mW (  1.6 dBm)

    Total Tx power : 5.5994 mW (  7.5 dBm)
    Total Rx power : 5.2582 mW (  7.2 dBm)

No XGXS present

PCS 802.3ba Registers:
======================
Control 1 = 0x0010
Status 1 = 0x0004
Dev ID 0 = 0x0000 Dev ID 1 = 0x0000
Speed Ability = 0x0008
Devices 1 = 0x0004 Devices 2 = 0x0000
Control 2 = 0x0005
Status 2 = 0x0020
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base R Status 1 = 0x1001
Base R Status 2 = 0x8000
BER high order counter = 0x0000
Errored blocks high order counter = 0x8000
Base R test pattern control = 0x0080
Base R test pattern error counter = 0x0000
Multi-lane BASE-R alignment status 1 = 0x10ff
Multi-lane BASE-R alignment status 2 = 0x0fff
Multi-lane BASE-R alignment status 3 = 0x00ff
Multi-lane BASE-R alignment status 4 = 0x0fff
BIP error counter lane 0 = 0x0000
BIP error counter lane 1 = 0x0000
BIP error counter lane 2 = 0x0000
BIP error counter lane 3 = 0x0000
BIP error counter lane 4 = 0x0000
BIP error counter lane 5 = 0x0000
BIP error counter lane 6 = 0x0000
```

```
BIP error counter lane 7 = 0x0000
BIP error counter lane 8 = 0x0000
BIP error counter lane 9 = 0x0000
BIP error counter lane 10 = 0x0000
BIP error counter lane 11 = 0x0000
BIP error counter lane 12 = 0x0000
BIP error counter lane 13 = 0x0000
BIP error counter lane 14 = 0x0000
BIP error counter lane 15 = 0x0000
BIP error counter lane 16 = 0x0000
BIP error counter lane 17 = 0x0000
BIP error counter lane 18 = 0x0000
BIP error counter lane 19 = 0x0000
Lane mapping register 0 = 0x000b
Lane mapping register 1 = 0x0001
Lane mapping register 2 = 0x0000
Lane mapping register 3 = 0x000c
Lane mapping register 4 = 0x000a
Lane mapping register 5 = 0x0003
Lane mapping register 6 = 0x0004
Lane mapping register 7 = 0x000e
Lane mapping register 8 = 0x0002
Lane mapping register 9 = 0x000d
Lane mapping register 10 = 0x000f
Lane mapping register 11 = 0x0007
Lane mapping register 12 = 0x0005
Lane mapping register 13 = 0x0010
Lane mapping register 14 = 0x0009
Lane mapping register 15 = 0x0006
Lane mapping register 16 = 0x0008
Lane mapping register 17 = 0x0011
Lane mapping register 18 = 0x0012
Lane mapping register 19 = 0x0013

Serdes registers:
==================

Chip id register: 0x8154
Chip revision id register: 0x1
Digital control 1 register register:
  serdes0:0x017a, serdes1:0x017a, serdes2:0x017a, serdes3:0x017a, serdes4:0x017a
  serdes5:0x017a, serdes6:0x017a, serdes7:0x017a, serdes8:0x017a, serdes9:0x017a
Digital control 2 register register:
  serdes0:0x0305, serdes1:0x0305, serdes2:0x0305, serdes3:0x0305, serdes4:0x0305
  serdes5:0x0305, serdes6:0x0305, serdes7:0x0305, serdes8:0x0305, serdes9:0x0305
Digital control 3 register register:
  serdes0:0x0d0f, serdes1:0x0d0f, serdes2:0x0d0f, serdes3:0x0d0f, serdes4:0x0d0f
  serdes5:0x0d0f, serdes6:0x0d0f, serdes7:0x0d0f, serdes8:0x0d0f, serdes9:0x0d0f
Digital control 5 register register:
  serdes0:0x6de0, serdes1:0x6de0, serdes2:0x6de0, serdes3:0x6de0, serdes4:0x6de0
  serdes5:0x6de0, serdes6:0x6de0, serdes7:0x6de0, serdes8:0x6de0, serdes9:0x6de0
Digital status 0 register register:
  serdes0:0x303b, serdes1:0x303b, serdes2:0x303b, serdes3:0x303b, serdes4:0x303b
  serdes5:0x303b, serdes6:0x303b, serdes7:0x303b, serdes8:0x303b, serdes9:0x303b
Line PRBS control register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
Line PRBS status register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
System PRBS control register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
System PRBS status register register:
```

```
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
PRBS status 2 register register:
  serdes0:0x8008, serdes1:0x8008, serdes2:0x8008, serdes3:0x8008, serdes4:0x8008
  serdes5:0x8008, serdes6:0x8008, serdes7:0x8008, serdes8:0x8008, serdes9:0x8008
TX control 1 register register:
  serdes0:0x1884, serdes1:0x1884, serdes2:0x1884, serdes3:0x1884, serdes4:0x1884
  serdes5:0x1884, serdes6:0x1884, serdes7:0x1884, serdes8:0x1884, serdes9:0x1884
TX control 2 register register:
  serdes0:0x00a0, serdes1:0x00a0, serdes2:0x00a0, serdes3:0x00a0, serdes4:0x00a0
  serdes5:0x00a0, serdes6:0x00a0, serdes7:0x00a0, serdes8:0x00a0, serdes9:0x00a0
TX control 4 register register:
  serdes0:0x2412, serdes1:0x2412, serdes2:0x2412, serdes3:0x2412, serdes4:0x2412
  serdes5:0x2412, serdes6:0x2412, serdes7:0x2412, serdes8:0x2412, serdes9:0x2412
TX control 7 register register:
  serdes0:0x1077, serdes1:0x1077, serdes2:0x1077, serdes3:0x1077, serdes4:0x1077
  serdes5:0x1077, serdes6:0x1077, serdes7:0x1077, serdes8:0x1077, serdes9:0x1077
TX control 8 register register:
  serdes0:0xb800, serdes1:0xb800, serdes2:0xb800, serdes3:0xb800, serdes4:0xb800
  serdes5:0xb800, serdes6:0xb800, serdes7:0xb800, serdes8:0xb800, serdes9:0xb800
TX LVDS contrl 1 register register:
  serdes0:0x6050, serdes1:0x6050, serdes2:0x6050, serdes3:0x6050, serdes4:0x6050
  serdes5:0x6050, serdes6:0x6050, serdes7:0x6050, serdes8:0x6050, serdes9:0x6050
TX LVDS contrl 2 register register:
  serdes0:0x3bb1, serdes1:0x3ba1, serdes2:0x3ba9, serdes3:0x3ba9, serdes4:0x3bb1
  serdes5:0x3ba9, serdes6:0x3ba9, serdes7:0x3ba9, serdes8:0x3bb1, serdes9:0x3ba9
TX LVDS contrl 3 register register:
  serdes0:0x3bb1, serdes1:0x3ba1, serdes2:0x3ba9, serdes3:0x3ba9, serdes4:0x3bb1
  serdes5:0x3ba9, serdes6:0x3ba9, serdes7:0x3ba9, serdes8:0x3bb1, serdes9:0x3ba9
RX control 2 register register:
  serdes0:0x2220, serdes1:0x2220, serdes2:0x2224, serdes3:0x2224, serdes4:0x2222
  serdes5:0x2224, serdes6:0x2220, serdes7:0x2224, serdes8:0x2220, serdes9:0x2224
RX control 3 register register:
  serdes0:0x1631, serdes1:0x1631, serdes2:0x1631, serdes3:0x1631, serdes4:0x1631
  serdes5:0x1631, serdes6:0x1631, serdes7:0x1631, serdes8:0x1631, serdes9:0x1631
RX control 4 register register:
  serdes0:0x60c8, serdes1:0x40c8, serdes2:0x50c8, serdes3:0x50c8, serdes4:0x60c8
  serdes5:0x50c8, serdes6:0x50c8, serdes7:0x50c8, serdes8:0x60c8, serdes9:0x50c8
RX control 6 register register:
  serdes0:0x081a, serdes1:0x081a, serdes2:0x081a, serdes3:0x081a, serdes4:0x081a
  serdes5:0x081a, serdes6:0x081a, serdes7:0x081a, serdes8:0x081a, serdes9:0x081a
RX control 7 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX control 8 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX control 9 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX LVDS contrl 1 register register:
  serdes0:0x0bfa, serdes1:0x0bba, serdes2:0x0bba, serdes3:0x0bba, serdes4:0x0bba
  serdes5:0x0bba, serdes6:0x0bba, serdes7:0x0bba, serdes8:0x0bba, serdes9:0x0bba

CFP Registers:
================

NVR 1 Registers:

(Reg 0x8000=0x0e) (Reg 0x8001=0x95) (Reg 0x8002=0x01) (Reg 0x8003=0x01)
(Reg 0x8004=0x00) (Reg 0x8005=0x00) (Reg 0x8006=0x00) (Reg 0x8007=0x00)
(Reg 0x8008=0x08) (Reg 0x8009=0x4a) (Reg 0x800a=0x11) (Reg 0x800b=0x81)
(Reg 0x800c=0x34) (Reg 0x800d=0x0a) (Reg 0x800e=0x00) (Reg 0x800f=0x00)
(Reg 0x8010=0x01) (Reg 0x8011=0x04) (Reg 0x8012=0xca) (Reg 0x8013=0x45)
```

```
(Reg 0x8014=0xcc) (Reg 0x8015=0xb8) (Reg 0x8016=0x08) (Reg 0x8017=0x34)
(Reg 0x8018=0x21) (Reg 0x8019=0x44) (Reg 0x801a=0x40) (Reg 0x801b=0x70)
(Reg 0x801c=0x1c) (Reg 0x801d=0x73) (Reg 0x801e=0x64) (Reg 0x801f=0x46)
(Reg 0x8020=0x00) (Reg 0x8021=0x46) (Reg 0x8022=0x49) (Reg 0x8023=0x4e)
(Reg 0x8024=0x49) (Reg 0x8025=0x53) (Reg 0x8026=0x41) (Reg 0x8027=0x52)
(Reg 0x8028=0x20) (Reg 0x8029=0x43) (Reg 0x802a=0x4f) (Reg 0x802b=0x52)
(Reg 0x802c=0x50) (Reg 0x802d=0x2e) (Reg 0x802e=0x20) (Reg 0x802f=0x20)
(Reg 0x8030=0x20) (Reg 0x8031=0x00) (Reg 0x8032=0x90) (Reg 0x8033=0x65)
(Reg 0x8034=0x46) (Reg 0x8035=0x54) (Reg 0x8036=0x4c) (Reg 0x8037=0x43)
(Reg 0x8038=0x31) (Reg 0x8039=0x31) (Reg 0x803a=0x38) (Reg 0x803b=0x31)
(Reg 0x803c=0x52) (Reg 0x803d=0x44) (Reg 0x803e=0x4e) (Reg 0x803f=0x53)
(Reg 0x8040=0x2d) (Reg 0x8041=0x43) (Reg 0x8042=0x31) (Reg 0x8043=0x20)
(Reg 0x8044=0x43) (Reg 0x8045=0x32) (Reg 0x8046=0x32) (Reg 0x8047=0x43)
(Reg 0x8048=0x53) (Reg 0x8049=0x4c) (Reg 0x804a=0x41) (Reg 0x804b=0x20)
(Reg 0x804c=0x20) (Reg 0x804d=0x20) (Reg 0x804e=0x20) (Reg 0x804f=0x20)
(Reg 0x8050=0x20) (Reg 0x8051=0x20) (Reg 0x8052=0x20) (Reg 0x8053=0x20)
(Reg 0x8054=0x32) (Reg 0x8055=0x30) (Reg 0x8056=0x31) (Reg 0x8057=0x30)
(Reg 0x8058=0x30) (Reg 0x8059=0x36) (Reg 0x805a=0x30) (Reg 0x805b=0x32)
(Reg 0x805c=0x30) (Reg 0x805d=0x30) (Reg 0x805e=0x49) (Reg 0x805f=0x50)
(Reg 0x8060=0x55) (Reg 0x8061=0x49) (Reg 0x8062=0x42) (Reg 0x8063=0x48)
(Reg 0x8064=0x43) (Reg 0x8065=0x52) (Reg 0x8066=0x41) (Reg 0x8067=0x41)
(Reg 0x8068=0x0a) (Reg 0x8069=0x0c) (Reg 0x806a=0x01) (Reg 0x806b=0x02)
(Reg 0x806c=0x01) (Reg 0x806d=0x04) (Reg 0x806e=0x0c) (Reg 0x806f=0x03)
(Reg 0x8070=0x0f) (Reg 0x8071=0x68) (Reg 0x8072=0x0f) (Reg 0x8073=0x01)
(Reg 0x8074=0x01) (Reg 0x8075=0x00) (Reg 0x8076=0x00) (Reg 0x8077=0x00)
(Reg 0x8078=0x00) (Reg 0x8079=0x00) (Reg 0x807a=0x00) (Reg 0x807b=0x00)
(Reg 0x807c=0x00) (Reg 0x807d=0x00) (Reg 0x807e=0x00) (Reg 0x807f=0x1a)

NVR 2 Registers:

(Reg 0x8080=0x46) (Reg 0x8081=0x00) (Reg 0x8082=0x44) (Reg 0x8083=0x00)
(Reg 0x8084=0x02) (Reg 0x8085=0x00) (Reg 0x8086=0x00) (Reg 0x8087=0x00)
(Reg 0x8088=0x87) (Reg 0x8089=0x5a) (Reg 0x808a=0x86) (Reg 0x808b=0x10)
(Reg 0x808c=0x7b) (Reg 0x808d=0xc0) (Reg 0x808e=0x7a) (Reg 0x808f=0x75)
(Reg 0x8090=0x00) (Reg 0x8091=0x00) (Reg 0x8092=0x00) (Reg 0x8093=0x00)
(Reg 0x8094=0x00) (Reg 0x8095=0x00) (Reg 0x8096=0x00) (Reg 0x8097=0x00)
(Reg 0x8098=0x00) (Reg 0x8099=0x00) (Reg 0x809a=0x00) (Reg 0x809b=0x00)
(Reg 0x809c=0x00) (Reg 0x809d=0x00) (Reg 0x809e=0x00) (Reg 0x809f=0x00)
(Reg 0x80a0=0x00) (Reg 0x80a1=0x00) (Reg 0x80a2=0x00) (Reg 0x80a3=0x00)
(Reg 0x80a4=0x00) (Reg 0x80a5=0x00) (Reg 0x80a6=0x00) (Reg 0x80a7=0x00)
(Reg 0x80a8=0xea) (Reg 0x80a9=0x60) (Reg 0x80aa=0xe0) (Reg 0x80ab=0x9c)
(Reg 0x80ac=0x44) (Reg 0x80ad=0x5c) (Reg 0x80ae=0x3a) (Reg 0x80af=0x98)
(Reg 0x80b0=0x6e) (Reg 0x80b1=0x17) (Reg 0x80b2=0x62) (Reg 0x80b3=0x1e)
(Reg 0x80b4=0x10) (Reg 0x80b5=0x48) (Reg 0x80b6=0x0e) (Reg 0x80b7=0x83)
(Reg 0x80b8=0x37) (Reg 0x80b9=0x00) (Reg 0x80ba=0x35) (Reg 0x80bb=0x00)
(Reg 0x80bc=0x1b) (Reg 0x80bd=0x00) (Reg 0x80be=0x19) (Reg 0x80bf=0x00)
(Reg 0x80c0=0x6e) (Reg 0x80c1=0x17) (Reg 0x80c2=0x62) (Reg 0x80c3=0x1e)
(Reg 0x80c4=0x01) (Reg 0x80c5=0xf5) (Reg 0x80c6=0x00) (Reg 0x80c7=0xfb)
(Reg 0x80c8=0x00) (Reg 0x80c9=0x00) (Reg 0x80ca=0x00) (Reg 0x80cb=0x00)
(Reg 0x80cc=0x00) (Reg 0x80cd=0x00) (Reg 0x80ce=0x00) (Reg 0x80cf=0x00)
(Reg 0x80d0=0x00) (Reg 0x80d1=0x00) (Reg 0x80d2=0x00) (Reg 0x80d3=0x00)
(Reg 0x80d4=0x00) (Reg 0x80d5=0x00) (Reg 0x80d6=0x00) (Reg 0x80d7=0x00)
(Reg 0x80d8=0x00) (Reg 0x80d9=0x00) (Reg 0x80da=0x00) (Reg 0x80db=0x00)
(Reg 0x80dc=0x00) (Reg 0x80dd=0x00) (Reg 0x80de=0x00) (Reg 0x80df=0x00)
(Reg 0x80e0=0x00) (Reg 0x80e1=0x00) (Reg 0x80e2=0x00) (Reg 0x80e3=0x00)
(Reg 0x80e4=0x00) (Reg 0x80e5=0x00) (Reg 0x80e6=0x00) (Reg 0x80e7=0x00)
(Reg 0x80e8=0x00) (Reg 0x80e9=0x00) (Reg 0x80ea=0x00) (Reg 0x80eb=0x00)
(Reg 0x80ec=0x00) (Reg 0x80ed=0x00) (Reg 0x80ee=0x00) (Reg 0x80ef=0x00)
(Reg 0x80f0=0x00) (Reg 0x80f1=0x00) (Reg 0x80f2=0x00) (Reg 0x80f3=0x00)
(Reg 0x80f4=0x00) (Reg 0x80f5=0x00) (Reg 0x80f6=0x00) (Reg 0x80f7=0x00)
(Reg 0x80f8=0x00) (Reg 0x80f9=0x00) (Reg 0x80fa=0x00) (Reg 0x80fb=0x00)
(Reg 0x80fc=0x00) (Reg 0x80fd=0x00) (Reg 0x80fe=0x00) (Reg 0x80ff=0xe9)

NVR 3 Registers:
```

```
(Reg 0x8100=0x00) (Reg 0x8101=0x00) (Reg 0x8102=0x00) (Reg 0x8103=0x00)
(Reg 0x8104=0x00) (Reg 0x8105=0x00) (Reg 0x8106=0x00) (Reg 0x8107=0x00)
(Reg 0x8108=0x00) (Reg 0x8109=0x00) (Reg 0x810a=0x00) (Reg 0x810b=0x00)
(Reg 0x810c=0x00) (Reg 0x810d=0x00) (Reg 0x810e=0x00) (Reg 0x810f=0x00)
(Reg 0x8110=0x00) (Reg 0x8111=0x00) (Reg 0x8112=0x00) (Reg 0x8113=0x00)
(Reg 0x8114=0x00) (Reg 0x8115=0x00) (Reg 0x8116=0x00) (Reg 0x8117=0x00)
(Reg 0x8118=0x00) (Reg 0x8119=0x00) (Reg 0x811a=0x00) (Reg 0x811b=0x00)
(Reg 0x811c=0x00) (Reg 0x811d=0x00) (Reg 0x811e=0x00) (Reg 0x811f=0x00)
(Reg 0x8120=0x00) (Reg 0x8121=0x00) (Reg 0x8122=0x00) (Reg 0x8123=0x00)
(Reg 0x8124=0x00) (Reg 0x8125=0x00) (Reg 0x8126=0x00) (Reg 0x8127=0x00)
(Reg 0x8128=0x00) (Reg 0x8129=0x00) (Reg 0x812a=0x00) (Reg 0x812b=0x00)
(Reg 0x812c=0x00) (Reg 0x812d=0x00) (Reg 0x812e=0x00) (Reg 0x812f=0x00)
(Reg 0x8130=0x00) (Reg 0x8131=0x00) (Reg 0x8132=0x00) (Reg 0x8133=0x00)
(Reg 0x8134=0x00) (Reg 0x8135=0x00) (Reg 0x8136=0x00) (Reg 0x8137=0x00)
(Reg 0x8138=0x00) (Reg 0x8139=0x00) (Reg 0x813a=0x00) (Reg 0x813b=0x00)
(Reg 0x813c=0x00) (Reg 0x813d=0x00) (Reg 0x813e=0x00) (Reg 0x813f=0x00)
(Reg 0x8140=0x00) (Reg 0x8141=0x00) (Reg 0x8142=0x00) (Reg 0x8143=0x00)
(Reg 0x8144=0x00) (Reg 0x8145=0x00) (Reg 0x8146=0x00) (Reg 0x8147=0x00)
(Reg 0x8148=0x00) (Reg 0x8149=0x00) (Reg 0x814a=0x00) (Reg 0x814b=0x00)
(Reg 0x814c=0x00) (Reg 0x814d=0x00) (Reg 0x814e=0x00) (Reg 0x814f=0x00)
(Reg 0x8150=0x00) (Reg 0x8151=0x00) (Reg 0x8152=0x00) (Reg 0x8153=0x00)
(Reg 0x8154=0x00) (Reg 0x8155=0x00) (Reg 0x8156=0x00) (Reg 0x8157=0x00)
(Reg 0x8158=0x00) (Reg 0x8159=0x00) (Reg 0x815a=0x00) (Reg 0x815b=0x00)
(Reg 0x815c=0x00) (Reg 0x815d=0x00) (Reg 0x815e=0x00) (Reg 0x815f=0x00)
(Reg 0x8160=0x00) (Reg 0x8161=0x00) (Reg 0x8162=0x00) (Reg 0x8163=0x00)
(Reg 0x8164=0x00) (Reg 0x8165=0x00) (Reg 0x8166=0x00) (Reg 0x8167=0x00)
(Reg 0x8168=0x00) (Reg 0x8169=0x00) (Reg 0x816a=0x00) (Reg 0x816b=0x00)
(Reg 0x816c=0x00) (Reg 0x816d=0x00) (Reg 0x816e=0x00) (Reg 0x816f=0x00)
(Reg 0x8170=0x00) (Reg 0x8171=0x00) (Reg 0x8172=0x00) (Reg 0x8173=0x00)
(Reg 0x8174=0x00) (Reg 0x8175=0x00) (Reg 0x8176=0x00) (Reg 0x8177=0x00)
(Reg 0x8178=0x00) (Reg 0x8179=0x00) (Reg 0x817a=0x00) (Reg 0x817b=0x00)
(Reg 0x817c=0x00) (Reg 0x817d=0x00) (Reg 0x817e=0x00) (Reg 0x817f=0x00)

NVR 4 Registers:

(Reg 0x8180=0x00)

Vendor NVR1 Registers

(Reg 0x8400=0x00) (Reg 0x8401=0x00) (Reg 0x8402=0x00) (Reg 0x8403=0x00)
(Reg 0x8404=0x00) (Reg 0x8405=0x00) (Reg 0x8406=0x00) (Reg 0x8407=0x00)
(Reg 0x8408=0x00) (Reg 0x8409=0x00) (Reg 0x840a=0x00) (Reg 0x840b=0x00)
(Reg 0x840c=0x00) (Reg 0x840d=0x00) (Reg 0x840e=0x00) (Reg 0x840f=0x00)
(Reg 0x8410=0x43) (Reg 0x8411=0x49) (Reg 0x8412=0x53) (Reg 0x8413=0x43)
(Reg 0x8414=0x4f) (Reg 0x8415=0x20) (Reg 0x8416=0x20) (Reg 0x8417=0x20)
(Reg 0x8418=0x20) (Reg 0x8419=0x20) (Reg 0x841a=0x20) (Reg 0x841b=0x20)
(Reg 0x841c=0x20) (Reg 0x841d=0x20) (Reg 0x841e=0x20) (Reg 0x841f=0x20)
(Reg 0x8420=0x43) (Reg 0x8421=0x46) (Reg 0x8422=0x50) (Reg 0x8423=0x2d)
(Reg 0x8424=0x31) (Reg 0x8425=0x30) (Reg 0x8426=0x30) (Reg 0x8427=0x47)
(Reg 0x8428=0x2d) (Reg 0x8429=0x4c) (Reg 0x842a=0x52) (Reg 0x842b=0x34)
(Reg 0x842c=0x20) (Reg 0x842d=0x20) (Reg 0x842e=0x20) (Reg 0x842f=0x20)
(Reg 0x8430=0x56) (Reg 0x8431=0x45) (Reg 0x8432=0x53) (Reg 0x8433=0x31)
(Reg 0x8434=0x32) (Reg 0x8435=0x46) (Reg 0x8436=0x4e) (Reg 0x8437=0x53)
(Reg 0x8438=0x31) (Reg 0x8439=0x34) (Reg 0x843a=0x32) (Reg 0x843b=0x32)
(Reg 0x843c=0x31) (Reg 0x843d=0x50) (Reg 0x843e=0x44) (Reg 0x843f=0x58)
(Reg 0x8440=0x31) (Reg 0x8441=0x30) (Reg 0x8442=0x2d) (Reg 0x8443=0x32)
(Reg 0x8444=0x35) (Reg 0x8445=0x34) (Reg 0x8446=0x39) (Reg 0x8447=0x2d)
(Reg 0x8448=0x30) (Reg 0x8449=0x31) (Reg 0x844a=0x20) (Reg 0x844b=0x20)
(Reg 0x844c=0x30) (Reg 0x844d=0x31) (Reg 0x844e=0x20) (Reg 0x844f=0x20)
(Reg 0x8450=0x00) (Reg 0x8451=0x00) (Reg 0x8452=0x00) (Reg 0x8453=0x00)
(Reg 0x8454=0x00) (Reg 0x8455=0x00) (Reg 0x8456=0x00) (Reg 0x8457=0x00)
(Reg 0x8458=0x00) (Reg 0x8459=0x00) (Reg 0x845a=0x00) (Reg 0x845b=0x00)
(Reg 0x845c=0x00) (Reg 0x845d=0x00) (Reg 0x845e=0x00) (Reg 0x845f=0x00)
```

```
(Reg 0x8460=0x00) (Reg 0x8461=0x00) (Reg 0x8462=0x00) (Reg 0x8463=0x00)
(Reg 0x8464=0x00) (Reg 0x8465=0x00) (Reg 0x8466=0x00) (Reg 0x8467=0x00)
(Reg 0x8468=0x00) (Reg 0x8469=0x00) (Reg 0x846a=0x00) (Reg 0x846b=0x00)
(Reg 0x846c=0x00) (Reg 0x846d=0x00) (Reg 0x846e=0x00) (Reg 0x846f=0x00)
(Reg 0x8470=0x00) (Reg 0x8471=0x00) (Reg 0x8472=0x00) (Reg 0x8473=0x00)
(Reg 0x8474=0x00) (Reg 0x8475=0x00) (Reg 0x8476=0x00) (Reg 0x8477=0x00)
(Reg 0x8478=0x00) (Reg 0x8479=0x00) (Reg 0x847a=0x00) (Reg 0x847b=0x00)
(Reg 0x847c=0x00) (Reg 0x847d=0x00) (Reg 0x847e=0x00) (Reg 0x847f=0x1d)

VR 1 Registers:

(Reg 0xa000=0x0000) (Reg 0xa001=0x0000) (Reg 0xa002=0x0000) (Reg 0xa003=0x0000)
(Reg 0xa004=0x0000) (Reg 0xa005=0x0003) (Reg 0xa006=0x0002) (Reg 0xa007=0x0001)
(Reg 0xa008=0x0003) (Reg 0xa009=0x0002) (Reg 0xa00a=0x0001) (Reg 0xa00b=0x0000)
(Reg 0xa00c=0x0000) (Reg 0xa00d=0x0000) (Reg 0xa00e=0x0000) (Reg 0xa00f=0x0000)
(Reg 0xa010=0x000e) (Reg 0xa011=0x0200) (Reg 0xa012=0x0000) (Reg 0xa013=0x0000)
(Reg 0xa014=0x0000) (Reg 0xa015=0x0000) (Reg 0xa016=0x0020) (Reg 0xa017=0x0000)
(Reg 0xa018=0x0000) (Reg 0xa019=0x0000) (Reg 0xa01a=0x0000) (Reg 0xa01b=0x0000)
(Reg 0xa01c=0x0000) (Reg 0xa01d=0x0003) (Reg 0xa01e=0x0000) (Reg 0xa01f=0x0000)
(Reg 0xa020=0x0000) (Reg 0xa021=0x0000) (Reg 0xa022=0x0000) (Reg 0xa023=0x0000)
(Reg 0xa024=0x0000) (Reg 0xa025=0x0000) (Reg 0xa026=0x0000) (Reg 0xa027=0x0000)
(Reg 0xa028=0x0040) (Reg 0xa029=0x8070) (Reg 0xa02a=0x0062) (Reg 0xa02b=0x0999)
(Reg 0xa02c=0x0099) (Reg 0xa02d=0x0000) (Reg 0xa02e=0x0000) (Reg 0xa02f=0x26a6)
(Reg 0xa030=0x7cc3) (Reg 0xa031=0x0000) (Reg 0xa032=0x0000) (Reg 0xa033=0x0000)
(Reg 0xa034=0x0000) (Reg 0xa035=0x0000) (Reg 0xa036=0x0000) (Reg 0xa037=0x0000)
(Reg 0xa038=0x0000) (Reg 0xa039=0x0000) (Reg 0xa03a=0x0000)

NETWORK LANE VR 1 Registers:

(Reg 0xa200=0x0000) (Reg 0xa201=0x0000) (Reg 0xa202=0x0000) (Reg 0xa203=0x0000)
(Reg 0xa204=0x0000) (Reg 0xa205=0x0000) (Reg 0xa206=0x0000) (Reg 0xa207=0x0000)
(Reg 0xa208=0x0000) (Reg 0xa209=0x0000) (Reg 0xa20a=0x0000) (Reg 0xa20b=0x0000)
(Reg 0xa20c=0x0000) (Reg 0xa20d=0x0000) (Reg 0xa20e=0x0000) (Reg 0xa20f=0x0000)
(Reg 0xa210=0x0000) (Reg 0xa211=0x0000) (Reg 0xa212=0x0000) (Reg 0xa213=0x0000)
(Reg 0xa214=0x0000) (Reg 0xa215=0x0000) (Reg 0xa216=0x0000) (Reg 0xa217=0x0000)
(Reg 0xa218=0x0000) (Reg 0xa219=0x0000) (Reg 0xa21a=0x0000) (Reg 0xa21b=0x0000)
(Reg 0xa21c=0x0000) (Reg 0xa21d=0x0000) (Reg 0xa21e=0x0000) (Reg 0xa21f=0x0000)
(Reg 0xa220=0x0000) (Reg 0xa221=0x0000) (Reg 0xa222=0x0000) (Reg 0xa223=0x0000)
(Reg 0xa224=0x0000) (Reg 0xa225=0x0000) (Reg 0xa226=0x0000) (Reg 0xa227=0x0000)
(Reg 0xa228=0x0000) (Reg 0xa229=0x0000) (Reg 0xa22a=0x0000) (Reg 0xa22b=0x0000)
(Reg 0xa22c=0x0000) (Reg 0xa22d=0x0000) (Reg 0xa22e=0x0000) (Reg 0xa22f=0x0000)
(Reg 0xa230=0x0000) (Reg 0xa231=0x0000) (Reg 0xa232=0x0000) (Reg 0xa233=0x0000)
(Reg 0xa234=0x0000) (Reg 0xa235=0x0000) (Reg 0xa236=0x0000) (Reg 0xa237=0x0000)
(Reg 0xa238=0x0000) (Reg 0xa239=0x0000) (Reg 0xa23a=0x0000) (Reg 0xa23b=0x0000)
(Reg 0xa23c=0x0000) (Reg 0xa23d=0x0000) (Reg 0xa23e=0x0000) (Reg 0xa23f=0x0000)
(Reg 0xa240=0x9999) (Reg 0xa241=0x9999) (Reg 0xa242=0x9999) (Reg 0xa243=0x9999)
(Reg 0xa244=0x0000) (Reg 0xa245=0x0000) (Reg 0xa246=0x0000) (Reg 0xa247=0x0000)
(Reg 0xa248=0x0000) (Reg 0xa249=0x0000) (Reg 0xa24a=0x0000) (Reg 0xa24b=0x0000)
(Reg 0xa24c=0x0000) (Reg 0xa24d=0x0000) (Reg 0xa24e=0x0000) (Reg 0xa24f=0x0000)
(Reg 0xa250=0xe058) (Reg 0xa251=0xe058) (Reg 0xa252=0xe058) (Reg 0xa253=0xe058)
(Reg 0xa254=0x0000) (Reg 0xa255=0x0000) (Reg 0xa256=0x0000) (Reg 0xa257=0x0000)
(Reg 0xa258=0x0000) (Reg 0xa259=0x0000) (Reg 0xa25a=0x0000) (Reg 0xa25b=0x0000)
(Reg 0xa25c=0x0000) (Reg 0xa25d=0x0000) (Reg 0xa25e=0x0000) (Reg 0xa25f=0x0000)
(Reg 0xa260=0x0000)

NETWORK LANE VR 2 Registers:

(Reg 0xa280=0x0000) (Reg 0xa281=0x0000) (Reg 0xa282=0x0000) (Reg 0xa283=0x0000)
(Reg 0xa284=0x0000) (Reg 0xa285=0x0000) (Reg 0xa286=0x0000) (Reg 0xa287=0x0000)
(Reg 0xa288=0x0000) (Reg 0xa289=0x0000) (Reg 0xa28a=0x0000) (Reg 0xa28b=0x0000)
(Reg 0xa28c=0x0000) (Reg 0xa28d=0x0000) (Reg 0xa28e=0x0000) (Reg 0xa28f=0x0000)
(Reg 0xa290=0x0000) (Reg 0xa291=0x0000) (Reg 0xa292=0x0000) (Reg 0xa293=0x0000)
(Reg 0xa294=0x0000) (Reg 0xa295=0x0000) (Reg 0xa296=0x0000) (Reg 0xa297=0x0000)
(Reg 0xa298=0x0000) (Reg 0xa299=0x0000) (Reg 0xa29a=0x0000) (Reg 0xa29b=0x0000)
```

```
(Reg 0xa29c=0x0000) (Reg 0xa29d=0x0000) (Reg 0xa29e=0x0000) (Reg 0xa29f=0x0000)
(Reg 0xa2a0=0xb766) (Reg 0xa2a1=0x98aa) (Reg 0xa2a2=0x922b) (Reg 0xa2a3=0x882c)
(Reg 0xa2a4=0x0000) (Reg 0xa2a5=0x0000) (Reg 0xa2a6=0x0000) (Reg 0xa2a7=0x0000)
(Reg 0xa2a8=0x0000) (Reg 0xa2a9=0x0000) (Reg 0xa2aa=0x0000) (Reg 0xa2ab=0x0000)
(Reg 0xa2ac=0x0000) (Reg 0xa2ad=0x0000) (Reg 0xa2ae=0x0000) (Reg 0xa2af=0x0000)
(Reg 0xa2b0=0x3238) (Reg 0xa2b1=0x364a) (Reg 0xa2b2=0x38b5) (Reg 0xa2b3=0x39c7)
(Reg 0xa2b4=0x0000) (Reg 0xa2b5=0x0000) (Reg 0xa2b6=0x0000) (Reg 0xa2b7=0x0000)
(Reg 0xa2b8=0x0000) (Reg 0xa2b9=0x0000) (Reg 0xa2ba=0x0000) (Reg 0xa2bb=0x0000)
(Reg 0xa2bc=0x0000) (Reg 0xa2bd=0x0000) (Reg 0xa2be=0x0000) (Reg 0xa2bf=0x0000)
(Reg 0xa2c0=0x2fc0) (Reg 0xa2c1=0x2fae) (Reg 0xa2c2=0x2fc0) (Reg 0xa2c3=0x2fd1)
(Reg 0xa2c4=0x0000) (Reg 0xa2c5=0x0000) (Reg 0xa2c6=0x0000) (Reg 0xa2c7=0x0000)
(Reg 0xa2c8=0x0000) (Reg 0xa2c9=0x0000) (Reg 0xa2ca=0x0000) (Reg 0xa2cb=0x0000)
(Reg 0xa2cc=0x0000) (Reg 0xa2cd=0x0000) (Reg 0xa2ce=0x0000) (Reg 0xa2cf=0x0000)
(Reg 0xa2d0=0x2b06) (Reg 0xa2d1=0x3579) (Reg 0xa2d2=0x3462) (Reg 0xa2d3=0x3867)
(Reg 0xa2d4=0x0000) (Reg 0xa2d5=0x0000) (Reg 0xa2d6=0x0000) (Reg 0xa2d7=0x0000)
(Reg 0xa2d8=0x0000) (Reg 0xa2d9=0x0000) (Reg 0xa2da=0x0000) (Reg 0xa2db=0x0000)
(Reg 0xa2dc=0x0000) (Reg 0xa2dd=0x0000) (Reg 0xa2de=0x0000) (Reg 0xa2df=0x0000)
(Reg 0xa2e0=0x0000)

HOST LANE VR 1 Registers:

(Reg 0xa400=0x0000) (Reg 0xa401=0x0000) (Reg 0xa402=0x0000) (Reg 0xa403=0x0000)
(Reg 0xa404=0x0000) (Reg 0xa405=0x0000) (Reg 0xa406=0x0000) (Reg 0xa407=0x0000)
(Reg 0xa408=0x0000) (Reg 0xa409=0x0000) (Reg 0xa40a=0x0000) (Reg 0xa40b=0x0000)
(Reg 0xa40c=0x0000) (Reg 0xa40d=0x0000) (Reg 0xa40e=0x0000) (Reg 0xa40f=0x0000)
(Reg 0xa410=0x0000) (Reg 0xa411=0x0000) (Reg 0xa412=0x0000) (Reg 0xa413=0x0000)
(Reg 0xa414=0x0000) (Reg 0xa415=0x0000) (Reg 0xa416=0x0000) (Reg 0xa417=0x0000)
(Reg 0xa418=0x0000) (Reg 0xa419=0x0000) (Reg 0xa41a=0x0000) (Reg 0xa41b=0x0000)
(Reg 0xa41c=0x0000) (Reg 0xa41d=0x0000) (Reg 0xa41e=0x0000) (Reg 0xa41f=0x0000)
(Reg 0xa420=0x0001) (Reg 0xa421=0x0001) (Reg 0xa422=0x0001) (Reg 0xa423=0x0001)
(Reg 0xa424=0x0001) (Reg 0xa425=0x0001) (Reg 0xa426=0x0001) (Reg 0xa427=0x0001)
(Reg 0xa428=0x0001) (Reg 0xa429=0x0001) (Reg 0xa42a=0x0000) (Reg 0xa42b=0x0000)
(Reg 0xa42c=0x0000) (Reg 0xa42d=0x0000) (Reg 0xa42e=0x0000) (Reg 0xa42f=0x0000)
(Reg 0xa430=0x0000) (Reg 0xa431=0x0000) (Reg 0xa432=0x0000) (Reg 0xa433=0x0000)
(Reg 0xa434=0x0000) (Reg 0xa435=0x0000) (Reg 0xa436=0x0000) (Reg 0xa437=0x0000)
(Reg 0xa438=0x0000) (Reg 0xa439=0x0000) (Reg 0xa43a=0x0000) (Reg 0xa43b=0x0000)
(Reg 0xa43c=0x0000) (Reg 0xa43d=0x0000) (Reg 0xa43e=0x0000) (Reg 0xa43f=0x0000)
(Reg 0xa440=0x0001) (Reg 0xa441=0x0001) (Reg 0xa442=0x0001) (Reg 0xa443=0x0001)
(Reg 0xa444=0x0001) (Reg 0xa445=0x0001) (Reg 0xa446=0x0001) (Reg 0xa447=0x0001)
(Reg 0xa448=0x0001) (Reg 0xa449=0x0001) (Reg 0xa44a=0x0000) (Reg 0xa44b=0x0000)
(Reg 0xa44c=0x0000) (Reg 0xa44d=0x0000) (Reg 0xa44e=0x0000) (Reg 0xa44f=0x0000)
(Reg 0xa450=0x0000)
```

The following example shows sample output from the **show controllers HundredGigE bert** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0 bert
Tue Mar 22 06:01:53.201 UTC
Command not supported on this interface
```

The following example shows sample output from the **show controllers HundredGigE control** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0 control
Tue Mar 22 06:02:02.882 UTC
Management information for interface HundredGigE0/3/0/0:

Port number: 0
Bay number: 0
Interface handle: 0x1380040

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: Not configured (None)
    IPG: Configuration not supported (standard (12))
    Loopback: Not configured (None)
    MTU: 9188 bytes
    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: 9600 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
    Allowed config mask: 0x26b

Cached driver state:
    MTU: 9196 bytes
    Burnt-in MAC address: 001d.70b6.6810

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

Bundle settings:
    Aggregated: No
    Bundle MTU: 1514 bytes
    Bundle MAC address: 001d.70b6.6810

Port FSM state:
    Port is enabled, link is up
Complete FSM state:
    Admin up
    Bundle admin up
    Client admin up
    Client admin tx not disabled
    Port enabled
    Port tx enabled
    Hardware link up
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:
```

The following example shows sample output from the **show controllers HundredGigE internal** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0 internal
Tue Mar 22 06:02:47.254 UTC
PLIM 1 Port HundredGigE Internal Information:
shmwin pointer: 0x581d4264
shmwin id     : 0x3c
shmwin initlization: complete
shmwin mac stats pointer: 0x603d3020
shmwin mac stats version: 0x1
shmwin ctx pointer: 0x603db07c
shmwin ctx version: 0x1
HW initilization: completed
Maximum CFP power class supported: 4
Maximum CFP power consumption supported: 30000 mW
```

The following example shows sample output from the **show controllers HundredGigE mac** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0 mac
Tue Mar 22 06:02:56.722 UTC

Operational address: 001d.70b6.6810
Burnt-in address: 001d.70b6.6810
MAC state for beluga 0 port 0

0 HSRP/VRRP MAC addresses

VLAN Ethertype: 0x8100
QinQ Ethertype: 0x88a8
MTP  Ethertype: 0x88e7

4 VLAN UIDB entries
VLAN1   VLAN2      Packet Type Flags      UIDB Result Flags
   0        0          VLAN                  1 VLAN
   0        0               ARPA             1 ARPA
   0        0                    SAP         1 SAP
   0        0                                1 SNAP
```

The following example shows sample output from the **show controllers HundredGigE phy** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0 phy
Tue Mar 22 06:03:04.371 UTC

802.3ba PCS
  Previous PCS Alarms:
    None

  Current PCS Status:
    PCS is able to support 100GBASE-R
    PCS is Block Locked
    PCS Rx Link Status is UP
    PCS Errored Block Counts: 0
    PCS BER (Sync Header Error) Counts: 0

PCS detailed information:

  RX Service Interface Lane Sync Header Lock Status:

    Lane-0 : Locked           Lane-10 : Locked
    Lane-1 : Locked           Lane-11 : Locked
    Lane-2 : Locked           Lane-12 : Locked
```

```
  Lane-3 : Locked           Lane-13 : Locked
  Lane-4 : Locked           Lane-14 : Locked
  Lane-5 : Locked           Lane-15 : Locked
  Lane-6 : Locked           Lane-16 : Locked
  Lane-7 : Locked           Lane-17 : Locked
  Lane-8 : Locked           Lane-18 : Locked
  Lane-9 : Locked           Lane-19 : Locked

RX Service Interface Lane Marker Lock Status:

  Lane-0 : Locked           Lane-10 : Locked
  Lane-1 : Locked           Lane-11 : Locked
  Lane-2 : Locked           Lane-12 : Locked
  Lane-3 : Locked           Lane-13 : Locked
  Lane-4 : Locked           Lane-14 : Locked
  Lane-5 : Locked           Lane-15 : Locked
  Lane-6 : Locked           Lane-16 : Locked
  Lane-7 : Locked           Lane-17 : Locked
  Lane-8 : Locked           Lane-18 : Locked
  Lane-9 : Locked           Lane-19 : Locked

Mapping of Service Interface Lane and RX PCS Lane:

  Rx Service Interface Lane 0 = PCS Lane 11
  Rx Service Interface Lane 1 = PCS Lane 1
  Rx Service Interface Lane 2 = PCS Lane 0
  Rx Service Interface Lane 3 = PCS Lane 12
  Rx Service Interface Lane 4 = PCS Lane 10
  Rx Service Interface Lane 5 = PCS Lane 3
  Rx Service Interface Lane 6 = PCS Lane 4
  Rx Service Interface Lane 7 = PCS Lane 14
  Rx Service Interface Lane 8 = PCS Lane 2
  Rx Service Interface Lane 9 = PCS Lane 13
  Rx Service Interface Lane 10 = PCS Lane 15
  Rx Service Interface Lane 11 = PCS Lane 7
  Rx Service Interface Lane 12 = PCS Lane 5
  Rx Service Interface Lane 13 = PCS Lane 16
  Rx Service Interface Lane 14 = PCS Lane 9
  Rx Service Interface Lane 15 = PCS Lane 6
  Rx Service Interface Lane 16 = PCS Lane 8
  Rx Service Interface Lane 17 = PCS Lane 17
  Rx Service Interface Lane 18 = PCS Lane 18
  Rx Service Interface Lane 19 = PCS Lane 19

PCS Lane BIP Error Counters:

  Lane-0 : 0                Lane-10 : 0
  Lane-1 : 0                Lane-11 : 0
  Lane-2 : 0                Lane-12 : 0
  Lane-3 : 0                Lane-13 : 0
  Lane-4 : 0                Lane-14 : 0
  Lane-5 : 0                Lane-15 : 0
  Lane-6 : 0                Lane-16 : 0
  Lane-7 : 0                Lane-17 : 0
  Lane-8 : 0                Lane-18 : 0
  Lane-9 : 0                Lane-19 : 0

Total PCS Lane BIP Error Count : 0
Total PCS Lane Sync Header Error Count  : 0
Total PCS Lane Bad 64/66 Code Count     : 3


Serdes section:
===============
```

```
None of 10 RX serial inputs detects loss of signal.
All of 10 Tx clock multiplication units are locked.
All of 10 Rx clock/data recovery units are locked.
None of 10 TX FIFO has underflow/overflow condition.
None of 10 RX FIFO has underflow/overflow condition.

CFP section:
==============

CFP General Information:

  Module Identifier:         CFP
  Ethernet Application Code: 100GBASE-LR4
  Module State:              Ready
  Power Class:               3
  Maximum Power Consumption: 23000 mW

CFP Vendor Information:

  Vendor Name:         CISCO-SUMITOMO
  Vendor PN:           FTLC1181RDNS-C1
  Vendor SN:           C22CSLA
  Vendor OUI:          0x0-0x90-0x65
  Lot Code:            00
  DATE CODE(YYYY/MM/DD): 2010/06/02
  CFP MSA Hardware Version:   1.0
  CFP MSA MDIO Version:       1.2
  Vendor Hardware Version:    1.2
  Vendor Firmware Version:    1.4

CFP UDI Information:

  UDI Compliant: Yes
  Cisco PID: CFP-100G-LR4
  Cisco VID: VES1

CFP Cisco Information:

  Vendor Name: CISCO
  Cisco PN   : 10-2549-01    Rev 01
  Cisco SN   : FNS14221PDX

CFP Detail Information:

  Number of lanes supoorted:

    Number of network lanes: 4
    Number of host lanes   : 10

  Time required by module:

    Maximum high-power-up time  :  15 s
    Maximum high-power-down time:   0 s
    Maximum tx-turn-on time     :   1 s
    Maximum tx-turn-off time    :   0 ms

  Module general control:

    Soft reset asserted     : No
    Soft low power asserted : No
    Soft tx disable asserted: No
    Soft program control 3 asserted: No
    Soft program control 2 asserted: No
```

```
    Soft program control 1 asserted: No
    Soft global alarm test asserted: No

    Tx disable pin asserted: No
    Low power pin asserted : No
    Program control 3 pin asserted: Yes
    Program control 2 pin asserted: Yes
    Program control 1 pin asserted: Yes

  Module Analog A/D value:

    Power supply voltage : 3.1969 V
    Temperature          : 38.4290 degC

  Network lane A/D value:

    Lane 0 Tx power: 1.2776 mW (  1.1 dBm)
    Lane 1 Tx power: 1.3995 mW (  1.5 dBm)
    Lane 2 Tx power: 1.4517 mW (  1.6 dBm)
    Lane 3 Tx power: 1.4856 mW (  1.7 dBm)

    Lane 0 Rx power: 1.1044 mW (  0.4 dBm)
    Lane 1 Rx power: 1.3834 mW (  1.4 dBm)
    Lane 2 Rx power: 1.3426 mW (  1.3 dBm)
    Lane 3 Rx power: 1.4456 mW (  1.6 dBm)

    Total Tx power : 5.6144 mW (  7.5 dBm)
    Total Rx power : 5.2760 mW (  7.2 dBm)
```

The following example shows sample output from the **show controllers HundredGigE regs** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0 regs
Tue Mar 22 06:03:25.597 UTC

PCS 802.3ba Registers:
======================
Control 1 = 0x0010
Status 1 = 0x0004
Dev ID 0 = 0x0000 Dev ID 1 = 0x0000
Speed Ability = 0x0008
Devices 1 = 0x0004 Devices 2 = 0x0000
Control 2 = 0x0005
Status 2 = 0x0020
PKG ID 0 = 0x0000 PKG ID 1 = 0x0000
Base R Status 1 = 0x1001
Base R Status 2 = 0x8000
BER high order counter = 0x0000
Errored blocks high order counter = 0x8000
Base R test pattern control = 0x0080
Base R test pattern error counter = 0x0000
Multi-lane BASE-R alignment status 1 = 0x10ff
Multi-lane BASE-R alignment status 2 = 0x0fff
Multi-lane BASE-R alignment status 3 = 0x00ff
Multi-lane BASE-R alignment status 4 = 0x0fff
BIP error counter lane 0 = 0x0000
BIP error counter lane 1 = 0x0000
BIP error counter lane 2 = 0x0000
BIP error counter lane 3 = 0x0000
BIP error counter lane 4 = 0x0000
BIP error counter lane 5 = 0x0000
BIP error counter lane 6 = 0x0000
BIP error counter lane 7 = 0x0000
BIP error counter lane 8 = 0x0000
```

```
BIP error counter lane 9 = 0x0000
BIP error counter lane 10 = 0x0000
BIP error counter lane 11 = 0x0000
BIP error counter lane 12 = 0x0000
BIP error counter lane 13 = 0x0000
BIP error counter lane 14 = 0x0000
BIP error counter lane 15 = 0x0000
BIP error counter lane 16 = 0x0000
BIP error counter lane 17 = 0x0000
BIP error counter lane 18 = 0x0000
BIP error counter lane 19 = 0x0000
Lane mapping register 0 = 0x000b
Lane mapping register 1 = 0x0001
Lane mapping register 2 = 0x0000
Lane mapping register 3 = 0x000c
Lane mapping register 4 = 0x000a
Lane mapping register 5 = 0x0003
Lane mapping register 6 = 0x0004
Lane mapping register 7 = 0x000e
Lane mapping register 8 = 0x0002
Lane mapping register 9 = 0x000d
Lane mapping register 10 = 0x000f
Lane mapping register 11 = 0x0007
Lane mapping register 12 = 0x0005
Lane mapping register 13 = 0x0010
Lane mapping register 14 = 0x0009
Lane mapping register 15 = 0x0006
Lane mapping register 16 = 0x0008
Lane mapping register 17 = 0x0011
Lane mapping register 18 = 0x0012
Lane mapping register 19 = 0x0013

Serdes registers:
==================

Chip id register: 0x8154
Chip revision id register: 0x1
Digital control 1 register register:
  serdes0:0x017a, serdes1:0x017a, serdes2:0x017a, serdes3:0x017a, serdes4:0x017a
  serdes5:0x017a, serdes6:0x017a, serdes7:0x017a, serdes8:0x017a, serdes9:0x017a
Digital control 2 register register:
  serdes0:0x0305, serdes1:0x0305, serdes2:0x0305, serdes3:0x0305, serdes4:0x0305
  serdes5:0x0305, serdes6:0x0305, serdes7:0x0305, serdes8:0x0305, serdes9:0x0305
Digital control 3 register register:
  serdes0:0x0d0f, serdes1:0x0d0f, serdes2:0x0d0f, serdes3:0x0d0f, serdes4:0x0d0f
  serdes5:0x0d0f, serdes6:0x0d0f, serdes7:0x0d0f, serdes8:0x0d0f, serdes9:0x0d0f
Digital control 5 register register:
  serdes0:0x6de0, serdes1:0x6de0, serdes2:0x6de0, serdes3:0x6de0, serdes4:0x6de0
  serdes5:0x6de0, serdes6:0x6de0, serdes7:0x6de0, serdes8:0x6de0, serdes9:0x6de0
Digital status 0 register register:
  serdes0:0x303b, serdes1:0x303b, serdes2:0x303b, serdes3:0x303b, serdes4:0x303b
  serdes5:0x303b, serdes6:0x303b, serdes7:0x303b, serdes8:0x303b, serdes9:0x303b
Line PRBS control register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
Line PRBS status register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
System PRBS control register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
System PRBS status register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
```

```
PRBS status 2 register register:
  serdes0:0x8008, serdes1:0x8008, serdes2:0x8008, serdes3:0x8008, serdes4:0x8008
  serdes5:0x8008, serdes6:0x8008, serdes7:0x8008, serdes8:0x8008, serdes9:0x8008
TX control 1 register register:
  serdes0:0x1884, serdes1:0x1884, serdes2:0x1884, serdes3:0x1884, serdes4:0x1884
  serdes5:0x1884, serdes6:0x1884, serdes7:0x1884, serdes8:0x1884, serdes9:0x1884
TX control 2 register register:
  serdes0:0x00a0, serdes1:0x00a0, serdes2:0x00a0, serdes3:0x00a0, serdes4:0x00a0
  serdes5:0x00a0, serdes6:0x00a0, serdes7:0x00a0, serdes8:0x00a0, serdes9:0x00a0
TX control 4 register register:
  serdes0:0x2412, serdes1:0x2412, serdes2:0x2412, serdes3:0x2412, serdes4:0x2412
  serdes5:0x2412, serdes6:0x2412, serdes7:0x2412, serdes8:0x2412, serdes9:0x2412
TX control 7 register register:
  serdes0:0x1077, serdes1:0x1077, serdes2:0x1077, serdes3:0x1077, serdes4:0x1077
  serdes5:0x1077, serdes6:0x1077, serdes7:0x1077, serdes8:0x1077, serdes9:0x1077
TX control 8 register register:
  serdes0:0xb800, serdes1:0xb800, serdes2:0xb800, serdes3:0xb800, serdes4:0xb800
  serdes5:0xb800, serdes6:0xb800, serdes7:0xb800, serdes8:0xb800, serdes9:0xb800
TX LVDS contrl 1 register register:
  serdes0:0x6050, serdes1:0x6050, serdes2:0x6050, serdes3:0x6050, serdes4:0x6050
  serdes5:0x6050, serdes6:0x6050, serdes7:0x6050, serdes8:0x6050, serdes9:0x6050
TX LVDS contrl 2 register register:
  serdes0:0x3bb1, serdes1:0x3ba1, serdes2:0x3ba9, serdes3:0x3ba9, serdes4:0x3bb1
  serdes5:0x3ba9, serdes6:0x3ba9, serdes7:0x3ba9, serdes8:0x3bb1, serdes9:0x3ba9
TX LVDS contrl 3 register register:
  serdes0:0x3bb1, serdes1:0x3ba1, serdes2:0x3ba9, serdes3:0x3ba9, serdes4:0x3bb1
  serdes5:0x3ba9, serdes6:0x3ba9, serdes7:0x3ba9, serdes8:0x3bb1, serdes9:0x3ba9
RX control 2 register register:
  serdes0:0x2220, serdes1:0x2220, serdes2:0x2224, serdes3:0x2224, serdes4:0x2222
  serdes5:0x2224, serdes6:0x2220, serdes7:0x2224, serdes8:0x2220, serdes9:0x2224
RX control 3 register register:
  serdes0:0x1631, serdes1:0x1631, serdes2:0x1631, serdes3:0x1631, serdes4:0x1631
  serdes5:0x1631, serdes6:0x1631, serdes7:0x1631, serdes8:0x1631, serdes9:0x1631
RX control 4 register register:
  serdes0:0x60c8, serdes1:0x40c8, serdes2:0x50c8, serdes3:0x50c8, serdes4:0x60c8
  serdes5:0x50c8, serdes6:0x50c8, serdes7:0x50c8, serdes8:0x60c8, serdes9:0x50c8
RX control 6 register register:
  serdes0:0x081a, serdes1:0x081a, serdes2:0x081a, serdes3:0x081a, serdes4:0x081a
  serdes5:0x081a, serdes6:0x081a, serdes7:0x081a, serdes8:0x081a, serdes9:0x081a
RX control 7 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX control 8 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX control 9 register register:
  serdes0:0x0000, serdes1:0x0000, serdes2:0x0000, serdes3:0x0000, serdes4:0x0000
  serdes5:0x0000, serdes6:0x0000, serdes7:0x0000, serdes8:0x0000, serdes9:0x0000
RX LVDS contrl 1 register register:
  serdes0:0x0bfa, serdes1:0x0bba, serdes2:0x0bba, serdes3:0x0bba, serdes4:0x0bba
  serdes5:0x0bba, serdes6:0x0bba, serdes7:0x0bba, serdes8:0x0bba, serdes9:0x0bba

CFP Registers:
==============

NVR 1 Registers:

(Reg 0x8000=0x0e) (Reg 0x8001=0x95) (Reg 0x8002=0x01) (Reg 0x8003=0x01)
(Reg 0x8004=0x00) (Reg 0x8005=0x00) (Reg 0x8006=0x00) (Reg 0x8007=0x00)
(Reg 0x8008=0x08) (Reg 0x8009=0x4a) (Reg 0x800a=0x11) (Reg 0x800b=0x81)
(Reg 0x800c=0x34) (Reg 0x800d=0x0a) (Reg 0x800e=0x00) (Reg 0x800f=0x00)
(Reg 0x8010=0x01) (Reg 0x8011=0x04) (Reg 0x8012=0xca) (Reg 0x8013=0x45)
(Reg 0x8014=0xcc) (Reg 0x8015=0xb8) (Reg 0x8016=0x08) (Reg 0x8017=0x34)
(Reg 0x8018=0x21) (Reg 0x8019=0x44) (Reg 0x801a=0x40) (Reg 0x801b=0x70)
```

```
(Reg 0x801c=0x1c) (Reg 0x801d=0x73) (Reg 0x801e=0x64) (Reg 0x801f=0x46)
(Reg 0x8020=0x00) (Reg 0x8021=0x46) (Reg 0x8022=0x49) (Reg 0x8023=0x4e)
(Reg 0x8024=0x49) (Reg 0x8025=0x53) (Reg 0x8026=0x41) (Reg 0x8027=0x52)
(Reg 0x8028=0x20) (Reg 0x8029=0x43) (Reg 0x802a=0x4f) (Reg 0x802b=0x52)
(Reg 0x802c=0x50) (Reg 0x802d=0x2e) (Reg 0x802e=0x20) (Reg 0x802f=0x20)
(Reg 0x8030=0x20) (Reg 0x8031=0x00) (Reg 0x8032=0x90) (Reg 0x8033=0x65)
(Reg 0x8034=0x46) (Reg 0x8035=0x54) (Reg 0x8036=0x4c) (Reg 0x8037=0x43)
(Reg 0x8038=0x31) (Reg 0x8039=0x31) (Reg 0x803a=0x38) (Reg 0x803b=0x31)
(Reg 0x803c=0x52) (Reg 0x803d=0x44) (Reg 0x803e=0x4e) (Reg 0x803f=0x53)
(Reg 0x8040=0x2d) (Reg 0x8041=0x43) (Reg 0x8042=0x31) (Reg 0x8043=0x20)
(Reg 0x8044=0x43) (Reg 0x8045=0x32) (Reg 0x8046=0x32) (Reg 0x8047=0x43)
(Reg 0x8048=0x53) (Reg 0x8049=0x4c) (Reg 0x804a=0x41) (Reg 0x804b=0x20)
(Reg 0x804c=0x20) (Reg 0x804d=0x20) (Reg 0x804e=0x20) (Reg 0x804f=0x20)
(Reg 0x8050=0x20) (Reg 0x8051=0x20) (Reg 0x8052=0x20) (Reg 0x8053=0x20)
(Reg 0x8054=0x32) (Reg 0x8055=0x30) (Reg 0x8056=0x31) (Reg 0x8057=0x30)
(Reg 0x8058=0x30) (Reg 0x8059=0x36) (Reg 0x805a=0x30) (Reg 0x805b=0x32)
(Reg 0x805c=0x30) (Reg 0x805d=0x30) (Reg 0x805e=0x49) (Reg 0x805f=0x50)
(Reg 0x8060=0x55) (Reg 0x8061=0x49) (Reg 0x8062=0x42) (Reg 0x8063=0x48)
(Reg 0x8064=0x43) (Reg 0x8065=0x52) (Reg 0x8066=0x41) (Reg 0x8067=0x41)
(Reg 0x8068=0x0a) (Reg 0x8069=0x0c) (Reg 0x806a=0x01) (Reg 0x806b=0x02)
(Reg 0x806c=0x01) (Reg 0x806d=0x04) (Reg 0x806e=0x0c) (Reg 0x806f=0x03)
(Reg 0x8070=0x0f) (Reg 0x8071=0x68) (Reg 0x8072=0x0f) (Reg 0x8073=0x01)
(Reg 0x8074=0x01) (Reg 0x8075=0x00) (Reg 0x8076=0x00) (Reg 0x8077=0x00)
(Reg 0x8078=0x00) (Reg 0x8079=0x00) (Reg 0x807a=0x00) (Reg 0x807b=0x00)
(Reg 0x807c=0x00) (Reg 0x807d=0x00) (Reg 0x807e=0x00) (Reg 0x807f=0x1a)

NVR 2 Registers:

(Reg 0x8080=0x46) (Reg 0x8081=0x00) (Reg 0x8082=0x44) (Reg 0x8083=0x00)
(Reg 0x8084=0x02) (Reg 0x8085=0x00) (Reg 0x8086=0x00) (Reg 0x8087=0x00)
(Reg 0x8088=0x87) (Reg 0x8089=0x5a) (Reg 0x808a=0x86) (Reg 0x808b=0x10)
(Reg 0x808c=0x7b) (Reg 0x808d=0xc0) (Reg 0x808e=0x7a) (Reg 0x808f=0x75)
(Reg 0x8090=0x00) (Reg 0x8091=0x00) (Reg 0x8092=0x00) (Reg 0x8093=0x00)
(Reg 0x8094=0x00) (Reg 0x8095=0x00) (Reg 0x8096=0x00) (Reg 0x8097=0x00)
(Reg 0x8098=0x00) (Reg 0x8099=0x00) (Reg 0x809a=0x00) (Reg 0x809b=0x00)
(Reg 0x809c=0x00) (Reg 0x809d=0x00) (Reg 0x809e=0x00) (Reg 0x809f=0x00)
(Reg 0x80a0=0x00) (Reg 0x80a1=0x00) (Reg 0x80a2=0x00) (Reg 0x80a3=0x00)
(Reg 0x80a4=0x00) (Reg 0x80a5=0x00) (Reg 0x80a6=0x00) (Reg 0x80a7=0x00)
(Reg 0x80a8=0xea) (Reg 0x80a9=0x60) (Reg 0x80aa=0xe0) (Reg 0x80ab=0x9c)
(Reg 0x80ac=0x44) (Reg 0x80ad=0x5c) (Reg 0x80ae=0x3a) (Reg 0x80af=0x98)
(Reg 0x80b0=0x6e) (Reg 0x80b1=0x17) (Reg 0x80b2=0x62) (Reg 0x80b3=0x1e)
(Reg 0x80b4=0x10) (Reg 0x80b5=0x48) (Reg 0x80b6=0x0e) (Reg 0x80b7=0x83)
(Reg 0x80b8=0x37) (Reg 0x80b9=0x00) (Reg 0x80ba=0x35) (Reg 0x80bb=0x00)
(Reg 0x80bc=0x1b) (Reg 0x80bd=0x00) (Reg 0x80be=0x19) (Reg 0x80bf=0x00)
(Reg 0x80c0=0x6e) (Reg 0x80c1=0x17) (Reg 0x80c2=0x62) (Reg 0x80c3=0x1e)
(Reg 0x80c4=0x01) (Reg 0x80c5=0xf5) (Reg 0x80c6=0x00) (Reg 0x80c7=0xfb)
(Reg 0x80c8=0x00) (Reg 0x80c9=0x00) (Reg 0x80ca=0x00) (Reg 0x80cb=0x00)
(Reg 0x80cc=0x00) (Reg 0x80cd=0x00) (Reg 0x80ce=0x00) (Reg 0x80cf=0x00)
(Reg 0x80d0=0x00) (Reg 0x80d1=0x00) (Reg 0x80d2=0x00) (Reg 0x80d3=0x00)
(Reg 0x80d4=0x00) (Reg 0x80d5=0x00) (Reg 0x80d6=0x00) (Reg 0x80d7=0x00)
(Reg 0x80d8=0x00) (Reg 0x80d9=0x00) (Reg 0x80da=0x00) (Reg 0x80db=0x00)
(Reg 0x80dc=0x00) (Reg 0x80dd=0x00) (Reg 0x80de=0x00) (Reg 0x80df=0x00)
(Reg 0x80e0=0x00) (Reg 0x80e1=0x00) (Reg 0x80e2=0x00) (Reg 0x80e3=0x00)
(Reg 0x80e4=0x00) (Reg 0x80e5=0x00) (Reg 0x80e6=0x00) (Reg 0x80e7=0x00)
(Reg 0x80e8=0x00) (Reg 0x80e9=0x00) (Reg 0x80ea=0x00) (Reg 0x80eb=0x00)
(Reg 0x80ec=0x00) (Reg 0x80ed=0x00) (Reg 0x80ee=0x00) (Reg 0x80ef=0x00)
(Reg 0x80f0=0x00) (Reg 0x80f1=0x00) (Reg 0x80f2=0x00) (Reg 0x80f3=0x00)
(Reg 0x80f4=0x00) (Reg 0x80f5=0x00) (Reg 0x80f6=0x00) (Reg 0x80f7=0x00)
(Reg 0x80f8=0x00) (Reg 0x80f9=0x00) (Reg 0x80fa=0x00) (Reg 0x80fb=0x00)
(Reg 0x80fc=0x00) (Reg 0x80fd=0x00) (Reg 0x80fe=0x00) (Reg 0x80ff=0xe9)

NVR 3 Registers:

(Reg 0x8100=0x00) (Reg 0x8101=0x00) (Reg 0x8102=0x00) (Reg 0x8103=0x00)
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(Reg 0x8104=0x00) (Reg 0x8105=0x00) (Reg 0x8106=0x00) (Reg 0x8107=0x00)
(Reg 0x8108=0x00) (Reg 0x8109=0x00) (Reg 0x810a=0x00) (Reg 0x810b=0x00)
(Reg 0x810c=0x00) (Reg 0x810d=0x00) (Reg 0x810e=0x00) (Reg 0x810f=0x00)
(Reg 0x8110=0x00) (Reg 0x8111=0x00) (Reg 0x8112=0x00) (Reg 0x8113=0x00)
(Reg 0x8114=0x00) (Reg 0x8115=0x00) (Reg 0x8116=0x00) (Reg 0x8117=0x00)
(Reg 0x8118=0x00) (Reg 0x8119=0x00) (Reg 0x811a=0x00) (Reg 0x811b=0x00)
(Reg 0x811c=0x00) (Reg 0x811d=0x00) (Reg 0x811e=0x00) (Reg 0x811f=0x00)
(Reg 0x8120=0x00) (Reg 0x8121=0x00) (Reg 0x8122=0x00) (Reg 0x8123=0x00)
(Reg 0x8124=0x00) (Reg 0x8125=0x00) (Reg 0x8126=0x00) (Reg 0x8127=0x00)
(Reg 0x8128=0x00) (Reg 0x8129=0x00) (Reg 0x812a=0x00) (Reg 0x812b=0x00)
(Reg 0x812c=0x00) (Reg 0x812d=0x00) (Reg 0x812e=0x00) (Reg 0x812f=0x00)
(Reg 0x8130=0x00) (Reg 0x8131=0x00) (Reg 0x8132=0x00) (Reg 0x8133=0x00)
(Reg 0x8134=0x00) (Reg 0x8135=0x00) (Reg 0x8136=0x00) (Reg 0x8137=0x00)
(Reg 0x8138=0x00) (Reg 0x8139=0x00) (Reg 0x813a=0x00) (Reg 0x813b=0x00)
(Reg 0x813c=0x00) (Reg 0x813d=0x00) (Reg 0x813e=0x00) (Reg 0x813f=0x00)
(Reg 0x8140=0x00) (Reg 0x8141=0x00) (Reg 0x8142=0x00) (Reg 0x8143=0x00)
(Reg 0x8144=0x00) (Reg 0x8145=0x00) (Reg 0x8146=0x00) (Reg 0x8147=0x00)
(Reg 0x8148=0x00) (Reg 0x8149=0x00) (Reg 0x814a=0x00) (Reg 0x814b=0x00)
(Reg 0x814c=0x00) (Reg 0x814d=0x00) (Reg 0x814e=0x00) (Reg 0x814f=0x00)
(Reg 0x8150=0x00) (Reg 0x8151=0x00) (Reg 0x8152=0x00) (Reg 0x8153=0x00)
(Reg 0x8154=0x00) (Reg 0x8155=0x00) (Reg 0x8156=0x00) (Reg 0x8157=0x00)
(Reg 0x8158=0x00) (Reg 0x8159=0x00) (Reg 0x815a=0x00) (Reg 0x815b=0x00)
(Reg 0x815c=0x00) (Reg 0x815d=0x00) (Reg 0x815e=0x00) (Reg 0x815f=0x00)
(Reg 0x8160=0x00) (Reg 0x8161=0x00) (Reg 0x8162=0x00) (Reg 0x8163=0x00)
(Reg 0x8164=0x00) (Reg 0x8165=0x00) (Reg 0x8166=0x00) (Reg 0x8167=0x00)
(Reg 0x8168=0x00) (Reg 0x8169=0x00) (Reg 0x816a=0x00) (Reg 0x816b=0x00)
(Reg 0x816c=0x00) (Reg 0x816d=0x00) (Reg 0x816e=0x00) (Reg 0x816f=0x00)
(Reg 0x8170=0x00) (Reg 0x8171=0x00) (Reg 0x8172=0x00) (Reg 0x8173=0x00)
(Reg 0x8174=0x00) (Reg 0x8175=0x00) (Reg 0x8176=0x00) (Reg 0x8177=0x00)
(Reg 0x8178=0x00) (Reg 0x8179=0x00) (Reg 0x817a=0x00) (Reg 0x817b=0x00)
(Reg 0x817c=0x00) (Reg 0x817d=0x00) (Reg 0x817e=0x00) (Reg 0x817f=0x00)

NVR 4 Registers:

(Reg 0x8180=0x00)

Vendor NVR1 Registers

(Reg 0x8400=0x00) (Reg 0x8401=0x00) (Reg 0x8402=0x00) (Reg 0x8403=0x00)
(Reg 0x8404=0x00) (Reg 0x8405=0x00) (Reg 0x8406=0x00) (Reg 0x8407=0x00)
(Reg 0x8408=0x00) (Reg 0x8409=0x00) (Reg 0x840a=0x00) (Reg 0x840b=0x00)
(Reg 0x840c=0x00) (Reg 0x840d=0x00) (Reg 0x840e=0x00) (Reg 0x840f=0x00)
(Reg 0x8410=0x43) (Reg 0x8411=0x49) (Reg 0x8412=0x53) (Reg 0x8413=0x43)
(Reg 0x8414=0x4f) (Reg 0x8415=0x20) (Reg 0x8416=0x20) (Reg 0x8417=0x20)
(Reg 0x8418=0x20) (Reg 0x8419=0x20) (Reg 0x841a=0x20) (Reg 0x841b=0x20)
(Reg 0x841c=0x20) (Reg 0x841d=0x20) (Reg 0x841e=0x20) (Reg 0x841f=0x20)
(Reg 0x8420=0x43) (Reg 0x8421=0x46) (Reg 0x8422=0x50) (Reg 0x8423=0x2d)
(Reg 0x8424=0x31) (Reg 0x8425=0x30) (Reg 0x8426=0x30) (Reg 0x8427=0x47)
(Reg 0x8428=0x2d) (Reg 0x8429=0x4c) (Reg 0x842a=0x52) (Reg 0x842b=0x34)
(Reg 0x842c=0x20) (Reg 0x842d=0x20) (Reg 0x842e=0x20) (Reg 0x842f=0x20)
(Reg 0x8430=0x56) (Reg 0x8431=0x45) (Reg 0x8432=0x53) (Reg 0x8433=0x31)
(Reg 0x8434=0x32) (Reg 0x8435=0x46) (Reg 0x8436=0x4e) (Reg 0x8437=0x53)
(Reg 0x8438=0x31) (Reg 0x8439=0x34) (Reg 0x843a=0x32) (Reg 0x843b=0x32)
(Reg 0x843c=0x31) (Reg 0x843d=0x50) (Reg 0x843e=0x44) (Reg 0x843f=0x58)
(Reg 0x8440=0x31) (Reg 0x8441=0x30) (Reg 0x8442=0x2d) (Reg 0x8443=0x32)
(Reg 0x8444=0x35) (Reg 0x8445=0x34) (Reg 0x8446=0x39) (Reg 0x8447=0x2d)
(Reg 0x8448=0x30) (Reg 0x8449=0x31) (Reg 0x844a=0x20) (Reg 0x844b=0x20)
(Reg 0x844c=0x30) (Reg 0x844d=0x31) (Reg 0x844e=0x20) (Reg 0x844f=0x20)
(Reg 0x8450=0x00) (Reg 0x8451=0x00) (Reg 0x8452=0x00) (Reg 0x8453=0x00)
(Reg 0x8454=0x00) (Reg 0x8455=0x00) (Reg 0x8456=0x00) (Reg 0x8457=0x00)
(Reg 0x8458=0x00) (Reg 0x8459=0x00) (Reg 0x845a=0x00) (Reg 0x845b=0x00)
(Reg 0x845c=0x00) (Reg 0x845d=0x00) (Reg 0x845e=0x00) (Reg 0x845f=0x00)
(Reg 0x8460=0x00) (Reg 0x8461=0x00) (Reg 0x8462=0x00) (Reg 0x8463=0x00)
(Reg 0x8464=0x00) (Reg 0x8465=0x00) (Reg 0x8466=0x00) (Reg 0x8467=0x00)
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(Reg 0x8468=0x00) (Reg 0x8469=0x00) (Reg 0x846a=0x00) (Reg 0x846b=0x00)
(Reg 0x846c=0x00) (Reg 0x846d=0x00) (Reg 0x846e=0x00) (Reg 0x846f=0x00)
(Reg 0x8470=0x00) (Reg 0x8471=0x00) (Reg 0x8472=0x00) (Reg 0x8473=0x00)
(Reg 0x8474=0x00) (Reg 0x8475=0x00) (Reg 0x8476=0x00) (Reg 0x8477=0x00)
(Reg 0x8478=0x00) (Reg 0x8479=0x00) (Reg 0x847a=0x00) (Reg 0x847b=0x00)
(Reg 0x847c=0x00) (Reg 0x847d=0x00) (Reg 0x847e=0x00) (Reg 0x847f=0x1d)

VR 1 Registers:

(Reg 0xa000=0x0000) (Reg 0xa001=0x0000) (Reg 0xa002=0x0000) (Reg 0xa003=0x0000)
(Reg 0xa004=0x0000) (Reg 0xa005=0x0003) (Reg 0xa006=0x0002) (Reg 0xa007=0x0001)
(Reg 0xa008=0x0003) (Reg 0xa009=0x0002) (Reg 0xa00a=0x0001) (Reg 0xa00b=0x0000)
(Reg 0xa00c=0x0000) (Reg 0xa00d=0x0000) (Reg 0xa00e=0x0000) (Reg 0xa00f=0x0000)
(Reg 0xa010=0x000e) (Reg 0xa011=0x0200) (Reg 0xa012=0x0000) (Reg 0xa013=0x0000)
(Reg 0xa014=0x0000) (Reg 0xa015=0x0000) (Reg 0xa016=0x0020) (Reg 0xa017=0x0000)
(Reg 0xa018=0x0000) (Reg 0xa019=0x0000) (Reg 0xa01a=0x0000) (Reg 0xa01b=0x0000)
(Reg 0xa01c=0x0000) (Reg 0xa01d=0x0003) (Reg 0xa01e=0x0000) (Reg 0xa01f=0x0000)
(Reg 0xa020=0x0000) (Reg 0xa021=0x0000) (Reg 0xa022=0x0000) (Reg 0xa023=0x0000)
(Reg 0xa024=0x0000) (Reg 0xa025=0x0000) (Reg 0xa026=0x0000) (Reg 0xa027=0x0000)
(Reg 0xa028=0x0040) (Reg 0xa029=0x8070) (Reg 0xa02a=0x0062) (Reg 0xa02b=0x0999)
(Reg 0xa02c=0x0099) (Reg 0xa02d=0x0000) (Reg 0xa02e=0x0000) (Reg 0xa02f=0x265f)
(Reg 0xa030=0x7cc3) (Reg 0xa031=0x0000) (Reg 0xa032=0x0000) (Reg 0xa033=0x0000)
(Reg 0xa034=0x0000) (Reg 0xa035=0x0000) (Reg 0xa036=0x0000) (Reg 0xa037=0x0000)
(Reg 0xa038=0x0000) (Reg 0xa039=0x0000) (Reg 0xa03a=0x0000)

NETWORK LANE VR 1 Registers:

(Reg 0xa200=0x0000) (Reg 0xa201=0x0000) (Reg 0xa202=0x0000) (Reg 0xa203=0x0000)
(Reg 0xa204=0x0000) (Reg 0xa205=0x0000) (Reg 0xa206=0x0000) (Reg 0xa207=0x0000)
(Reg 0xa208=0x0000) (Reg 0xa209=0x0000) (Reg 0xa20a=0x0000) (Reg 0xa20b=0x0000)
(Reg 0xa20c=0x0000) (Reg 0xa20d=0x0000) (Reg 0xa20e=0x0000) (Reg 0xa20f=0x0000)
(Reg 0xa210=0x0000) (Reg 0xa211=0x0000) (Reg 0xa212=0x0000) (Reg 0xa213=0x0000)
(Reg 0xa214=0x0000) (Reg 0xa215=0x0000) (Reg 0xa216=0x0000) (Reg 0xa217=0x0000)
(Reg 0xa218=0x0000) (Reg 0xa219=0x0000) (Reg 0xa21a=0x0000) (Reg 0xa21b=0x0000)
(Reg 0xa21c=0x0000) (Reg 0xa21d=0x0000) (Reg 0xa21e=0x0000) (Reg 0xa21f=0x0000)
(Reg 0xa220=0x0000) (Reg 0xa221=0x0000) (Reg 0xa222=0x0000) (Reg 0xa223=0x0000)
(Reg 0xa224=0x0000) (Reg 0xa225=0x0000) (Reg 0xa226=0x0000) (Reg 0xa227=0x0000)
(Reg 0xa228=0x0000) (Reg 0xa229=0x0000) (Reg 0xa22a=0x0000) (Reg 0xa22b=0x0000)
(Reg 0xa22c=0x0000) (Reg 0xa22d=0x0000) (Reg 0xa22e=0x0000) (Reg 0xa22f=0x0000)
(Reg 0xa230=0x0000) (Reg 0xa231=0x0000) (Reg 0xa232=0x0000) (Reg 0xa233=0x0000)
(Reg 0xa234=0x0000) (Reg 0xa235=0x0000) (Reg 0xa236=0x0000) (Reg 0xa237=0x0000)
(Reg 0xa238=0x0000) (Reg 0xa239=0x0000) (Reg 0xa23a=0x0000) (Reg 0xa23b=0x0000)
(Reg 0xa23c=0x0000) (Reg 0xa23d=0x0000) (Reg 0xa23e=0x0000) (Reg 0xa23f=0x0000)
(Reg 0xa240=0x9999) (Reg 0xa241=0x9999) (Reg 0xa242=0x9999) (Reg 0xa243=0x9999)
(Reg 0xa244=0x0000) (Reg 0xa245=0x0000) (Reg 0xa246=0x0000) (Reg 0xa247=0x0000)
(Reg 0xa248=0x0000) (Reg 0xa249=0x0000) (Reg 0xa24a=0x0000) (Reg 0xa24b=0x0000)
(Reg 0xa24c=0x0000) (Reg 0xa24d=0x0000) (Reg 0xa24e=0x0000) (Reg 0xa24f=0x0000)
(Reg 0xa250=0xe058) (Reg 0xa251=0xe058) (Reg 0xa252=0xe058) (Reg 0xa253=0xe058)
(Reg 0xa254=0x0000) (Reg 0xa255=0x0000) (Reg 0xa256=0x0000) (Reg 0xa257=0x0000)
(Reg 0xa258=0x0000) (Reg 0xa259=0x0000) (Reg 0xa25a=0x0000) (Reg 0xa25b=0x0000)
(Reg 0xa25c=0x0000) (Reg 0xa25d=0x0000) (Reg 0xa25e=0x0000) (Reg 0xa25f=0x0000)
(Reg 0xa260=0x0000)

NETWORK LANE VR 2 Registers:

(Reg 0xa280=0x0000) (Reg 0xa281=0x0000) (Reg 0xa282=0x0000) (Reg 0xa283=0x0000)
(Reg 0xa284=0x0000) (Reg 0xa285=0x0000) (Reg 0xa286=0x0000) (Reg 0xa287=0x0000)
(Reg 0xa288=0x0000) (Reg 0xa289=0x0000) (Reg 0xa28a=0x0000) (Reg 0xa28b=0x0000)
(Reg 0xa28c=0x0000) (Reg 0xa28d=0x0000) (Reg 0xa28e=0x0000) (Reg 0xa28f=0x0000)
(Reg 0xa290=0x0000) (Reg 0xa291=0x0000) (Reg 0xa292=0x0000) (Reg 0xa293=0x0000)
(Reg 0xa294=0x0000) (Reg 0xa295=0x0000) (Reg 0xa296=0x0000) (Reg 0xa297=0x0000)
(Reg 0xa298=0x0000) (Reg 0xa299=0x0000) (Reg 0xa29a=0x0000) (Reg 0xa29b=0x0000)
(Reg 0xa29c=0x0000) (Reg 0xa29d=0x0000) (Reg 0xa29e=0x0000) (Reg 0xa29f=0x0000)
(Reg 0xa2a0=0xb766) (Reg 0xa2a1=0x98ea) (Reg 0xa2a2=0x91eb) (Reg 0xa2a3=0x882c)
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(Reg 0xa2a4=0x0000) (Reg 0xa2a5=0x0000) (Reg 0xa2a6=0x0000) (Reg 0xa2a7=0x0000)
(Reg 0xa2a8=0x0000) (Reg 0xa2a9=0x0000) (Reg 0xa2aa=0x0000) (Reg 0xa2ab=0x0000)
(Reg 0xa2ac=0x0000) (Reg 0xa2ad=0x0000) (Reg 0xa2ae=0x0000) (Reg 0xa2af=0x0000)
(Reg 0xa2b0=0x321d) (Reg 0xa2b1=0x36cb) (Reg 0xa2b2=0x38da) (Reg 0xa2b3=0x3a08)
(Reg 0xa2b4=0x0000) (Reg 0xa2b5=0x0000) (Reg 0xa2b6=0x0000) (Reg 0xa2b7=0x0000)
(Reg 0xa2b8=0x0000) (Reg 0xa2b9=0x0000) (Reg 0xa2ba=0x0000) (Reg 0xa2bb=0x0000)
(Reg 0xa2bc=0x0000) (Reg 0xa2bd=0x0000) (Reg 0xa2be=0x0000) (Reg 0xa2bf=0x0000)
(Reg 0xa2c0=0x2fc0) (Reg 0xa2c1=0x2fd1) (Reg 0xa2c2=0x2fd1) (Reg 0xa2c3=0x2fd1)
(Reg 0xa2c4=0x0000) (Reg 0xa2c5=0x0000) (Reg 0xa2c6=0x0000) (Reg 0xa2c7=0x0000)
(Reg 0xa2c8=0x0000) (Reg 0xa2c9=0x0000) (Reg 0xa2ca=0x0000) (Reg 0xa2cb=0x0000)
(Reg 0xa2cc=0x0000) (Reg 0xa2cd=0x0000) (Reg 0xa2ce=0x0000) (Reg 0xa2cf=0x0000)
(Reg 0xa2d0=0x2b33) (Reg 0xa2d1=0x360a) (Reg 0xa2d2=0x3453) (Reg 0xa2d3=0x37f2)
(Reg 0xa2d4=0x0000) (Reg 0xa2d5=0x0000) (Reg 0xa2d6=0x0000) (Reg 0xa2d7=0x0000)
(Reg 0xa2d8=0x0000) (Reg 0xa2d9=0x0000) (Reg 0xa2da=0x0000) (Reg 0xa2db=0x0000)
(Reg 0xa2dc=0x0000) (Reg 0xa2dd=0x0000) (Reg 0xa2de=0x0000) (Reg 0xa2df=0x0000)
(Reg 0xa2e0=0x0000)

HOST LANE VR 1 Registers:

(Reg 0xa400=0x0000) (Reg 0xa401=0x0000) (Reg 0xa402=0x0000) (Reg 0xa403=0x0000)
(Reg 0xa404=0x0000) (Reg 0xa405=0x0000) (Reg 0xa406=0x0000) (Reg 0xa407=0x0000)
(Reg 0xa408=0x0000) (Reg 0xa409=0x0000) (Reg 0xa40a=0x0000) (Reg 0xa40b=0x0000)
(Reg 0xa40c=0x0000) (Reg 0xa40d=0x0000) (Reg 0xa40e=0x0000) (Reg 0xa40f=0x0000)
(Reg 0xa410=0x0000) (Reg 0xa411=0x0000) (Reg 0xa412=0x0000) (Reg 0xa413=0x0000)
(Reg 0xa414=0x0000) (Reg 0xa415=0x0000) (Reg 0xa416=0x0000) (Reg 0xa417=0x0000)
(Reg 0xa418=0x0000) (Reg 0xa419=0x0000) (Reg 0xa41a=0x0000) (Reg 0xa41b=0x0000)
(Reg 0xa41c=0x0000) (Reg 0xa41d=0x0000) (Reg 0xa41e=0x0000) (Reg 0xa41f=0x0000)
(Reg 0xa420=0x0001) (Reg 0xa421=0x0001) (Reg 0xa422=0x0001) (Reg 0xa423=0x0001)
(Reg 0xa424=0x0001) (Reg 0xa425=0x0001) (Reg 0xa426=0x0001) (Reg 0xa427=0x0001)
(Reg 0xa428=0x0001) (Reg 0xa429=0x0001) (Reg 0xa42a=0x0000) (Reg 0xa42b=0x0000)
(Reg 0xa42c=0x0000) (Reg 0xa42d=0x0000) (Reg 0xa42e=0x0000) (Reg 0xa42f=0x0000)
(Reg 0xa430=0x0000) (Reg 0xa431=0x0000) (Reg 0xa432=0x0000) (Reg 0xa433=0x0000)
(Reg 0xa434=0x0000) (Reg 0xa435=0x0000) (Reg 0xa436=0x0000) (Reg 0xa437=0x0000)
(Reg 0xa438=0x0000) (Reg 0xa439=0x0000) (Reg 0xa43a=0x0000) (Reg 0xa43b=0x0000)
(Reg 0xa43c=0x0000) (Reg 0xa43d=0x0000) (Reg 0xa43e=0x0000) (Reg 0xa43f=0x0000)
(Reg 0xa440=0x0001) (Reg 0xa441=0x0001) (Reg 0xa442=0x0001) (Reg 0xa443=0x0001)
(Reg 0xa444=0x0001) (Reg 0xa445=0x0001) (Reg 0xa446=0x0001) (Reg 0xa447=0x0001)
(Reg 0xa448=0x0001) (Reg 0xa449=0x0001) (Reg 0xa44a=0x0000) (Reg 0xa44b=0x0000)
(Reg 0xa44c=0x0000) (Reg 0xa44d=0x0000) (Reg 0xa44e=0x0000) (Reg 0xa44f=0x0000)
(Reg 0xa450=0x0000)
```

The following example shows sample output from the **show controllers HundredGigE stats** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0 stats
Tue Mar 22 06:04:08.484 UTC
Statistics for interface HundredGigE0/3/0/0 (cached values):

Ingress:
    Input total bytes           = 73475628362976
    Input good bytes            = 73443591856352

    Input total packets         = 8009121965
    Input 802.1Q frames         = 0
    Input pause frames          = 0
    Input pkts 64 bytes         = 925
    Input pkts 65-127 bytes     = 5220
    Input pkts 128-255 bytes    = 59
    Input pkts 256-511 bytes    = 2
    Input pkts 512-1023 bytes   = 1
    Input pkts 1024-1518 bytes  = 4
    Input pkts 1519-Max bytes   = 8009115754

    Input good pkts             = 8009121964
```

```
    Input unicast pkts          = 8009117183
    Input multicast pkts        = 4780
    Input broadcast pkts        = 1

    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            = 6947

    Input error giant           = 0
    Input error runt            = 0
    Input error jabbers         = 0
    Input error fragments       = 0
    Input error CRC             = 1
    Input error collisions      = 0
    Input error symbol          = 3
    Input error other           = 0

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

Egress:
    Output total bytes          = 70097928185720
    Output good bytes           = 70067364389772

    Output total packets        = 7640945487
    Output 802.1Q frames        = 0
    Output pause frames         = 0
    Output pkts 64 bytes        = 725
    Output pkts 65-127 bytes    = 10602
    Output pkts 128-255 bytes   = 275
    Output pkts 256-511 bytes   = 5
    Output pkts 512-1023 bytes  = 0
    Output pkts 1024-1518 bytes = 6
    Output pkts 1519-Max bytes  = 7640933874

    Output good pkts            = 7640945487
    Output unicast pkts         = 7640941982
    Output multicast pkts       = 3501
    Output broadcast pkts       = 6

    Output drop underrun        = 0
    Output drop abort           = 2
    Output drop other           = 2373

    Output error other          = 0
```

The following example shows sample output from the **show controllers HundredGigE xgxs** command for the Cisco CRS 1-Port 100-Gigabit Ethernet Interface Module:

```
RP/0/RP0RSP0/CPU0:router# show controllers HundredGigE 0/3/0/0 xgxs
Tue Mar 22 06:04:19.546 UTC
No XGXS present
```

The following example shows sample output from the **show controllers hundredGigE phy** command for A9K-2x100GE line card:

```
RP/0/RP0RSP0/CPU0:router# show controller hundredGigE 0/9/0/0 phy

PHY data for interface: HundredGigE0/9/0/0:
```

```
Rx        64B66B      Lane        Sync        PCS         Virt  PCS
Service   Block       Marker      Header      Lane        Lane  Lane
Lane      Lock        Sync        Err Cnt     BIP Errors  Error Mapping
--        ---------   ---------   ----------  ----------  ----- -------
0         Locked      Locked      0           0           Clean 0
1         Locked      Locked      0           0           Clean 10
2         Locked      Locked      0           0           Clean 1
3         Locked      Locked      0           0           Clean 11
4         Locked      Locked      0           0           Clean 12
5         Locked      Locked      0           0           Clean 2
6         Locked      Locked      0           0           Clean 3
7         Locked      Locked      0           0           Clean 13
8         Locked      Locked      0           0           Clean 14
9         Locked      Locked      0           0           Clean 4
10        Locked      Locked      0           0           Clean 15
11        Locked      Locked      0           0           Clean 5
12        Locked      Locked      0           0           Clean 6
13        Locked      Locked      0           0           Clean 16
14        Locked      Locked      0           0           Clean 17
15        Locked      Locked      0           0           Clean 7
16        Locked      Locked      0           0           Clean 8
17        Locked      Locked      0           0           Clean 18
18        Locked      Locked      0           0           Clean 9
19        Locked      Locked      0           0           Clean 19

CFP EEPROM port: 0
  Xcvr Type: CFP
  Ext Type: 8W,
  Connector Type: MPO
  Ethernet Application Codes: 100GE-SR10,
  Number of Lanes: Network 10, Host 10
  Max Bit Rate: Network Lane 10.4Gbit/s, Host Lane 10.4Gbit/s
    Link Reaches: SM Fiber 0KM, MM Fiber: 100M, Copper: 0M
  Device Tech1: VCSEL, DML,
  Device Tech2: No WL, Uncool Xmtr, Xmtr not tunable, No VOA, PIN detector, No EDC,
  Encoding: NRZ, Non-PSK,
  Vendor Name: Reflex Photonics
  Vendor OUI: 00.00.00
  Vendor Part Number: CF-X12-C11801
  Vendor Serial Number: X000A906
  Date Code (yyyymmdd): 20110527, Lot Code 25
  DDM Type: RX Avg Power, TX OMA,
  Module DDM: Power Supply Voltage, Temperature,
  Per Lane DDM: Laser Temp,
  Enhanced Options:
 MSA Data (CFP NVR 1 Table - addr 0x8000-0x807F)
0x0000: 0e 30 09 03 00 00 00 00 : 08 aa 4a 34 34 00 0a 00
0x0010: 0a 01 83 40 86 60 4e 20 : 00 04 40 3c 50 26 fa 46
0x0020: 00 52 65 66 6c 65 78 20 : 50 68 6f 74 6f 6e 69 63
0x0030: 73 00 00 00 43 46 2d 58 : 31 32 2d 43 31 31 38 30
0x0040: 31 20 20 20 58 30 30 30 : 41 39 30 36 20 20 20 20
0x0050: 20 20 20 20 32 30 31 31 : 30 35 32 37 32 35 20 20
0x0060: 20 20 20 20 20 20 20 20 : 0a 0d 04 14 04 05 0c 03
0x0070: 01 00 01 01 01 00 01 01 : 40 00 00 00 00 00 00 17


        Part Number:   (ver.: )
        Product ID:
 Vendor Specific Data (Vendor Cisco NVR 1 Table - address 0x8400-0x847F)
0x0100: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0110: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0120: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0130: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
```

```
0x0140: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0150: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0160: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x0170: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00


 Module
 Thresholds:        Alarm High         Warning High          Warning Low            Alarm
Low
 Temperature:       +0.273 C             +0.253 C             +0.019 C             +0.000
 C
 Voltage:           5.031 Volt            5.338 Volt            0.013 Volt            2.879
 Volt

 Temperature: +45.132 C
 Voltage: 3.355 Volt

 Lanes
 Thresholds:        Alarm High           Warning High             Warning Low
Alarm Low
 Temperature:       +0.273 C              +0.253 C                +0.019 C
+0.000 C
 Bias:              0.000 mAmps           0.000 mAmps             0.000 mAmps
0.000 mAmps
 Transmit Power: 0.000 mW (<-40.00 dBm)   0.000 mW (<-40.00 dBm)  0.000 mW (<-40.00 dBm)
0.000 mW (<-40.00 dBm)
 Receive Power: 0.000 mW (<-40.00 dBm)    0.000 mW (<-40.00 dBm)  0.000 mW (<-40.00 dBm)
0.000 mW (<-40.00 dBm)

               Lane             Temp             Bias                    Tx Power
         Rx Power
                    0       +42.640 C              N/A                        N/A
              N/A
                    1       +42.640 C              N/A                        N/A
              N/A
                    2       +42.640 C              N/A                        N/A
              N/A
                    3       +42.640 C              N/A                        N/A
              N/A
                    4       +42.640 C              N/A                        N/A
              N/A
                    5       +42.640 C              N/A                        N/A
              N/A
                    6       +42.640 C              N/A                        N/A
              N/A
                    7       +42.640 C              N/A                        N/A
              N/A
                    8       +42.640 C              N/A                        N/A
              N/A
                    9       +42.640 C              N/A                        N/A
              N/A
Threshold Data (CFP NVR 2 Table - address 0x8080-0x80ff)
0x0080: 00 46 00 41 00 05 00 00 : c4 86 d0 84 00 7d 70 7b
0x0090: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x00a0: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x00b0: 00 00 00 00 00 00 00 00 : 00 46 00 41 00 05 00 00
0x00c0: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x00d0: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x00e0: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 00
0x00f0: 00 00 00 00 00 00 00 00 : 00 00 00 00 00 00 00 1e
```

The following example shows sample output from the **show controllers hundredGigE phy** command for A9K-400G-DWDM-TR line card:

```
RP/0/RP0RSP0/CPU0:router# show controller hundredGigE0/2/0/20/0 phy

Rx        64B66B      Lane        Sync        PCS         Virt  PCS
Service   Block       Marker      Header      Lane        Lane  Lane
Lane      Lock        Sync        Err Cnt     BIP Errors  Error Mapping
--        ---------   ---------   ----------  ----------  ----- -------
0         Locked      Locked      0           0           Clean 1
1         Locked      Locked      0           0           Clean 2
2         Locked      Locked      0           0           Clean 4
3         Locked      Locked      0           0           Clean 7
4         Locked      Locked      0           0           Clean 9
5         Locked      Locked      0           0           Clean 10
6         Locked      Locked      0           0           Clean 12
7         Locked      Locked      0           0           Clean 14
8         Locked      Locked      0           0           Clean 17
9         Locked      Locked      0           0           Clean 18
10        Locked      Locked      0           0           Clean 0
11        Locked      Locked      0           0           Clean 3
12        Locked      Locked      0           0           Clean 5
13        Locked      Locked      0           0           Clean 6
14        Locked      Locked      0           0           Clean 8
15        Locked      Locked      0           0           Clean 11
16        Locked      Locked      0           0           Clean 13
17        Locked      Locked      0           0           Clean 15
18        Locked      Locked      0           0           Clean 16
19        Locked      Locked      0           0           Clean 19

*** PHY PCS PMA Statistics ***
Rx        Rx          Aligment    PCS         PCS
Service   Block       Marker      Lane        Lane
Lane      Lock        Lock        BIP Errors  Mapping
-------   ---------   ---------   ----------  -------
0         Locked      Locked      367         0
1         Locked      Locked      367         0
2         Locked      Locked      367         0
3         Locked      Locked      367         0
4         Locked      Locked      367         0
5         Locked      Locked      367         0
6         Locked      Locked      367         0
7         Locked      Locked      367         0
8         Locked      Locked      367         0
9         Locked      Locked      367         0
10        Locked      Locked      367         0
11        Locked      Locked      367         0
12        Locked      Locked      367         0
13        Locked      Locked      367         0
14        Locked      Locked      367         0
15        Locked      Locked      367         0
16        Locked      Locked      367         0
17        Locked      Locked      367         0
18        Locked      Locked      367         0
19        Locked      Locked      367         0
```

show lldp

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

show lldp

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	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/RP0RSP0/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/RP0RSP0/CPU0:router# show lldp
Wed Apr 13 06:42:48.221 DST
% LLDP is not enabled
```

Related Commands

Command	Description
lldp, on page 94	Enables LLDP globally for both transmit and receive operation on the system.
lldp timer, on page 100	Specifies the LLDP packet rate.
lldp holdtime, on page 98	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 99	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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	This command was introduced.

Usage Guidelines

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/RP0RSP0/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: GigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8
Port Description: GigabitEthernet0/0/0/8
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: GigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8.1
Port Description: GigabitEthernet0/0/0/8.1
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
```

Related Commands

Command	Description
lldp, on page 94	Enables LLDP globally for both transmit and receive operation on the system.

show lldp errors

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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	This command was introduced.

Usage Guidelines

Task ID

Task ID	Operation
ethernet-services	read

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

```
RP/0/RP0RSP0/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 94	Enables LLDP globally for both transmit and receive operation on the system.
show lldp traffic, on page 194	Displays statistics for LLDP traffic.

show lldp interface

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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	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/RP0RSP0/CPU0:router# show lldp interface gigabitethernet 0/1/0/7
Wed Apr 13 13:22:30.501 DST
```

```
GigabitEthernet0/1/0/7:
        Tx: enabled
        Rx: enabled
        Tx state: IDLE
        Rx state: WAIT FOR FRAME
```

Table 6: 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 94	Enables LLDP globally for both transmit and receive operation on the system.
lldp (interface), on page 96	Enters LLDP configuration mode.

show lldp neighbors

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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	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/RP0RSP0/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 7: 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/RP0RSP0/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: GigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8
Port Description: GigabitEthernet0/0/0/8
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: GigabitEthernet0/0/0/8
Chassis id: 0026.9815.c3e6
Port id: Gi0/0/0/8.1
Port Description: GigabitEthernet0/0/0/8.1
```

```
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
```

Related Commands

Command	Description
lldp, on page 94	Enables LLDP globally for both transmit and receive operation on the system.
clear lldp, on page 85	Resets LLDP traffic counters or LLDP neighbor information.

show lldp traffic

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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.
Release 4.2.3	This command was introduced.
Release 5.2.1	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/RP0RSP0/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 8: 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.

Field	Description
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.
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.

Related Commands

Command	Description
lldp, on page 94	Enables LLDP globally for both transmit and receive operation on the system.
clear lldp, on page 85	Resets LLDP traffic counters or LLDP neighbor information.

show mac-accounting (Ethernet)

To display MAC accounting statistics for an interface, use the **show mac-accounting** command in EXEC modeXR EXEC mode.

show mac-accounting {**GigabitEthernet** | **TenGigE** | **Hundred GigE** | **bundle-ether***bundle-id*} *interface-path-id* {**bundle-ether***bundle-id*}[**location node-id**]
show mac-accounting {**GigabitEthernet** | **TenGigE**} *interface-path-id* [**location node-id**]

Syntax Description

{**GigabitEthernet** | **TenGigEHundred GigEbundle-ether** }	Indicates the type of Ethernet interface whose MAC accounting statistics you want to display. Enter **GigabitEthernet**, **TenGigE** , **bundle-ether**.
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 detailed MAC accounting information for the specified interface on the specified node. The *node-id* argument is entered in the *rack*/*slot*/*module*/*port* notation.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 4.1.1	This command was introduced.
Release 4.3.2	The **bundle-ether** keyword was included.
Release 5.0.1	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use these 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 a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
interface	read

Examples

These examples show the outputs from the **show mac-accounting** command, which displays MAC accounting statistics on any specified interface:

```
RP/0/RP0RSP0/CPU0:router# show mac-accounting TenGigE 0/2/0/4 location 0/1/CPU0

TenGigE0/2/0/4
  Input (511 free)
000b.4558.caca: 4 packets, 456 bytes
             Total: 4 packets, 456 bytes


RP/0/RP0RSP0/CPU0:router# show mac-accounting hundredGigE 0/1/0/0

HundredGigE0/1/0/0
  Input (51 free)
             Total:  0 packets, 0 bytes
```

Table 9: show mac-accounting Field Descriptions

Field	Description
Interface	The interface from which the statistics are generated.
Input	Heading for the ingress MAC accounting statistics. The number of MAC accounting entries still available is shown in parentheses.
Total	Total statistics for the traffic accounted for by MAC accounting. This excludes any traffic for which there is no MAC address entry, such as non-IP traffic from an unknown MAC source address. This output also excludes any MAC addresses that have 0 packets currently, even if that MAC address was accounted before. Such type of MAC addresses still contribute towards the maximum address limit.

Related Commands

Command	Description
clear mac-accounting (Ethernet), on page 87	Clears MAC accounting statistics for an interface.
mac-accounting, on page 103	Generates accounting information for IP traffic based on the source and destination MAC addresses on LAN interfaces.

small-frame-padding

To enable small frame padding on physical interfaces, use the **small-frame-padding** command in the interface configuration mode. To disable small frame padding, use the **no** form of this command.

small-frame-padding *interface-path-id*

Syntax Description

interface-path-id	Physical interface type.

Command Default

None

Command Modes

Interface Configuration mode

Command History

Release	Modification
Release 4.3.1	This command was introduced.
Release 6.3.1	This command was enabled for Satellite nV access interfaces.
Release 7.10.1	The command extended support with the following line cards: • Fourth generation of the ASR 9000 Series Ethernet line cards • Fifth generation of the ASR 9000 Series Ethernet line cards

Usage Guidelines

This command is applicable for all physical interfaces of the Cisco ASR 9000 series router line cards.

Task ID

Task ID	Operation
interface	read, write

Example

This example shows how to use the small-frame-padding command:

```
RP/0/RP0RSP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# small-frame-padding
```

speed (Fast Ethernet)

To configure the speed for a Fast Ethernet interface, enter the **speed** command in interface configuration mode. To return the system to auto-negotiate speed, use the **no** form of this 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

If auto-negotiation is enabled on an interface, the default speed is negotiated.

If auto-negotiation is disabled on an interface, the default speed is the maximum speed allowed on the interface.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.2.3	This command was introduced.

Usage Guidelines

Note The **speed** command is available on Management Ethernet interfaces and Fast Ethernet interfaces only.

Note Keep in mind that both ends of a link must have the same interface speed. A manually configured interface speed overrides any auto-negotiated 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.

Note The **speed** configuration is supported for 1 Gigabit Ethernet copper SFPs and not supported for 1 Gigabit Ethernet optical SFPs.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to configure the Fast Ethernet interface to transmit at one gigabit:

```
RP/0/RP0RSP0/CPU0:router(config)# interface FastEthernet 0/0/2/0
RP/0/RP0RSP0/CPU0:router(config-if)# speed 1000
```

transport-mode (UDLR)

To specify the Unidirectional Link Routing (UDLR) mode as receive-only or transmit-only for a 10-Gigabit Ethernet interface, use the **transport-mode** command in interface configuration mode. To return to the default mode, use the **no** form of this command.

Note The **signal-degrade** option specified is applicable only on 1 GigabitEthernet Cisco ASR 9000 Ethernet and Enhanced Ethernet line cards.

transport-mode {{**rx-only** | **tx-only**} | {**signal-degrade**}}

Syntax Description

rx-only	Configures the 10GE UDLR mode as receive-only.
tx-only	Configures the 10GE UDLR mode as transmit-only
signal-degrade	Configures the port as signal-degrade mode. When you configure **signal-degrade** on 1 GigabitEthernet Cisco ASR 9000 Ethernet and Enhanced Ethernet Line cards, it brings down the interface when low Rx power is detected. Once the signal is recovered, the interface comes up.

Command Default

UDLR is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.2.2	This command was introduced.
Release 5.3.0	The **signal-degrade** keyword was added.

Usage Guidelines

UDLR is supported in 10GE LAN mode only on these line cards:

- 24-Port 10-Gigabit Ethernet line card (A9K-24X10GE-SE/TR)
- 36-Port 10-Gigabit Ethernet line card (A9K-36X10GE-SE/TR)

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure the 10GE interface for transmit-only mode:

```
RP/0/RP0RSP0/CPU0:router# config
```

```
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# transport-mode tx-only
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

Ethernet OAM Commands

This module provides command line interface (CLI) commands for configuring Ethernet Operations, Administration, and Maintenance (EOAM) on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 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.

action capabilities-conflict

To configure what action is taken on an interface when a capabilities-conflict event occurs, use the **action capabilities-conflict** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action capabilities-conflict {**disable** | **efd** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a capabilities-conflict event occurs.
efd	Puts the line protocol into the down state for an interface when a capabilities-conflict event occurs. The state is removed when the first packet is received without a conflict.
error-disable-interface	Puts the interface into the error-disable state when a capabilities-conflict event occurs.
log	Creates a syslog entry when a capabilities-conflict event occurs.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The **efd** keyword was added.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (log) in Ethernet OAM configuration mode.

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 configure that no action is performed on the interface when a capabilities-conflict event occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action capabilities-conflict disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a capabilities-conflict event occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action capabilities-conflict efd
```

The following example shows how to configure that the interface is put into the error-disable state when a capabilities-conflict event occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action capabilities-conflict error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a capabilities-conflict event occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# action capabilities-conflict log
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

action critical-event

To configure what action is taken on an interface when a critical-event notification is received from the remote Ethernet OAM peer, use the **action critical-event** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action critical-event {**disable** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a critical-event notification is received.
error-disable-interface	Puts the interface into the error-disable state when a critical-event notification is received.
log	Creates a syslog entry when a critical-event notification is received.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (log) in Ethernet OAM configuration mode.

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 configure that no action is performed on the interface when a critical-event notification is received.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action critical-event disable
```

The following example shows how to configure that the interface is put into the error-disable state when a critical-event notification is received.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action critical-event error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a critical-event notification is received. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# action critical-event log
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

action discovery-timeout

To configure what action is taken on an interface when a connection timeout occurs, use the **action discovery-timeout** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action discovery-timeout {**disable** | **efd** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a connection timeout occurs.
efd	Puts the line protocol into the down state for an interface when a connection timeout occurs. The state is removed when the session is re-established.
error-disable-interface	Puts the interface into the error-disable state when a connection timeout occurs.
log	Creates a syslog entry when a connection timeout occurs.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 4.0.0	The **efd** keyword was added.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (log) in Ethernet OAM configuration mode.

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 configure that no action is performed on the interface when a connection timeout occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action discovery-timeout disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a connection timeout occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action discovery-timeout efd
```

The following example shows how to configure that the interface is put into the error-disable state when a connection timeout occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action discovery-timeout error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a connection timeout occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# action discovery-timeout log
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

action dying-gasp

To configure what action is taken on an interface when a dying-gasp notification is received from the remote Ethernet OAM peer, use the **action dying-gasp** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action dying-gasp {**disable** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a dying-gasp notification is received.
error-disable-interface	Puts the interface into the error-disable state when a dying-gasp notification is received.
log	Creates a syslog entry when a dying-gasp notification is received.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (log) in Ethernet OAM configuration mode.

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 configure that no action is performed on the interface when a dying-gasp notification is received.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action dying-gasp disable
```

The following example shows how to configure that the interface is put into the error-disable state when a dying-gasp notification is received.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action dying-gasp error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a dying-gasp notification is received. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# action dying-gasp log
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

action high-threshold

To configure what action is taken on an interface when a high threshold is exceeded, use the **action high-threshold** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action high-threshold {**disable** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a high threshold is exceeded.
error-disable-interface	Puts the interface into the error-disable state when a high threshold is exceeded.
log	Creates a syslog entry when a high threshold is exceeded.

Command Default

The default is that no action is taken when a high threshold is exceeded.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (disable) in Ethernet OAM configuration mode.

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 configure that a syslog entry is created on the interface when a high threshold is exceeded.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action high-threshold log
```

The following example shows how to configure that the interface is put into the error-disable state when a high threshold is exceeded.

```
RP/0/RP0RSP0/CPU0:router# configure
```

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action high-threshold error-disable-interface
```

The following example shows how to configure that no action is taken when a high threshold is exceeded. This configuration overrides the Ethernet OAM profile configuration.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# action high-threshold disable
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

action remote-loopback

To configure what action is taken on an interface when a remote-loopback event occurs, use the **action remote-loopback** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action remote-loopback {**disable** | **log**}

Syntax Description

disable	Performs no action on the interface when a remote-loopback event occurs.
log	Creates a syslog entry when a remote-loopback event occurs.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (log) in Ethernet OAM configuration mode.

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 configure that no action is performed on the interface when a remote-loopback event occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action remote-loopback disable
```

The following example shows how to configure that a syslog entry is created when a remote-loopback event occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# action remote-loopback log
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

action session-down

To configure what action is taken on an interface when an Ethernet OAM session goes down, use the **action session-down** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action session-down {**disable** | **efd** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when an Ethernet OAM session goes down.
efd	Puts the line protocol into the down state for an interface when an Ethernet OAM session goes down. The state is removed when the Ethernet OAM session comes back up.
error-disable-interface	Puts the interface into the error-disable state when an Ethernet OAM session goes down.
log	Creates a syslog entry when a capabilities-conflict event occurs.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The **efd** keyword was added.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (log) in Ethernet OAM configuration mode.

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 configure that no action is performed on the interface when an Ethernet OAM session goes down.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action session-down disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when an Ethernet OAM session goes down.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action session-down efd
```

The following example shows how to configure that the interface is put into the error-disable state when an Ethernet OAM session goes down.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action session-down error-disable-interface
```

The following example shows how to configure that a syslog entry is created when an Ethernet OAM session goes down. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# action session-down log
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

action session-up

To configure what action is taken on an interface when an Ethernet OAM session is established, use the **action session-up** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action session-up {**disable** | **log**}

Syntax Description

disable	Performs no action on the interface when an Ethernet OAM session is established.
log	Creates a syslog entry when an Ethernet OAM session is established.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (log) in Ethernet OAM configuration mode.

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 configure that no action is performed on the interface when an Ethernet OAM session is established.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action session-up disable
```

The following example shows how to configure that a syslog entry is created when an Ethernet OAM session is established. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# action session-up log
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

action uni-directional link-fault

To configure what action is taken on an interface when a link-fault notification is received from the remote Ethernet OAM peer, use the **action uni-directional link-fault** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action uni-directional link-fault {**disable** | **efd** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a link-fault notification is received from the remote Ethernet OAM peer.
efd	Puts the line protocol into the down state for an interface when a link-fault notification is received from the remote Ethernet OAM peer. The state is removed when the peer indicates that the fault has cleared.
error-disable-interface	Puts the interface into the error-disable state when a link-fault notification is received from the remote Ethernet OAM peer.
log	Creates a syslog entry when a capabilities-conflict event occurs.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 4.0.0	This command was introduced. This command replaces the **action link-fault** command.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (log) in Ethernet OAM configuration mode.

Usage Guidelines

This command only determines the action taken when a uni-directional link fault notification is received from the peer; it does not affect the action taken when a fault is detected locally.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a link-fault notification is received.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
```

```
RP/0/RP0RSP0/CPU0:router(config-eoam)# action uni-directional link-fault disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a link-fault notification is received.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action uni-directional link-fault efd
```

The following example shows how to configure that the interface is put into the error-disable state when a link-fault notification is received.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action uni-directional link-fault
error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a link-fault notification is received. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# action uni-directional link-fault log
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

action wiring-conflict

To configure what action is taken on an interface when a wiring-conflict event occurs, use the **action wiring-conflict** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action wiring-conflict {**disable** | **efd** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a wiring conflict is detected.
efd	Puts the line protocol into the down state for an interface when a wiring conflict is detected. The state is removed when a wiring conflict is no longer detected.
error-disable-interface	Puts the interface into the error-disable state when a wiring conflict is detected.
log	Creates a syslog entry when a wiring conflict is detected.

Command Default

The default action is to put the interface into error-disable state.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The **efd** keyword was added.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (error-disable-interface) in Ethernet OAM configuration mode.

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 configure that no action is performed on the interface when a wiring-conflict event occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action wiring-conflict disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a wiring-conflict event occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action wiring-conflict efd
```

The following example shows how to configure that a syslog entry is created when a wiring-conflict event occurs.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# action wiring-conflict log
```

The following example shows how to configure that the interface is put into the error-disable state when a wiring-conflict event occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
(config-if-eoam)# action wiring-conflict error-disable-interface
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

aggregate

To configure the size and number of bins into which to aggregate the results of statistics collection, use the **aggregate** command in SLA profile statistics configuration mode. To return to the default, use the **no** form of this command.

aggregate { **bins** *count* **width** **[usec]** *width* | **none**}

Syntax Description

bins *count*	Number of bins. The range is 2 to 100.
width *width*	For delay and jitter measurements, the size of each bin in milliseconds (range is 1 to 10000). When the **usec** keyword is specified, the size of bins can be configured in microseconds (range is 1 to 10000000). For loss measurements, the size of each bin in percentage points (range is 1 to 100). In addition, the width must be specified if the number of bins is at least 2, regardless of the type of measurement.
usec	(Optional) When specified, the size of each bin can be configured in microseconds.
none	No aggregation is performed. All samples are stored individually.

Command Default

For delay measurements, all collected statistics are aggregated into one bin.

For loss measurements, the default is aggregation disabled.

Command Modes

SLA profile statistics configuration (config-sla-prof-stat-cfg)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.3.0	The measurement statistics for Y.1731 Synthetic Loss Measurement (SLM) was included.
Release 7.7.1	The **usec** option was introduced.

Usage Guidelines

Changing the aggregation for a given metric clears all stored data for that metric.

When aggregation is enabled, a number of bins are created, each of which represents a range of values. Instead of storing each individual result, all that is stored is a counter of the number of results that fall within the range for each bin. This uses much less memory than storing each individual result.

For delay and jitter measurements, the first bin starts at 0, each bin covers a range of values defined by the specified width, except for the last bin which ends at infinity. For example, an aggregate bin count of 4 and a width of 20 for delay measurements yields 4 bins of statistics for these sample ranges:

- Bin 1—Samples with delay ranges 0 to < 20 ms.
- Bin 2—Samples with delay ranges greater than or equal to 20 and < 40 ms.
- Bin 3—Samples with delay ranges greater than or equal to 40 and < 60 ms.

- Bin 4—Samples with delay ranges 60 ms or greater (unbounded).

For synthetic loss measurements, the first bin starts at 0, each bin covers a range of values defined by the specified width, except for the last bin which ends at infinity. For example, an aggregate bin count of 4 and a width of 25 for loss measurements yields 4 bins of statistics for these sample ranges:

- Bin 1—Samples with loss ranges 0 to < 25 percentage points.
- Bin 2—Samples with loss ranges greater than or equal to 25 and < 50 percentage points.
- Bin 3—Samples with loss ranges greater than or equal to 50 and < 75 percentage points.
- Bin 4—Samples with loss ranges greater than or equal to 75 and <100 percentage points.

Note For delay and jitter measurements (round-trip or one-way), the lower bound of the first bin is zero, and the last bin is effectively of infinite width. If aggregation is disabled, each individual delay value is stored. For loss measurements, the lower bound of the first bin is zero, and the upper bound of the last bin is 100. The last bin may be wider than the other bins. If aggregation is disabled, each calculated FLR value is stored.

Note The lower bound of each bin is inclusive, while the upper bound is exclusive. Changing the aggregation for a given metric clears all stored data for that metric.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure round-trip-delay statistics measurement in 4 bins each with a width of 10000000 microseconds:

```
Router# configure
Router(config)# ethernet sla
Router(config-sla)# profile Prof1 type cfm-delay-measurement
Router(config-sla-prof)# statistics measure round-trip-delay
Router(config-sla-prof-stat-cfg)# aggregate bins 4 width usec 10000000
```

ais transmission

To configure Alarm Indication Signal (AIS) transmission for a Connectivity Fault Management (CFM) domain service, use the **ais transmission** command in CFM domain service configuration mode. To disable AIS transmission in a CFM domain service, use the **no** form of this command.

ais transmission [{**interval 1s** | **1m**}] [**cos** *cos*]

Syntax Description

interval	(Optional) Interval at which AIS packets are transmitted. Valid values are: • **1s** – Interval of 1 second • **1m** – Interval of 1 minute
cos *cos*	(Optional) Specifies the Class of Service (CoS) for the AIS packets. Valid values are 0 to 7.

Command Default

AIS transmission is disabled by default.

If **interval** is not specified, the default interval is 1 second.

IF **cos** is not specified, each MEP uses its own CoS value, inherited from the interface.

Command Modes

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

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

This command enables AIS for all MEPs in the service. AIS messages are triggered by the following events:

- Detection of a CCM defect.
- Detection of a missing peer MEP (when cross-check is configured).
- Receipt of AIS or LCK messages.
- Detection of interface down events (for down MEPs only).

AIS messages are transmitted in the opposite direction of CCMs and other CFM messages that are sent by the MEP. Therefore, up MEPs send AIS messages out of the interface, whereas down MEPs send AIS messages toward the bridging function.

In addition, AIS messages are sent at a higher maintenance level than other CFM messages sent by the MEP:

- If there is a higher-level MEP on the interface in the same direction (up MEP or down MEP), then the AIS messages are passed internally to this higher level MEP. In this case, no AIS messages are actually transmitted (unless the higher-level MEP is also in a service with AIS transmission configured).
- If there is a MIP on the interface, then AIS messages are sent at the level of the MIP.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure Alarm Indication Signal (AIS) transmission for a CFM domain service:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service S1 bridge group BG1 bridge-domain BD2
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# ais transmission interval 1m cos 7
```

The following example shows how to configure Alarm Indication Signal (AIS) transmission for a CFM domain service:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# ais transmission interval 1m cos 7
```

Related Commands

Command	Description
log ais, on page 325	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
ais transmission up, on page 231	Configures AIS transmission on a CFM interface.
show ethernet cfm interfaces ais, on page 381	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.

ais transmission up

To configure Alarm Indication Signal (AIS) transmission on a Connectivity Fault Management (CFM) interface, use the **ais transmission up** command in interface CFM configuration mode. To disable AIS transmission on an interface, use the **no** form of this command.

ais transmission up [{**interval 1s** | **1m**}] [**cos** *cos*]

Syntax Description

interval	(Optional) Interval at which AIS packets are transmitted. Valid values are: • **1s** – Interval of 1 second • **1m** – Interval of 1 minute
cos *cos*	(Optional) Specifies the Class of Service (CoS) for the AIS packets. Valid values are 0 to 7.

Command Default

AIS transmission is disabled by default.

If **interval** is not specified, the default interval is 1 second.

IF **cos** is not specified, each MEP uses its own CoS value, inherited from the interface.

Command Modes

Interface CFM configuration (config-if-cfm)

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

AIS transmission packets for CFM can be configured only on interfaces with no down MEPs. AIS packets are transmitted only if a MIP exists on the interface and the line protocol state is down. AIS messages are transmitted up, toward the bridging function (same direction as an up MEP sends CCMs), and they are transmitted at the level of the MIP.

If AIS transmission is configured on an interface with any down MEPs, the configuration is ignored, and an error is displayed in the **show ethernet cfm configuration-errors** command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure AIS transmission on a CFM interface.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/2
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-if-cfm)# ais transmission up interval 1m cos 7
```

Related Commands

Command	Description
ais transmission, on page 229	Configures AIS transmission for a CFM domain service.
log ais, on page 325	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
show ethernet cfm interfaces ais, on page 381	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.

buckets archive

To configure the number of buckets to store in memory, use the **buckets archive** command in SLA profile statistics configuration mode. To return to the default value, use the **no** form of this command.

buckets archive *number*

Syntax Description

number	Number of buckets to store. The range is 1 to 100.

Command Default

The default number of buckets stored in memory is 100.

Command Modes

SLA profile statistics configuration (config-sla-prof-stat-cfg)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.

Usage Guidelines

The results stored in the oldest bucket are discarded when the limit is reached, to make room for new results. If the number of archived buckets for a given metric decreases, the oldest buckets are deleted and the remaining buckets are untouched. If the number archived buckets for a given metric increases, the newest buckets are filled when the data is collected. See the Usage Guidelines in the buckets size, on page 234 command for a description of buckets.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the number of buckets to store in memory:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RP0RSP0/CPU0:router(config-sla-prof-stat-cfg)# buckets archive 50
```

Related Commands

Command	Description
buckets size, on page 234	Configures the size of the buckets in which statistics are collected.

buckets size

To configure the size of the buckets in which statistics are collected, use the **buckets size** command in SLA profile statistics configuration mode. To return the **buckets size** to the default value, use the **no** form of this command.

buckets size *number* {}

Syntax Description

number	Specifies the size of each bucket. The number of probes that each buckets may contain. The range is 1 to 100.
per-probe	Probes span multiple buckets.
probes	Buckets span multiple probes.

Command Default

1 probe per bucket is collected.

Command Modes

SLA profile statistics configuration mode (config-sla-prof-stat-cfg)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.3.0	The **per-probe** keyword was deprecated.

Usage Guidelines

A bucket represents a time period during which statistics are collected. All the results received during that time period are recorded in the corresponding bucket. If aggregation is enabled, each bucket has its own set of bins and counters, and only results received during the time period represented by the bucket are included in those counters.

By default, there is a separate bucket for each probe. The time period is determined by how long the probe lasts (configured by the probe (SLA), on page 354, send (SLA), on page 366, and schedule (SLA), on page 362 commands). This command allows you to modify the size of buckets so that you can have more buckets per probe, or fewer buckets per probe (fewer buckets allows the results from multiple probes to be included in the same bucket).

Note Changing the size of the buckets for a given metric clears all stored data for that metric. All existing buckets are deleted and new buckets are created.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure the size of the buckets in which statistics are collected.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RP0RSP0/CPU0:router(config-sla-prof-stat-cfg)# buckets size 100 per-probe
```

Related Commands

Command	Description
buckets archive, on page 233	Configures the number of buckets to store in memory.
probe (SLA), on page 354	Enters SLA profile probe configuration mode.
schedule (SLA), on page 362	
send (SLA), on page 366	Configures the number and timing of packets sent by a probe in an operations profile.

clear error-disable

To clear error-disable reason of an interface, use the **clear error-disable** command in the EXEC mode.

clear error-disable {**interface**<*interface*>| {**all** |<*location* > }}

Syntax Description

interface	The interface for which you want to clear the error-disable reason.
location	Clear error-disable for all interfaces on a specific card, or on all cards.

Command Default

An interface, location o

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
interface	exec

Example

The following example shows how to clear error-disable reason for an interface:

```
RP/0/0/CPU0:ios#sh error-disable
Interface            Error-Disable reason            Retry (s)  Time disabled
-------------------  ------------------------------  ---------  --------------
Gi0/0/0/0            ethernet-oam-link-fault               ---  01:00 01 Jan

RP/0/0/CPU0:ios#
RP/0/0/CPU0:ios#clear error-disable interface G 0/0/0/0
```

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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/CPU0:router# clear ethernet cfm ccm-learning-database location all
```

Related Commands

Command	Description
show ethernet cfm ccm-learning-database, on page 377	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 EXEC modeXR 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*/*module* notation.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/CPU0:router# clear ethernet cfm interface statistics location all
```

Related Commands

Command	Description
show ethernet cfm interfaces statistics, on page 383	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 EXEC modeXR 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 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/CPU0:router# clear ethernet cfm local meps all
```

Related Commands

Command	Description
show ethernet cfm local meps, on page 388	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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.3.1	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/RP0RSP0/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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/CPU0:router# clear ethernet cfm peer meps all
```

Related Commands

Command	Description
show ethernet cfm peer meps, on page 394	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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/CPU0:router# clear ethernet cfm traceroute-cache all
```

Related Commands

Command	Description
traceroute cache, on page 461	Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries.

Command	Description
show ethernet cfm traceroute-cache, on page 402	Displays the contents of the traceroute cache.

clear ethernet lmi interfaces

To clear Ethernet LMI statistics on one or all interfaces, use the **clear ethernet lmi interfaces** command in EXEC modeXR EXEC mode.

clear ethernet lmi interfaces {*type interface-path-id* | **all**}

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.
all	Specifies clearing of LMI statistics for all Ethernet interfaces running the E-LMI protocol.

Command Default

None

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	execute

The following example shows how to clear E-LMI statistics for Gigabit Ethernet interface 0/0/0/0:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet lmi interfaces GigabitEthernet 0/0/0/0
```

Related Commands

Command	Description
show ethernet lmi interfaces, on page 408	Displays E-LMI information for an interface, including protocol status and error and event statistics.

clear ethernet oam statistics

To clear the packet counters on Ethernet OAM interfaces, use the **clear ethernet oam statistics** command in EXEC modeXR EXEC mode.

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

Syntax Description

interface *type 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	Clears the statistics for a specific node. For more information about the syntax for the router, use the question mark (**?**) online help function.
node-id	Path ID of the node.
all	Clears the statistics for all nodes on the router.

Command Default

No parameters clears the packet counters on all Ethernet OAM interfaces.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	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 the packet counters on a specific interface:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet oam statistics interface gigabitethernet 0/1/5/1
```

Related Commands

Command	Description
show ethernet oam statistics, on page 427	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

clear ethernet sla statistics all

To delete the contents of buckets containing SLA statistics collected by all operations probes, including on-demand operations, use the **clear ethernet sla statistics all** command in EXEC modeXR EXEC mode.

clear ethernet sla statistics [{**current** | **history**}] **all**

Syntax Description

current	(Optional) Clears statistics for buckets currently being filled for all operations.
history	(Optional) Clears statistics for full buckets for all operations.
all	Clears statistics for all operations.

Command Default

When **current** or **history** are not used, all buckets (current, old, new, half empty, and full) for all operations (including on-demand operations) are cleared. This is equivalent to restarting the operation.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.0.0	This command was introduced.

Usage Guidelines

When you clear a bucket for a currently running probe, the remaining statistics are still collected and stored in that bucket.

See the Usage Guidelines in the buckets size, on page 234 command for a description of buckets.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to delete the contents of all buckets containing SLA metrics collected by all probes:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics all
```

The following example shows how to delete the contents of all current buckets containing SLA metrics collected by all probes:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics current all
```

The following example shows how to delete the contents of all full buckets containing SLA metrics collected by all probes:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics history all
```

clear ethernet sla statistics on-demand

To delete the contents of buckets containing SLA statistics collected by on-demand probes, use the **clear ethernet sla statistics on-demand** command in EXEC modeXR EXEC mode.

clear ethernet sla statistics [{**current** | **history**}] **on-demand** {**all***id*} [{**interface** *type interface-path-id* **domain all** | **interface** *type interface-path-id* **domain** *domain-name* **target** {**all** | **mac-address** *H.H.H* | **mep-id** *id*} | **interface all domain** *domain-name*}]

Syntax Description

current	(Optional) Clears statistics for all buckets currently being filled.
history	(Optional) Clears statistics for all full buckets.
all	Clears statistics for all on-demand operations.
id	Clears statistics for the on-demand operation of the specified number.
interface *type*	(Optional) Clears statistics for 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.
domain all	Clears statistics for on-demand operations for all domains. **Note** From Release 7.4.1 onwards, you cannot clear statistics for on-demand operations for all domains.
domain *domain-name*	Clears statistics for on-demand operations for the specified domain.
target all	Clears statistics for on-demand operations targeted to all MEPs for the specified interface domain. **Note** From Release 7.4.1 onwards, you cannot clear statistics for on-demand operations targeted to all MEPs for the specified interface domain.
target mac-address *H.H.H*	Clears statistics for on-demand operations targeted to the specified MAC address.
target mep-id *id*	Clears statistcs for on-demand operations targeted to the specified MEP ID.
interface all	(Optional) Clears statistics for on-demand operations on all interfaces.

Command Default

When **current** or **history** are not used, all buckets for on-demand operations (current, old, new, half empty, and full) are cleared. This is equivalent to restarting the operation.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 7.4.1	The **all** keyword is deprecated for domains and targets.

Usage Guidelines

When you clear a bucket for a currently running probe, the remaining statistics are still collected and stored in that bucket.

See the Usage Guidelines in the buckets size, on page 234 command for a description of buckets.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to delete the contents of all buckets currently being filled for the on-demand operation with ID 1:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics current on-demand 1
```

The following example shows how to delete the contents of all buckets for all on-demand operations:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics on-demand all
```

The following example shows how to delete the contents of all buckets for all on-demand operations on a specified interface and domain that is targeted to a specific MEP:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics on-demand all interface TenGigE
0/6/1/0 domain D1 target mep-id 3
```

Related Commands

Command	Description
clear ethernet sla statistics all, on page 249	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
ethernet sla on-demand operation type cfm-delay-measurement probe, on page 285	Executes an on-demand Ethernet SLA operation probe for CFM delay measurement.
ethernet sla on-demand operation type cfm-synthetic-loss-measurement probe, on page 307	Executes an on-demand Ethernet SLA operation probe for CFM synthetic loss measurement.
show ethernet sla operations, on page 434	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 437	Displays the contents of buckets containing Ethernet SLA metrics collected by probes.

clear ethernet sla statistics profile

To delete the contents of buckets containing SLA statistics collected by probes for a profile, use the **clear ethernet sla statistics profile** command in EXEC modeXR EXEC mode.

clear ethernet sla statistics [{**current** | **history**}] **profile** {**all***profile-name*} [{**interface** *type interface-path-id* **domain all** | **interface** *type interface-path-id* **domain** *domain-name* **target** {**all** | **mac-address** *H.H.H* | **mep-id** *id*} | **interface all domain** *domain-name*}]

Syntax Description

current	(Optional) Clears statistics for all buckets currently being filled.
history	(Optional) Clears statistics for all full buckets.
profile-name	Clears statistics for the specified profile name.
all	Clears statistics for all profiles.
interface *type*	(Optional) Clears statistics for 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.
domain all	Clears statistics for on-demand operations for all domains. **Note** From Release 7.4.1 onwards, you cannot clear statistics for on-demand operations for all domains.
domain *domain-name*	Clears statistics for on-demand operations for the specified domain.
target all	Clears statistics for on-demand operations targeted to all MEPs for the specified interface domain. **Note** From Release 7.4.1 onwards, you cannot clear statistics for on-demand operations targeted to all MEPs for the specified interface domain.
target mac-address *H.H.H*	Clears statistics for on-demand operations targeted to the specified MAC address.
target mep-id *id*	Clears statistcs for on-demand operations targeted to the specified MEP ID.
interface all	(Optional) Clears statistics for on-demand operations on all interfaces.

Command Default

When **current** or **history** are not used, all buckets in the profile (current, old, new, half empty, and full) are cleared. This is equivalent to restarting the operation.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 7.4.1	The **all** keyword is deprecated for domains and targets.

Usage Guidelines

When you clear a bucket for a currently running probe, the remaining statistics are still collected and stored in that bucket.

See the Usage Guidelines in the buckets size, on page 234 command for a description of buckets.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to delete the contents of all buckets currently being filled for a specified profile:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics current profile P1
```

The following example shows how to delete the contents of all full buckets for a specified profile:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics history profile P2
```

The following example shows how to delete the contents of all buckets for a specified profile:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics profile P3
```

The following example shows how to delete the contents of all buckets for all profiles:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics profile all
```

The following example shows how to delete the contents of all buckets for all profiles on a specified interface and domain that is targeted to a specific MEP:

```
RP/0/RP0RSP0/CPU0:router# clear ethernet sla statistics profile all interface TenGigE 0/6/1/0
 domain D1 target mep-id 3
```

Related Commands

Command	Description
buckets size, on page 234	Configures the size of the buckets in which statistics are collected.

clear ethernet udld statistics

To remove the statistics of state machine transitions and packets exchanged on an interface running UDLD protocol, use the **clear ethernet udld statistics** command in the ethernet interface configuration mode.

clear ethernet udld statistics[**interface** *type* |**unaccounted-drops** |**all**]

Syntax Description

interface*type*	(Optional) Clears information about the specified interface type. If an interface is specified, only the interface-specific counters are shown and not the node counters.
unaccounted-drops	(Optional) Clears information for only the node counters.
all	(Optional) Clears all the udld statistics.

Command Default

None

Command Modes

Ethernet Interface Configuration

Command History

Release	Modification
Release 4.2.0	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 run the **clear ethernet udld statistics** command for an interface:

```
RP/0/RP0RSP0/CPU0:routerclear ethernet udld statistics interface GigabitEthernet
 0/1/0/1
```

Related Commands

Command	Description
show ethernet udld statistics, on page 447	Displays statistics on state machine transitions and packets sent and received for an UDLD interface.

connection timeout

To configure the timeout value for an Ethernet OAM session, use the **connection timeout** command in Ethernet OAM configuration mode.

connection timeout *seconds*

Syntax Description

seconds	Connection timeout period in number of lost periodic information OAMPDUs. The range is 2 to 30.

Command Default

The default value is 5.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

If no packets are received from the OAM peer in the specified connection timeout period which is measured in number of lost periodic Information OAMPDUs, then the OAM session is brought down, and the negotiation phase starts again.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure the connection timeout value of an Ethernet OAM session:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# connection timeout 20
```

Related Commands

Command	Description
action discovery-timeout, on page 211	Configures what action is taken on an interface when a connection timeout occurs.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.

Command	Description
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 421	Displays the current status of Ethernet OAM sessions.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

continuity-check archive hold-time

To configure the time limit for how long peer maintenance-end-points (MEPs) are held in the continuity-check database after they have timed out (no more CCMs are received), use the **continuity-check archive hold-time** command in CFM domain service configuration mode. To return to the default value, use the **no** form of this command.

continuity-check archive hold-time *minutes*

Syntax Description

minutes	Time limit (in minutes) that peer MEPs are held in the continuity-check database before they are cleared. Range is 1 to 65535.

Command Default

The default is 100.

Command Modes

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

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

Peer MEPs appear in **show ethernet cfm peer meps** command display output after they timeout (no more continuity check messages (CCMs) are received).

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the time limit for how long continuity-check messages are held in the continuity-check archive:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# continuity-check archive hold-time 100
```

The following example shows how to configure the time limit for how long continuity-check messages are held in the continuity-check archive:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
```

```
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# continuity-check archive hold-time 100
```

Related Commands

Command	Description
show ethernet cfm peer meps, on page 394	Displays information about maintenance end points (MEPs) for peer MEPs.

continuity-check interval

To enable continuity check and configure the time interval at which continuity-check messages are transmitted or to set the threshold limit for when a MEP is declared down, use the **continuity-check interval** command in CFM domain service configuration mode. To disable continuity check, use the **no** form of this command.

continuity-check interval *time* [**loss-threshold** *threshold*]

Syntax Description

time	Interval at which continuity-check messages are transmitted. Valid values are: • 3.3ms: 3.3 milliseconds • 10ms: 10 milliseconds • 100ms: 100 milliseconds • 1s: 1 second • 10s: 10 seconds • 1m: 1 minute • 10m: 10 minutes
loss-threshold *threshold*	(Optional) Specifies the number of continuity-check messages that are lost before CFM declares that a MEP is down (unreachable). Range is 2 to 255. Used in conjunction with **interval**.

Command Default

Continuity check is off by default.

If **loss-threshold** is not specified, the default is 3.

Command Modes

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

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 4.3.1	The **continuity-check interval** command was updated to allow CCM time interval of 10ms.
Release 7.1.15	The command was updated to allow CCM time interval of 3.3ms.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure the time interval at which continuity-check messages are transmitted and set the threshold limit for when a MEP is declared down.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# continuity-check interval 100ms loss-threshold
 10
```

This example shows how to configure the time interval at which continuity-check messages are transmitted and set the threshold limit for when a MEP is declared down.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# continuity-check interval 100ms loss-threshold
 10
```

continuity-check loss auto-traceroute

To configure automatic triggering of a traceroute when a MEP is declared down, use the **continuity-check loss auto-traceroute** command in CFM domain service configuration mode. To disable automatic triggering of a traceroute, use the **no** form of this command.

continuity-check loss auto-traceroute

This command has no keywords or arguments.

Command Default

Auto-trigger is off.

Command Modes

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

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

The results of the traceroute can be seen using the **show ethernet cfm traceroute-cache** command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure automatic triggering of a traceroute when a MEP is declared down:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# continuity-check loss auto-traceroute
```

The following example shows how to configure automatic triggering of a traceroute when a MEP is declared down:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# continuity-check loss auto-traceroute
```

Related Commands

Command	Description
show ethernet cfm traceroute-cache, on page 402	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 3.9.0	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.

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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet cfm mep domain Dm1 service Sv1 mep-id 1
RP/0/RP0RSP0/CPU0:router(config-if-cfm-mep)# cos 7
```

Related Commands

Command	Description
ethernet cfm (interface), on page 277	Enters interface CFM configuration mode.

debug ethernet cfm packets

To log debug messages about CFM packets that are sent or received by the Ethernet connectivity fault management (CFM) process, use the **debug ethernet cfm packets** command in EXEC modeXR EXEC mode.

debug ethernet cfm packets [**domain** *domain-name* [**service** *service-name* [**mep-id** *mep-id*]]] [**interface** *type interface-path-id* [**domain** *domain-name*]] [**packet-type** {**ccm** | **linktrace** | **loopback**}] [**remote mac-address** *mac-address*] [**remote mep-id** *mep-id*] [{**sent** | **received**}] [{**brief** | **full** | **hexdump**}]
debug ethernet cfm packets [**domain** *domain-name* [**service** *service-name* [**mep-id** *mep-id*]]] [**interface** *type interface-path-id* [**domain** *domain-name*]] [**packet-type** {**ais** | **ccm** | **delay-measurement** | **linktrace** | **loopback**}] [**remote mac-address** *mac-address*] [**remote mep-id** *mep-id*] [{**sent** | **received**}] [{**brief** | **full** | **hexdump**}]

Syntax Description

domain *domain-name*	(Optional) Filters packets for display by the specified CFM maintenance domain, where *domain-name* is a string of up to 80 characters.
service *service-name*	(Optional) Filters packets for display by the specified service name, where *service-name* is a string of up to 80 characters.
mep-id *mep-id*	(Optional) Filters packets for display by the specified maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *type interface-path-id*	(Optional) Filters packets for display by the specified 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.
packet-type	(Optional) Filters packets for display by the specified packet type. The following packet types are valid: • **ais** • **ccm** • **delay-measurement** • **linktrace** • loopback
remote mac-address *mac-address*	(Optional) Filters packets for display by the specified MAC address.
remote mep-id *mep-id*	(Optional) Filters packets for display by the remote MEP properties.
sent	(Optional) Displays only sent packets.
received	(Optional) Displays only received packets.
brief	(Optional) Displays brief information about each packet.

full	(Optional) Displays a full decode of each packet.
hexdump	(Optional) Displays a full decode and hexadecimal output of each packet.

Command Default

If no parameters are specified, all CFM packets are debugged and logged.

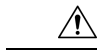
Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines



Caution Enabling packet debugging without filters can have an adverse effect on the performance of the router. To avoid this, filters should always be specified to restrict the output to the domain, service, local MEP, interface, direction and packet type of interest.

Packets can be filtered for debugging by specifying any of the optional parameters.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows a sample output of the **debug ethernet cfm packets** command with a full decode and hexadecimal output for sent and received CCM packets:

```
RP/0/RP0RSP0/CPU0:router# debug ethernet cfm packets hexdump

RP/0/RSP0RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX: GigabitEthernet0/1/0/0 ingress:
 CCM packet rcvd at level 2 for domain foo, service foo: length 91, src MAC 0001.0203.0402,
 dst MAC 0180.c200.0032: Packet processed successfully
RP/0/RSP0RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: Level 2, opcode CCM,
version 0, RDI bit unset, interval 10s, seq. num 1, remote MEP ID 16, flags 0x05, first TLV
 offset 70, 0 unknown TLVs
RP/0/RSP0RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: MAID: MDID String 'dom4',
 SMAN String 'ser4'
RP/0/RSP0RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: Sender ID: Chassis ID
Local 'hpr', Mgmt Addr <none>
RP/0/RSP0RP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: Port status: Up, interface
 status Up
RP/0/RSP0RP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:   Raw Frame:
RP/0/RSP0RP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:     0x40010546 00000001 00100404
 646F6D34 02047365 72340000 00000000 00000000
RP/0/RSP0RP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:     0x00000000 00000000 00000000
 00000000 00000000 00000000 00000000 00000000
RP/0/RSP0RP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:     0x00000000 00000000 00000200
 01020400 01010100 05030768 707200
RP/0/RSP0RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX: GigabitEthernet0/1/0/0 egress:
CCM packet sent at level 2 for domain foo, service foo: length 91, src MAC 0001.0203.0400,
```

```
 dst MAC 0180.c200.0032
RP/0/RSP0RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Level 2, opcode CCM,
version 0, RDI bit set, interval 10s, seq. num 16, remote MEP ID 1, flags 0x85, first TLV
offset 70, 0 unknown TLVs
RP/0/RSP0RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: MAID: MDID String 'foo',
 SMAN String 'foo'
RP/0/RSP0RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Sender ID: Chassis ID
Local 'ios', Mgmt Addr <none>
RP/0/RSP0RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Port status: Up, interface
 status Up
RP/0/RSP0RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   Raw Frame:
RP/0/RSP0RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:     0x40018546 00000010 00010403
 666F6F02 03666F6F 00000000 00000000 00000000
RP/0/RSP0RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:     0x00000000 00000000 00000000
 00000000 00000000 00000000 00000000 00000000
RP/0/RSP0RP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:     0x00000000 00000000 00000200
 01020400 01010100 05030769 6F7300
```

Related Commands

Command	Description
debug ethernet cfm protocol-state, on page 268	Logs debug messages about CFM state machines and protocol events.

debug ethernet cfm protocol-state

To log debug messages about CFM state machines and protocol events, use the **debug ethernet cfm protocol-state** command in EXEC modeXR EXEC mode.

debug ethernet cfm protocol-state [**domain** *domain-name* [**service** *service-name* [**mep-id** *mep-id*]]] [**interface** *type interface-path-id* [**domain** *domain-name*]]

Syntax Description

domain *domain-name*	(Optional) Filters information for display by the specified CFM maintenance domain, where *domain-name* is a string of up to 80 characters.
service *service-name*	(Optional) Filters information for display by the specified service name, where *service-name* is a string of up to 80 characters.
mep-id *mep-id*	(Optional) Filters information for display by the specified maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *type interface-path-id*	(Optional) Filters information for display by the specified 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

If no parameters are specified, all CFM state machines and protocol events are debugged and logged.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

Debug messages can be filtered by specifying any of the optional parameters.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows a sample output of the **debug ethernet cfm protocol-state** command.

```
RP/0/RP0RSP0/CPU0:router# debug ethernet cfm protocol-state

RP/0/RSP0RP0/CPU0:May 29 14:41:49.966 : cfmd[150]: CFM: Created 1 local MEPs in PM and
Engine
RP/0/RSP0RP0/CPU0:May 29 14:41:49.967 : cfmd[150]: CFM: State changes notification for 1
```

```
EFPs
RP/0/RSP0RP0/CPU0:May 29 14:42:14.143 : cfmd[150]: CFM: New remote MEP detected in domain
foo, service foo for local MEP ID 1 on interface GigabitEthernet0/1/0/0; remote MEP ID 16,
 MAC 0001.0203.0402, errors: set: mismatched MAID; current: mismatched MAID;
RP/0/RSP0RP0/CPU0:May 29 14:42:16.644 : cfmd[150]: CFM: Fault alarm notification for local
 MEP - domain: foo, service: foo, MEP ID: 1, interface: GigabitEthernet0/1/0/0, defect:
cross-connect CCM
RP/0/RSP0RP0/CPU0:May 29 14:43:32.247 : cfmd[150]: CFM: Initiated exploratory linktrace to
 ffff.ffff.ffff from MEP in domain foo, service foo, MEP ID 1, interface
GigabitEthernet0/1/0/0 with ttl 64 and transaction ID 65537, reply-filtering Default and
directed MAC None
May 29 14:43:49.155 : cfmd[150]: CFM: Remote MEP timed out in domain foo, service foo for
local MEP ID 1 on interface GigabitEthernet0/1/0/0; remote MEP ID 16, MAC 0001.0203.0402,
errors: cleared: mismatched MAID; current: none
```

Related Commands

Command	Description
debug ethernet cfm packets, on page 265	Logs debug messages about CFM packets that are sent or received by the Ethernet CFM process.

domain

To create and name a container for all domain configurations and enter the CFM domain configuration mode, use the **domain** command in CFM configuration mode. To remove the domain, use the **no** form of this command.

domain *domain-name* **level** *level-value* [**id** **null** [**dns** *dns-name*][**mac** *H.H.H*][**string** *string*]]

Syntax Description

domain-name	Administrative name unique to this container, case sensitive ASCII string, up to 80 characters.
level *level-value*	The CFM protocol level of this domain. Range is 0 to 7.
id	(Optional) Maintenance domain identifier (MDID) used in conjunction with one of the following keywords to specify the MDID type and value: • null • **dns** *DNS-name* • **mac** *H.H.H* • **string** *string*
null	(Optional) Null value ID, used with the **id** keyword.
dns *DNS-name*	(Optional) DNS name, up to 43 characters in length, used with the **id** keyword.
mac *H.H.H*	(Optional) Hexadecimal MAC address, used with the **id** keyword.
string *string*	(Optional) Maintenance domain identifier (MDID) value, up to 43 characters in length, used with the **id** keyword. **Note** The domain name may be the used here as the maintenance domain identifier (MDID) if desired.

Command Default

If **id** is not specified, the domain name is used as the MDID.

Command Modes

CFM configuration (config-cfm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

The level must be specified.

The maintenance domain identifier (MDID) is used as the first part of the maintenance association identifier (MAID) in CFM frames. If the MDID is not specified, the domain name is used as the MDID by default.

Multiple domains may be specified at the same level. If the MDID is specified as NULL, the MAID is constructed as a short maintenance association name.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to create a domain and give it a domain name, level, and maintenance domain identifier (MDID):

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)#
```

Related Commands

Command	Description
ethernet cfm (global), on page 276	Enters CFM configuration mode.
ethernet cfm (interface), on page 277	Enters interface CFM configuration mode.
mep domain, on page 339	Creates a MEP on an interface.
service, on page 369	
show ethernet cfm configuration-errors, on page 379	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 385	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.

efd

To enable Ethernet Fault Detection (EFD) on all down Maintenance End Points (MEPs) in a down MEPs service, use the **efd** command in CFM domain service configuration mode. To disable EFD, use the **no** form of this command.

efd {**protection-switching**}
no efd

Syntax Description

protection-switching	Enables protection switching, which causes high-priority notifications to be sent when peer MEPs specified for cross-check time out, or when CCMs are received with the RDI bit set.

Note The high-priority notifications only apply to MEPs that are offloaded. In the case of non-offloaded MEPs, enabling protection switching has no effect, and the command only enables EFD.

Command Default

EFD is disabled.

Command Modes

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

Command History

Release	Modification
Release 3.9.1	This command was introduced.
Release 4.3.1	The **protection-switching** keyword was included.

Usage Guidelines

EFD can only be enabled for down MEPs within a down MEPs service.

If the **efd** command is issued when any MEP in the service has any of the following error conditions, the MEP will shut down the interface:

- The MEP appears cross-connected to another MAID.
- The MEP is receiving invalid CCMs, such as receiving its own MAC or MEP-ID.
- All peer MEPs are reporting a state other than UP via the Port Status TLV.
- A peer MEP is reporting a state other than UP in Interface Status TLV.
- When cross-check is configured, and a session with an expected MEP times out, EFD is triggered on the local MEP.
- No CCMs are received from a peer MEP appearing in the configured cross-check list.
- An RDI is being received from a peer MEP.
- The MEP is receiving an AIS/LCK.

The MEP will bring the interface back up when the error condition is no longer detected.

Note When an interface is shut down by a MEP using EFD, the MEP will continue to send and receive CCMs and other CFM messages.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to enable EFD:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service S1 down-meps
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# efd
```

Related Commands

Command	Description
show efd interface, on page 375	Displays all interfaces that are shut down because of EFD.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.

error-disable recovery cause

To configure error-disable to automatically attempt recovery, use the **error-disable recovery cause** command.

error-disable recovery cause { **ethernet-oam-critical-event** | **ethernet-oam-link-fault** | **. . .** } [**interval**<**30 – 1,000,000** >]

Syntax Description

link-oam-critical-event	Used when a critical event is detected by Ethernet Link OAM.
cause	One of the defined error-disable causes, for example: ethernet-oam-link-fault.
interval	Specifies the interval, in seconds, at which retries are attempted. The range is 30 to 1,000,000.
link-oam-link-fault	Used when a unidirectional link is detected by Ethernet Link OAM.

Command Default

Default interval period is 300 seconds.

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.7.3	This command was introduced.

Usage Guidelines

When error disable recovery is enabled, the interface automatically recovers from the error-disabled state, and the device retries bringing the interface up.

Task ID

Task ID	Operation
interface	write

Example

The following example shows the full list of error-disable recovery causes:

```
RP/0/0/CPU0:ios(config)#error-disable recovery cause ?
cluster-udld                    Used when UDLD is enabled on a Cluster port and UDLD is in
 aggressive mode and UDLD goes uni directional
link-oam-capabilities-conflict  Used when Ethernet Link OAM configuration conflicts with
the peer
link-oam-critical-event         Used when a critical event is detected by Ethernet Link OAM
link-oam-discovery-timeout      Used when an Ethernet Link OAM session fails to come up in
 time
link-oam-dying-gasp             Used when a dying gasp is detected by Ethernet Link OAM
link-oam-link-fault             Used when a unidirectional link is detected by Ethernet
Link OAM
link-oam-miswired               Used when a mis-wiring is detected with Ethernet Link OAM
link-oam-session-down           Used when an Ethernet Link OAM session goes down
link-oam-threshold-breached     Used when a configured error threshold has been breached
pvrst-pvid-mismatch            Used when a PVRST BPDU packet is tagged with a VLAN ID which
 is different from the VLAN ID on which it was sent.
stp-bpdu-guard                  Used when an STP BPDU is received on a port on which BPDU
```

```
Guard is configured
stp-legacy-bpdu                 Used when a legacy BPDU is received on a port. Only MSTP
and RSTP BPDUs are supported
udld-loopback                 Used when UDLD detects that the port is in loopback mode(i.e.
 its Tx is directly connected to its Rx)
udld-neighbor-mismatch          Used when mismatched neighbors are detected by UDLD
udld-timeout                    Used when all UDLD neigbors on the link have timed out
udld-unidirectional             Used when a link is detected to be unidirectional
```

ethernet cfm (global)

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

ethernet cfm

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)#
```

Related Commands

Command	Description
domain, on page 270	
ethernet cfm (interface), on page 277	Enters interface CFM configuration mode.
show ethernet cfm configuration-errors, on page 379	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 385	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.

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 3.9.1	This command was introduced.
Release 3.9.1	This command was introduced.
Release 4.1.0	Support for subinterface configuration mode was added.

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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-if-cfm)#
```

Related Commands

Command	Description
cos (CFM), on page 264	Configures the CoS for all CFM packets generated by the MEP on an interface.
ethernet cfm (global), on page 276	Enters CFM configuration mode.
mep domain, on page 339	Creates a MEP on an interface.
show ethernet cfm configuration-errors, on page 379	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 385	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.

ethernet lmi

To enable Ethernet Local Managment Interface (E-LMI) operation on an interface and enter interface Ethernet LMI configuration mode, use the **ethernet lmi** command in interface configuration mode. To disable Ethernet LMI and return to the default, use the **no** form of the command.

ethernet lmi

Syntax Description

This command has no keywords or arguments.

Command Default

Ethernet LMI is disabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

Ethernet LMI is supported only on physical Ethernet interfaces.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to enable Ethernet LMI on a Gigabit Ethernet interface and enter Ethernet LMI configuration mode:

```
RP/0/RP0RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RP0RSP0/CPU0:router(config-if-elmi)#
```

Related Commands

Command	Description
interface (Ethernet), on page 92	Specifies or creates an Ethernet interface and enters interface configuration mode.

ethernet oam

To enable Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode, use the **ethernet oam** command in interface configuration mode. To disable Ethernet Link OAM, use the **no** form of this command.

ethernet oam

Syntax Description

This command has no keywords or arguments.

Command Default

When enabled on an interface, the Ethernet Link OAM default values apply.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

When you enable Ethernet Link OAM on an interface, the default Ethernet Link OAM values are applied to the interface. For the default Ethernet Link OAM values, see the related Ethernet Link OAM commands.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable Ethernet Link OAM and enter interface Ethernet OAM configuration mode.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)#
```

ethernet oam loopback

To start or stop a loopback at the remote end of an Ethernet OAM interface, use the **ethernet oam loopback** command in EXEC modeXR EXEC mode.

ethernet oam loopback {**enable** | **disable**} *type interface-path-id*

Syntax Description

enable	Starts a loopback at the remote end.
disable	Stops the loopback at the remote end.
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

Loopback is not enabled.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

This command puts the remote peer device into loopback mode. This means that all traffic sent to the peer is looped back, which means that it is sent back from the peer and received by the router. All traffic received from the peer device is discarded.

This command returns when the OAM client receives confirmation from the remote end that the remote loopback has been enabled or disabled. If no response or a failure response is received, an error is returned.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to start a loopback at the far end of an Ethernet OAM interface.

```
RP/0/RP0RSP0/CPU0:router# ethernet oam loopback enable tengigabitethernet 0/6/1/0
```

Related Commands

Command	Description
remote-loopback, on page 358	Enables a remote loopback on the far end of an Ethernet OAM interface.
action remote-loopback, on page 217	Configures what action is taken on an interface when a remote-loopback event occurs.
snmp-server traps ethernet oam events, on page 452	
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.

ethernet oam profile

To create an Ethernet Operations, Administration and Maintenance (EOAM) profile and enter EOAM configuration mode, use the **ethernet oam profile** command in global configuration XR Config mode. To delete an EOAM profile, use the **no** form of this command.

ethernet oam profile *profile-name*

Syntax Description

profile-name	Text string name of the OAM profile. The maximum length is 32 bytes.

Command Default

No default behavior or values

Command Modes

Global configuration (config)

XR config

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

Before you can delete an EOAM profile, you must remove the profile from all interfaces to which it is attached.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to create an Ethernet OAM profile and enter Ethernet OAM configuration mode:

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)#
```

ethernet sla

To enter the Ethernet Service Level Agreement (SLA) configuration mode, use the **ethernet sla** command in Global Configuration modeXR Config mode.

ethernet sla

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	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 Ethernet SLA configuration mode.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)#
```

ethernet sla on-demand operation type cfm-delay-measurement probe

To execute an on-demand Ethernet SLA operation probe for CFM delay measurement, use the **ethernet sla on-demand operation type cfm-delay-measurement probe** command in EXEC modeXR EXEC mode.

<groupcomp >
<kwd >ethernet</kwd>
<sep> </sep>
<kwd >sla</kwd>
<sep> </sep>
<kwd >on-demand</kwd>
<sep> </sep>
<kwd >operation</kwd>
<sep> </sep>
<kwd >type</kwd>
<sep> </sep>
<groupchoice >
<kwd >cfm-delay-measurement</kwd>
<kwd >cfm-delay-measurement-v0</kwd>
</groupchoice>
<sep> </sep>
<kwd >probe</kwd>
<sep> </sep>
<groupcomp importance='optional' >
<kwd >priority</kwd>
<sep> </sep>
<kwd >number</kwd>
</groupcomp>
<sep> </sep>
<groupcomp importance='optional' >
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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* {**milliseconds** | **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** • 100 to 10000 **milliseconds** (specified in increments of 100)
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* {**milliseconds** | **seconds**}	Specifies the time between sending packets in a burst, where *number* is in the following range: • 100 to 30000 **milliseconds** • 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.
test pattern hex 0x *HHHHHHHH*	(Optional) Specifies a 4-byte string (8 hexadecimal characters) to repeat as many times as required to fill the outgoing probe packet to the specified minimum packet size. The default is all 0s.
domain *domain-name*	Specifies the name of the domain for the locally defined CFM MEP.
source interface *type*	Specifies the source interface type of the locally defined CFM MEP. 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.
target mac-address *H.H.H*	Specifies the MAC address (in dotted hexadecimal format) of the target MEP that is known to the local MEP for the probe.
target mep-id *id-number*	Specifies the ID (from 1 to 8191) of the target MEP that is known to the local MEP for the probe.
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. See the Usage Guidelines for more information.
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.
asynchronous	(Optional) Specifies that the command displays the on-demand operation ID and exits immediately, with the operation continuing in the background. The default is synchronous and the operation displays the on-demand operation ID and all results on the console when it completes.

Command Default

No on-demand operations are configured or executed.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.3.0	The **cfm-delay-measurement-v0** option was included.

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 enter the most basic SLA on-demand operation to measure CFM delay statistics. This example implements these defaults:

- Send a burst once for a packet count of 10 and interval of 1 second (10-second probe).

- Use default class of service (CoS) for the egress interface.
- Measure all statistics, including both one-way and round-trip delay and jitter statistics.
- Aggregate statistics into one bin.
- Schedule now.
- Display results on the console.

```
RP/0/RP0RSP0/CPU0:router# ethernet sla on-demand operation type cfm-delay-measurement
probe domain D1 source interface TenGigE 0/6/1/0 target mep-id 100
```

Related Commands

Command	Description
clear ethernet sla statistics all, on page 249	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 251	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 434	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 437	Displays the contents of buckets containing Ethernet SLA metrics collected by probes.

ethernet sla on-demand operation type cfm-loopback probe

To execute an on-demand Ethernet SLA operation probe for CFM loopback measurement, use the **ethernet sla on-demand operation type cfm-loopback probe** command in EXEC modeXR EXEC mode.

ethernet sla on-demand operation type cfm-delay-measurement cfm-delay-measurement-v0probe [**priority** *number*]
send {**packet** {**once** | **every** *number* {**milliseconds** | **seconds** | **minutes** | **hours**}} | **burst** {**once** | **every** *number* {**seconds** | **minutes** | **hours**}} **packet count** *number* **interval** *number* {**milliseconds** | **seconds**}} [**packet size** *bytes* [**test pattern** {**hex 0x** *HHHHHHHH* | **pseudo-random**}]]
domain *domain_name* **source interface** *type interface-path-id* **target** {**mac-address** *H.H.H.H* | **mep-id** *id_number*}
[**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*
[**asynchronous**]

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* {**milliseconds** | **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** • 100 to 10000 **milliseconds** (specified in increments of 100)
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* {**milliseconds** | **seconds**}	Specifies the time between sending packets in a burst, where *number* is in the following range: • 100 to 30000 **milliseconds** • 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.
test pattern hex 0x *HHHHHHHH*	(Optional) Specifies a 4-byte string (8 hexadecimal characters) to repeat as many times as required to fill the outgoing probe packet to the specified minimum packet size. The default is all 0s.
test pattern pseudo-random	(Optional) Specifies a pseudo-random bit sequence determined by the protocol to fill the outgoing probe packet to the specified minimum packet size.
domain *domain-name*	Specifies the name of the domain for the locally defined CFM MEP.

source interface *type*	Specifies the source interface type of the locally defined CFM MEP. 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.
target mac-address *H.H.H.H*	Specifies the MAC address (in dotted hexadecimal format) of the target MEP that is known to the local MEP for the probe.
target mep-id *id-number*	Specifies the ID (from 1 to 8191) of the target MEP that is known to the local MEP for the probe.
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 jitter statistics from destination to source. • **one-way-jitter-sd**—One-way jitter statistics 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. See the Usage Guidelines for more information.
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* **:** *ss*	(Optional) Specifies a specific time at which to start the probe in 24-hour notation.
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.
asynchronous	(Optional) Specifies that the command displays the on-demand operation ID and exits immediately, with the operation continuing in the background. The default is synchronous and the operation displays the on-demand operation ID and all results on the console when it completes.

Command Default

No on-demand operations are configured or executed.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.3.0	The **cfm-delay-measurement-v0** keyword was included.

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 enter the most basic SLA on-demand operation to measure CFM loopback statistics. This example implements the following defaults:

- Send a burst once for a packet count of 10 and interval of 1 second (10-second probe).

- Use default test pattern of 0's for padding.
- Use default class of service (CoS) for the egress interface.
- Measure all statistics.
- Aggregate statistics into one bin.
- Schedule now.
- Display results on the console.

```
RP/0/RP0RSP0/CPU0:router# ethernet sla on-demand operation type cfm-loopback
probe packet size 1500 domain D1 source interface TenGigE 0/6/1/0 target mep-id 100
```

Related Commands

Command	Description
clear ethernet sla statistics all, on page 249	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 251	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 434	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 437	Displays the contents of buckets containing Ethernet SLA metrics collected by probes.

ethernet sla on-demand operation type cfm-synthetic-loss-measurement probe

To execute an on-demand Ethernet SLA operation probe for CFM synthetic loss measurement, use the **ethernet sla on-demand operation type cfm-synthetic-loss-measurement probe** command in EXEC modeXR EXEC mode.

ethernet sla on-demand operation type cfm-synthetic-loss-measurement probe [**priority** *number*] [**send** {**packet** {**once** | **every** *number* {**milliseconds** | **seconds** | **minutes** | **hours**}} | **burst** {**once** | **every** *number* {**seconds** | **minutes** | **hours**}}} **packet count** *number* **interval** *number* {**milliseconds** | **seconds**}]**synthetic loss calculation packets** *number* [**packet size** *bytes* [**test pattern hex 0x** *HHHHHHHH*]] **domain** *domain_name* **source interface** *type interface-path-id* **target** {**mac-address** **H.H.H.H** | **mep-id** *id_number*} [**statistics measure** {**one-way-loss-sd** | **one-way-loss-ds**} [**aggregate** {**none** | **bins** *number* **width** *count*}] [**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*]] [**asynchronous**]

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* {**milliseconds** | **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** • 100 to 10000 **milliseconds** (specified in increments of 100)
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* {**milliseconds** | **seconds**}	Specifies the time between sending packets in a burst, where *number* is in the following range: • 100 to 30000 **milliseconds** • 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.
test pattern hex 0x *HHHHHHHH*	(Optional) Specifies a 4-byte string (8 hexadecimal characters) to repeat as many times as required to fill the outgoing probe packet to the specified minimum packet size. The default is all 0s.
synthetic loss calculation packets*number*	Defines the number of packets that must be used to make each FLR calculation for synthetic loss measurements. It ranges from 10 to 12096000.
domain *domain-name*	Specifies the name of the domain for the locally defined CFM MEP.
source interface *type*	Specifies the source interface type of the locally defined CFM MEP. 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.
target mac-address *H.H.H*	Specifies the MAC address (in dotted hexadecimal format) of the target MEP that is known to the local MEP for the probe.
target mep-id *id-number*	Specifies the ID (from 1 to 8191) of the target MEP that is known to the local MEP for the probe.
statistics measure	(Optional) Specifies the type of statistics to collect: • **one-way-loss-ds**—One-way loss statistics from destination to source. • **one-way-loss-sd**—One-way loss statistics from source to destination.

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 *count*	Specifies the range of the samples to be collected within each bin in percentage points, from 1 to 100.
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 these 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 these 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 these 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.
asynchronous	(Optional) Specifies that the command displays the on-demand operation ID and exits immediately, with the operation continuing in the background. The default is synchronous and the operation displays the on-demand operation ID and all results on the console when it completes.

Command Default

No on-demand operations are configured or executed.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.3.0	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 a minimum configuration, that specifies the local domain and source interface and target MEP, using these defaults:

- Send a burst once for a packet count of 100 and interval of 100 milliseconds .
- The number of packets to be used for FLR calculation is 100.
- Measure the one way loss statistics in both the directions .
- Aggregate statistics into one bin.
- Schedule now.
- Display results on the console.

```
RP/0/RP0RSP0/CPU0:routerethernet sla on-demand operation type cfm-synthetic-loss-measurement
 probe
domain D1 source interface TenGigE 0/6/1/0 target mac-address 2.3.4
```

Related Commands

Command	Description
clear ethernet sla statistics all, on page 249	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 251	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 434	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 437	Displays the contents of buckets containing Ethernet SLA metrics collected by probes.

ethernet udld reset interface

To reset the UDLD protocol state for a specified interface or for all interfaces, use the **ethernet udld reset interface** command in the Ethernet Interface Configuration mode.

ethernet udld reset interface [**interface** *type* |**all**]

Syntax Description

interface *type*	(Optional) Specifies the interface type for which the UDLD protocol state needs to be reset.
all	(Optional) Resets the UDLD state for all interfaces.

Command Default

No default behavior or values

Command Modes

Ethernet Interface Configuration

Command History

Release	Modification
Release 4.2.0	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 run the **ethernet udld reset interface** command:

```
RP/0/RP0RSP0/CPU0:router# ethernet udld reset interface GigabitEthernet
0/10/0/11
```

ethernet uni id

To specify a name for the Ethernet User-Network Interface (UNI) link, use the **ethernet uni id** command in interface configuration mode.

ethernet uni id *name*

Syntax Description

name	Maximum of 64 characters to identify the Ethernet UNI link.

Command Default

No name is specified for the Ethernet UNI link.

Command Modes

Interface (config-if)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

The UNI name should be unique among all UNIs that are part of a given Ethernet Virtual Connection (EVC).

When the Ethernet Local Management Interface (E-LMI) protocol is running on the UNI, the name specified in the **ethernet uni id** command is advertised by E-LMI to the Customer Edge (CE) device. It is also carried in Ethernet Connectivity Fault Management (CFM) Continuity Check Messages (CCMs) if there is an Up MEP on the UNI, and passed to E-LMI on the peer MEP so that it can be advertised to the remote CE device.

Task ID

Task ID	Operation
interface	read, write

The following example shows how to configure the UNI name called "PE1-CustA-Slot0-Port0" on Gigabit Ethernet interface 0/0/0/0:

```
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/0/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet uni id PE1-CustA-Slot0-Port0
```

Related Commands

Command	Description
interface (Ethernet), on page 92	Specifies or creates an Ethernet interface and enters interface configuration mode.

extension remote-uni disable

To disable transmission of the Cisco-proprietary Remote UNI Details information element in Ethernet LMI (E-LMI) STATUS messages, use the **extension remote-uni disable** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

extension remote-uni disable

This command has no keywords or arguments.

Command Default

The Cisco-proprietary Remote UNI Details information element is sent in E-LMI STATUS messages.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

Use the **extension remote-uni disable** command to have stricter conformance to the MEF 16 E-LMI specification for information elements in STATUS messages.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to disable transmission of the Cisco-proprietary Remote UNI Details information element:

```
RP/0/RP0RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RP0RSP0/CPU0:router(config-if-elmi)# extension remote-uni disable
```

Related Commands

Command	Description
interface (Ethernet), on page 92	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 279	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.

frame-period threshold

To configure the thresholds that trigger an Ethernet OAM frame-period error event, use the **frame-period threshold** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

frame-period threshold {**frames** [**low** *threshold* [**thousand** | **million** | **billion**]][**high** *threshold* [**thousand** | **million** | **billion**]] | **ppm** [**low** *threshold*][**high** *threshold*]}

Syntax Description

low *threshold*	Low threshold, in frames, that triggers a frame-period error event. The range is 0 to 1000000.
high *threshold*	(Optional) High threshold, in frames, that triggers a frame-period error event. The range is 0 to 1000000. The high threshold value can be configured only in conjunction with the low threshold value.

Command Default

The default low threshold is 1 ppm.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 6.1.32	This command was introduced.

Usage Guidelines

The frame period window is defined in the IEEE specification as a number of received frames, in our implementation it is x milliseconds.

To obtain the number of frames, the configured time interval is converted to a window size in frames using the interface speed. For example, for a 1Gbps interface, the IEEE defines minimum frame size as 512 bits. So, we get a maximum of approximately 1.5 million frames per second. If the window size is configured to be 8 seconds (8000ms) then this would give us a Window of 12 million frames in the specification's definition of Errored Frame Window.

The thresholds for frame-period are measured in errors per million frames. Hence, if you configure a window of 8000ms (that is a window of 12 million frames) and a high threshold of 100, then the threshold would be crossed if there are 1200 errored frames in that period (that is, 100 per million for 12 million).

When the low threshold is passed, a frame-period error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the low and high thresholds that trigger a frame-period error event.

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0RSP0/CPU0:router(config-eoam-lm)# frame-period threshold ppm low 100 high 600000
```

frame-period window

To configure the window size for an Ethernet OAM frame-period error event, use the **frame-period window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

frame-period window {**milliseconds** *window* | **frames** *window*[**thousand | million | billion**]}

Syntax Description

window	Size of the window for a frame-period error in milliseconds. The range is 100 to 60000.

Command Default

The default value is 1000 milliseconds.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 6.1.32	This command was introduced.

Usage Guidelines

The IEEE 802.3 standard defines the window size as number of frames rather than a time duration. These two formats can be converted either way by using a knowledge of the interface speed. Note that the conversion assumes that all frames are of the minimum size.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the window size for a frame-period error.

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0RSP0/CPU0:router(config-eoam-lm)# frame-period window milliseconds 60000
```

frame-seconds threshold

To configure the thresholds that trigger a frame-seconds error event, use the **frame-seconds threshold** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

frame-seconds threshold
low *threshould*
high *threshould*

Syntax Description

low *threshold*	(Optional, at least one of high and low must be specified) Low threshold, in seconds, that triggers a frame-seconds error event. The range is 1 to 900.
high *threshold*	(Optional, at least one of high and low must be specified) High threshold, in seconds, that causes a frame-seconds error event to trigger an action. The range is 1 to 900.

Command Default

The default value is 1.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.0	Allowed high threshold without low threshold.

Usage Guidelines

When the low threshold is passed, a frame-seconds error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions. The high threshold is optional and is configurable only in conjunction with the low threshold.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the low and high thresholds that trigger a frame-seconds error event:

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
```

```
RP/0/RP0RSP0/CPU0:router(config-eoam)# link-monitor (config-eoam)#  link-monitor
RP/0/RP0RSP0/CPU0:router(config-eoam-lm)# frame-seconds threshold low 10 high 900
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 324	Enters Ethernet OAM link monitor configuration mode.

frame-seconds window

To configure the window size for the OAM frame-seconds error event, use the **frame-seconds window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

frame-seconds window milliseconds *window*

Syntax Description

window Size of the window for a frame-seconds error in milliseconds. The range is 10000 to 900000.

Note The only accepted values are multiples of the line card-specific polling interval, that is, 1000 milliseconds for most line cards.

Command Default

The default value is 60000.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Added units (milliseconds) to command.

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 configure the window size for a frame-seconds error.

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0RSP0/CPU0:router(config-eoam-lm)# frame-seconds window milliseconds 900000
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 324	Enters Ethernet OAM link monitor configuration mode.

frame threshold

To configure the thresholds that triggers an Ethernet OAM frame error event, use the **frame threshold** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

frame threshold [**low** *threshold*][**high** *threshold*]

Syntax Description

low *threshold*	(Optional, at least one of high and low must be specified) Low threshold, in symbols, that triggers a frame error event. The range is 1 to 12000000.
high *threshold*	(Optional, at least one of high and low must be specified) High threshold, in symbols, that causes a frame error event to trigger an action. The range is 1 to 12000000.

Command Default

The default low threshold is 1.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Allowed high threshold without low threshold.

Usage Guidelines

When the low threshold is passed, a frame error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions. The high threshold is optional and is configurable only in conjunction with the low threshold.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the low and high thresholds that trigger a frame error event:

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0RSP0/CPU0:router(config-eoam-lm)# frame threshold low 100 high 60000
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 324	Enters Ethernet OAM link monitor configuration mode.

frame window

To configure the frame window size of an OAM frame error event, use the **frame window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

frame window milliseconds *window*

Syntax Description

window	Size of the window for a frame error in milliseconds. The range is 1000 to 60000.

Command Default

The default value is 1000.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Added units (milliseconds) to command.

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 configure the window size for a frame error.

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0RSP0/CPU0:router(config-eoam-lm)# frame window milliseconds 6000
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 324	Enters Ethernet OAM link monitor configuration mode.

link-monitor

To enter Ethernet OAM link monitor configuration mode, use the **link-monitor** command in Ethernet OAM configuration mode. To enter interface Ethernet OAM link monitor configuration mode, use the **link-monitor** command in interface Ethernet OAM configuration mode.

link-monitor

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	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

This example shows how to enter the Ethernet OAM link monitor configuration mode.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0RSP0/CPU0:router(config-eoam-lm)#
```

The following example shows how to enter the link monitor configuration mode from interface Ethernet OAM configuration mode.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# link-monitor
```

log ais

To configure AIS logging for a Connectivity Fault Management (CFM) domain service to indicate when AIS or LCK packets are received, use the **log ais** command in CFM domain service configuration mode. To disable AIS logging, use the no form of this command.

log ais

Command Default

Logging is disabled.

Command Modes

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

Command History

Release	Modification
Release 3.9.1	This command was introduced.
Release 3.9.1	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 configure AIS logging for a Connectivity Fault Management (CFM) domain service to indicate when AIS or LCK packets are received:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service S2 bridge group BG1 bridge-domain BD2
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# log ais
```

The following example shows how to configure AIS logging for a Connectivity Fault Management (CFM) domain service to indicate when AIS or LCK packets are received:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# log ais
```

Related Commands

Command	Description
ais transmission, on page 229	Configures AIS transmission for a CFM domain service.

Command	Description
ais transmission up, on page 231	Configures AIS transmission on a CFM interface.
show ethernet cfm interfaces ais, on page 381	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.

log continuity-check errors

To enable logging of continuity-check errors, use the **log continuity-check errors** command in CFM domain service configuration mode. To disable logging of continuity-check errors, use the no form of this command.

log continuity-check errors

Syntax Description

This command has no keywords or arguments.

Command Default

Logging is disabled.

Command Modes

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

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

The following types of continuity-check errors are logged:

- Incorrect level (cross-connect)
- Incorrect interval
- Incorrect MA-ID (cross-connect)
- Local MAC address received (loop)
- Local MEP-ID received (mis-config)
- Invalid source MAC received
- RDI received

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable logging of continuity check errors:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check errors
```

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
```

```
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check errors
```

log continuity-check mep changes

To enable logging of peer maintenance-end-point (MEP) state changes, use the **log continuity-check mep changes** command in CFM domain service configuration mode. To disable logging of peer MEP state changes, use the no form of this command.

log continuity-check mep changes

Syntax Description

This command has no keywords or arguments.

Command Default

Logging is disabled

Command Modes

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

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

This command enables logging of state changes that occur in MEPs for a particular service, such as:

- New peer MEP detected.
- Peer MEP time out (loss of continuity) detected.

Note If a Local MEP is receiving Wrong Level CCMs, then a transient timeout might occur when correct Level CCMs are received again.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable logging of continuity-check mep changes:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check mep changes
```

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check mep changes
```

log crosscheck errors

To enable logging of crosscheck error events, use the **log crosscheck errors** command in CFM domain service configuration mode. To disable logging of crosscheck error events, use the no form of this command.

log crosscheck errors

Syntax Description

This command has no keywords or arguments.

Command Default

Logging is disabled.

Command Modes

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

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

This command enables logging of crosscheck errors, such as:

- MEPs missing
- Additional peer MEPs detected

Note Crosscheck errors are only detected and logged when crosscheck is configured using the **mep crosscheck** and **mep-id** commands.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable logging of crosscheck errors:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# log crosscheck errors
```

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# log crosscheck errors
```

Related Commands

Command	Description
mep crosscheck, on page 336	Enters CFM MEP crosscheck configuration mode.
mep-id, on page 337	Enables crosscheck on a MEP.

log disable

To turn off syslog messages for Ethernet LMI (E-LMI) errors or events, use the **log disable** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

log {**errors** | **events**} **disable**

Syntax Description

errors	Disables logging of E-LMI protocol and reliability errors.
events	Disables logging of significant E-LMI protocol events.

Command Default

E-LMI syslog messages are enabled for errors and events.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

To see statistics on E-LMI protocol and reliability errors and protocol events, use the **show ethernet lmi interfaces** command.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to disable logging of E-LMI protocol and reliability errors:

```
RP/0/RP0RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RP0RSP0/CPU0:router(config-if-elmi)# log errors disable
```

The following example shows how to disable logging of E-LMI events:

```
RP/0/RP0RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RP0RSP0/CPU0:router(config-if-elmi)# log events disable
```

Related Commands

Command	Description
interface (Ethernet), on page 92	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 279	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.
show ethernet lmi interfaces, on page 408	Displays E-LMI information for an interface, including protocol status and error and event statistics.

log efd

To enable logging of Ethernet Fault Detection (EFD) state changes to an interface (such as when an interface is shut down or brought up via EFD), use the **log efd** command in CFM domain service configuration mode. To disable EFD logging, use the no form of this command.

log efd

Syntax Description

This command has no keywords or arguments.

Command Default

EFD logging is disabled.

Command Modes

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

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

When EFD logging is enabled, a syslog is generated whenever the EFD state of an interface changes.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable EFD logging:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service S1 down-meps
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# log efd
```

Related Commands

Command	Description
efd, on page 272	Enables EFD on all down MEPs in a down MEPs service.
show efd interface, on page 375	Displays all interfaces that are shut down because of EFD.

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 3.9.0	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:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# maximum-meps 4000
```

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
```

x1

```
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# maximum-meps 4000
```

Related Commands

Command	Description
domain, on page 270	
ethernet cfm (global), on page 276	Enters CFM configuration mode.
ethernet cfm (interface), on page 277	Enters interface CFM configuration mode.
service, on page 369	
show ethernet cfm configuration-errors, on page 379	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 385	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.
show ethernet cfm peer meps, on page 394	Displays information about maintenance end points (MEPs) for peer MEPs.

mep crosscheck

To enter CFM MEP crosscheck configuration mode, use the **mep crosscheck** command in CFM domain service configuration mode.

mep crosscheck

Syntax Description

This command has no keywords or arguments.

Command Default

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

Command Modes

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

Command History

Release	Modification
Release 3.9.0	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 CFM MEP crosscheck configuration mode:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RP0RSP0/CPU0:router(config-cfm-xcheck)#
```

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RP0RSP0/CPU0:router(config-cfm-xcheck)#
```

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 3.9.0	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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
```

```
RP/0/RP0RSP0/CPU0:router(config-cfm-xcheck)# mep-id 10
```

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RP0RSP0/CPU0:router(config-cfm-xcheck)# mep-id 10
```

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 3.9.1	This command was introduced. This command replaces the **ethernet cfm mep** command.

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, on page 369 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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
```

Related Commands

Command	Description
ethernet cfm (interface), on page 277	Enters interface CFM configuration mode.
show ethernet cfm configuration-errors, on page 379	Displays information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred.

mib-retrieval

To enable MIB retrieval in an Ethernet OAM profile or on an Ethernet OAM interface, use the **mib-retrieval** command in Ethernet OAM or interface Ethernet OAM configuration mode. To return the interface to the default (disabled), use the **disable** keyword, and to remove the configuration use the **no** form of the command.

mib-retrieval [**disable**]

Syntax Description

disable	Disables MIB retrieval on the Ethernet OAM interface.

Command Default

MIB retrieval is disabled by default.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing **mib-retrieval disable** version of the command in Ethernet OAM Configuration mode.

Usage Guidelines

When MIB retrieval is enabled on an Ethernet OAM interface, the OAM client advertises support for MIB retrieval to the peer.

When MIB retrieval is disabled (the default), only the enable form of the **mib-retrieval** command is available in interface Ethernet OAM configuration mode. The **disable** keyword is provided to override the profile when needed.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable MIB retrieval on a Gigabit Ethernet interface:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# mib-retrieval
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.

Command	Description
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

mip auto-create

To enable the automatic creation of Maintenance Intermediate Points (MIPs) in a bridge domain or cross-connect, use the **mip auto-create** command in CFM domain service configuration mode. To disable automatic creation of MIPs, use the **no** form of this command.

mip auto-create {**all** | **lower-mep-only**} {**ccm-learning**}

Syntax Description

all	Enables automatic creation of MIPs on all interfaces.
lower-mep-only	[Optional] Enables automatic creation of MIPs only on interfaces with a MEP at a lower level.
ccm-learning	[Optional] Enables CCM learning for MIPs created in this service. This must be used only in services with a relatively long CCM interval of at least 100 ms. CCM learning at MIPs is disabled by default.

Command Default

None

Command Modes

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

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.3.1	The **ccm-learning** keyword was introduced.

Usage Guidelines

The MIP auto-creation feature is configured only for services associated with bridge domains or cross-connects.

Unlike MEPs, MIPs are not explicitly configured on each interface. MIPs are created automatically according to the algorithm specified in the CFM 802.1ag standard. For each interface, the algorithm, in brief, operates in this manner:

- The bridge-domain or cross-connect for the interface is found, and all services associated with that bridge-domain or cross-connect are considered for MIP auto-creation.
- The level of the highest-level MEP on the interface is found. From among the services considered above, the service in the domain with the lowest level that is higher than the highest MEP level is selected. If there are no MEPs on the interface, the service in the domain with the lowest level is selected.
- The MIP auto-creation configuration for the selected service is examined to determine whether a MIP should be created.

Note Configuring a MIP auto-creation policy for a service does not guarantee that a MIP will automatically be created for that service. The policy is only considered if that service is first selected by the algorithm.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to enable the automatic creation of MIPs for all interfaces in a bridge domain:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# mip auto-create all
```

Related Commands

Command	Description
domain, on page 270	
ethernet cfm (global), on page 276	Enters CFM configuration mode.
service, on page 369	
show ethernet cfm configuration-errors, on page 379	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 385	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.
show ethernet cfm peer meps, on page 394	Displays information about maintenance end points (MEPs) for peer MEPs.

mode (Ethernet OAM)

To configure the Ethernet OAM mode on an interface, use the **mode** command in Ethernet OAM or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of the command.

mode {**active** | **passive**}

Syntax Description

passive	Specifies that the interface operates in passive mode, where it cannot initiate the discovery process, generate a retrieval PDU, or request loopback.
active	Specifies that the interface operates in active mode to initiate processes and make requests.

Command Default

The default is active.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing default value (active) in Ethernet OAM configuration mode.

Usage Guidelines

If a profile exists on the interface, setting the mode with this command overrides the mode setting in the profile on an interface.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable Ethernet OAM passive mode on a Gigabit Ethernet interface:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# mode passive
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.

Command	Description
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

monitoring

To enable Ethernet OAM link monitoring, use the **monitoring** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return link monitoring to its default state of enabled, use the **no** form of this command.

monitoring [**disable**]

Syntax Description

disable (Optional) Disables Ethernet OAM link monitoring.

Note When configuring on a profile, only the **monitoring disable** form of the command is supported.

Command Default

Link monitoring is enabled by default.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 6.1.32	This command was introduced.

Usage Guidelines

Monitoring is enabled by default. To disable it either on a profile or an interface, use the **monitoring disable** form of the command.

If monitoring is disabled on a profile, but you want to override the configuration and enable it for an interface, use the **monitoring** command in interface Ethernet OAM link monitor configuration mode.

You cannot configure the **monitoring** command without the **disable** keyword on a profile.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to disable link-monitoring on an Ethernet OAM interface:

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0RSP0/CPU0:router(config-eoam-lm)# monitoring disable
```

packet size

To configure the minimum size (in bytes) for outgoing probe packets, including padding when necessary, use the **packet size** command in SLA profile probe configuration mode. To remove this configuration, use the no form of this command.

packet size *bytes* [**test pattern** {**hex 0x** *HHHHHHHH* | **pseudo-random**}]

Syntax Description

bytes	(Optional) Minimum size of the packet including padding when necessary. The range is 1 to 9000 bytes. This value refers to the total frame size including the Layer 2 or Layer 3 packet header. Optional TLVs, such as the End TLV, are only included when the requested packet size allows.
test pattern hex 0x *HHHHHHHH*	(Optional) Specifies a 4-byte string (8 hexadecimal characters) to repeat as many times as required to fill the outgoing probe packet to the specified minimum packet size. The default is all 0s.
test pattern pseudo-random	(Optional) Specifies a pseudo-random bit sequence determined by the protocol to fill the outgoing probe packet to the specified minimum packet size.

Command Default

The minimum packet size is not configured. When a minimum packet size is configured and padding is required, the default padding is all 0s.

Command Modes

SLA profile probe configuration (config-sla-prof-pb)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The **test pattern hex** and **pseudo-random** keywords were added.
Release 4.0.0	This command was introduced.

Usage Guidelines

For supported packet types, this configuration determines the minimum size of all outgoing SLA probe packets, including the size to which they are padded. The amount of padding that is added to a packet depends on the type of frame that is sent and the amount of data in the frame.

When the packet size is not configured, packets are sent at the minimum size required to fit all the required information. Even when the packet size is configured, the packets may be larger than the configured size if the required information exceeds the configured value.

Note If a probe packet is too large, it may get dropped somewhere in the network.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the minimum size of outgoing probe packets using default padding of all 0s as needed:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)# packet size 9000
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)# commit
```

The following example shows how to configure a hexadecimal test pattern to pad packets with to reach the minimum packet size:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)# packet size 9000 test pattern hex 0xabcdabcd
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)# commit
```

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 3.7.2	This command was introduced.
Release 4.0.0	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

Task ID	Operations
ethernet-services	execute

Examples

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

```
RP/0/RP0RSP0/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
```

polling-verification-timer

To set or disable the Metro Ethernet Forum (MEF) T392 Polling Verification Timer (PVT) for Ethernet Local Management Interface (E-LMI) operation, use the **polling-verification-timer** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

polling-verification-timer {*interval* | **disable**}

Syntax Description

interval	Number of seconds in the range 5 to 30. The default is 15.
disable	Turns off the timer.

Command Default

The T392 Polling Verification Timer is set to 15 seconds.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

The PVT specifies the allowable time between transmission of a STATUS message and receipt of a STATUS ENQUIRY from the Customer Edge (CE) device before recording an error. If the PVT expiration time is reached on consecutive packets for the number of times specified by the **status-counter** command without a STATUS ENQUIRY being received, the E-LMI protocol status is changed to Down.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to set the MEF Polling Verification Timer for E-LMI to 30 seconds:

```
RP/0/RP0RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RP0RSP0/CPU0:router(config-if-elmi)# polling-verification-timer 30
```

Related Commands

Command	Description
interface (Ethernet), on page 92	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 279	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.
show ethernet lmi interfaces, on page 408	Displays E-LMI information for an interface, including protocol status and error and event statistics.

priority (SLA)

To configure the priority of outgoing SLA probe packets, use the **priority** command in SLA profile probe configuration mode. To return the priority to the default value, use the no form of this command.

priority *priority*

Syntax Description

priority	Priority level. The range is 0 to 7.

Command Default

When the priority is not configured by SLA, the default is the Class of Service (CoS) priority for the egress interface.

Command Modes

SLA profile probe configuration (config-sla-prof-pb)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.

Usage Guidelines

The default priority for all CFM operation types is the Class of Service (CoS) priority for the egress interface. SLA operations that are configured on Maintenance End Points (MEPs) do not use the Class of Service (CoS) settings that are configured independently on Maintenance End Points (MEPs). Use this command to change the priority level of SLA probe packets.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the priority of outgoing SLA probe packets.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)# priority 7
```

probe (SLA)

To enter SLA profile probe configuration mode, use the **probe** command in SLA profile configuration mode. To exit to the previous mode, use the no form of this command.

probe

Syntax Description

This command has no keywords or arguments.

Command Default

If no items are configured in the probe mode, all items in the probe mode use their default values.

Command Modes

SLA profile configuration (config-sla-prof)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.

Usage Guidelines

Each profile may optionally have 1 probe submode.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enter the SLA profile probe configuration mode:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)#
```

profile (EOAM)

To attach an Ethernet OAM profile to an interface, use the **profile** command in interface Ethernet OAM configuration mode. To remove the profile from the interface, use the no form of this command.

profile *name*

Syntax Description

name	Text name of the Ethernet OAM profile to attach to the interface.

Command Default

No profile is attached.

Command Modes

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

When an Ethernet OAM profile is attached to an interface using this command, all of the parameters configured for the profile are applied to the interface.

Individual parameters that are set by the profile configuration can be overridden by configuring them directly on the interface.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to attach an Ethernet OAM profile to a Gigabit Ethernet interface.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# profile Profile_1
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

profile (SLA)

To create an SLA operation profile and enter the SLA profile configuration mode, use the **profile** command in SLA configuration mode. To remove the profile, use the **no** form of this command.

profile *profile-name* **type** {{**cfm-delay-measurement** | **cfm-delay-measurement-v0**} | **cfm-loopback** | **cfm-synthetic-loss-measurement**}

Syntax Description

profile-name	Profile name, case-sensitive string up to 31 characters in length. The name "all" cannot be used.
type	Specifies the type of packets sent by operations in this profile. Valid types are: • **cfm-delay-measurement**: CFM delay measurement packets • **cfm-delay-measurement-v0**: CFM delay measurement version 0 packets • **cfm-loopback**: CFM loopback packets • **cfm-synthetic-loss-measurement**: CFM synthetic loss measurement packets

Command Default

No default behavior or values

Command Modes

Ethernet SLA configuration (config-sla)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.3.0	The **cfm-delay-measurement-v0** and **cfm-synthetic-loss-measurement** keyword was introduced.

Usage Guidelines

Note Each profile is uniquely identified by its name. Changing the packet **type** for the profile removes all stored data from the profile and is equivalent to deleting the profile and creating a new profile.

Note You can configure the Ethernet SLA profile to use Y.1731 DMM frames. The restriction of 150 configured Ethernet SLA operations for each CFM MEP is removed not only for profiles using DMM frames, but also for profiles using the other supported Y.1731 frame types, such as loopback measurement and synthetic loss measurement. For interoperability purposes, it is still possible to configure profiles to use DMM v0 frames. This is done by specifying a type of **cfm-delay-measurement-v0** on the **profile(SLA)** command. The limit of 150 configured operations for each CFM MEP still applies in this case.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure an SLA operation profile and enter the SLA profile configuration mode:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)#
```

remote-loopback

To enable a remote loopback on the far end of an Ethernet OAM interface, use the **remote-loopback** command in Ethernet OAM configuration or interface Ethernet OAM configuration mode. To return the interface to the default (disabled), use the **disable** keyword, and to remove the configuration, use the **no** form of the command.

remote-loopback [**disable**]
no remote-loopback [**disable**]

Syntax Description

disable	Disables the remote loopback at the far end of the Ethernet OAM interface.

Command Default

Remote loopback is disabled by default.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing **remote-loopback disable** version of the command in Ethernet OAM configuration mode.

Usage Guidelines

When remote loopback is enabled on an Ethernet OAM interface, the OAM client advertises support for remote loopback to the peer.

When remote loopback is disabled (the default), only the enable form of the **remote-loopback** command is available in interface Ethernet OAM configuration mode. The **disable** keyword is provided to override the profile when needed.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable remote loopback on a Gigabit Ethernet interface:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# remote-loopback
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.

Command	Description
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
ethernet oam loopback, on page 281	Starts or stops a loopback at the remote end of an Ethernet OAM interface.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

require-remote

To require that certain features are enabled before an OAM session can become active, or to disable a requirement that is part of an active OAM profile, use the **require-remote** command in Ethernet OAM configuration or interface Ethernet OAM configuration mode. To remove the configuration and return to the default, use the **no** form of this command.

require-remote {**mode** {**active** | **passive** | **disabled**} | **mib-retrieval** [**disabled**] | **remote-loopback**[**disalbed**] | **link-monitoring** [**disabled**]}

Syntax Description

mode {**active** | **passive**}	Requires that active or passive mode is configured on the peer device before the OAM profile can become active.
mib-retrieval	Requires that MIB-retrieval is configured on the peer device before the OAM profile can become active.
remote-loopback	Requires that remote-loopback is configured on the peer device before the OAM profile can become active.
link-monitoring	Requires that link-monitoring feature is configured on the peer device before the OAM profile can become active.
disabled	Specify that there is no requirement for a feature to be enabled on the peer. Can be used in Interface Ethernet OAM configuration mode to override the Ethernet OAM profile configuration for this option and remove the requirement for that feature to be enabled on the peer.

Command Default

No default behaviour or values

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing **disabled** keyword in Ethernet OAM configuration mode.

Usage Guidelines

The **disabled** keyword is available only when you are configuring Ethernet OAM on an interface, and is used to override the configuration that is part of an active OAM profile.

The **disabled** keyword does not remove the configuration of the command. Use the **no** form of this command to do that.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to require that specific features are enabled before an OAM session can become active

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# require-remote mode active
RP/0/RP0RSP0/CPU0:router(config-eoam)# require-remote mib-retrieval
RP/0/RP0RSP0/CPU0:router(config-eoam)# require-remote link-monitoring
```

The following example shows how to disable requirements on a particular interface that is part of an active OAM profile:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/6/5/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# require-remote mode active disabled
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# require-remote mib-retrieval disabled
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# require-remote link-monitoring disabled
```

Related Commands

Command	Description
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.
action capabilities-conflict, on page 207	Configures what action is taken on an interface when a capabilities-conflict event occurs.
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 421	Displays the current status of Ethernet OAM sessions.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

schedule (SLA)

To schedule an operation probe in a profile, use the **schedule** command in SLA profile configuration mode. To disable a schedule, use the **no** form of this command.

Hourly Scheduling
schedule every *number* { **hours** | **minutes** } [**first at hh : mm** [**: ss**]] [**for duration** { **seconds** | **minutes** | **hours** }]

Daily Scheduling
schedule every day [**at hh:mm**] [**for duration** {**seconds** | **minutes** | **hours** | **days**}]

Weekly Scheduling
schedule every week on day [**at hh:mm**] [**for duration** {**seconds** | **minutes** | **hours** | **days** | **week**}]

Syntax Description

every week on *day* [**at** *hh:mm*][**f** or *duration* {**seconds** | **minutes** | **hours** | **days** | **week**}]	Schedules a probe one day per week, on the specified *day*, at the specified time (*hh:mm*), for the specified *duration*.
every day [**at** *hh:mm*][**f** or *duration* {**seconds** | **minutes** | **hours** | **days**}	Schedules a probe every day, at the specified time (*hh:mm*), for the specified *duration*.
every *number* {**hours** | **minutes**} **first at** *hh:mm*[*.ss*]	Schedules a probe every specified *number* of **hours** or **minutes**, starting at the specified time after midnight (*hh:mm*[*.ss*]).
every *number* {**hours** | **minutes**} [**f** or *duration* {**seconds** | **minutes** | **hours**}]	Schedules a probe every specified *number* of **hours** or **minutes**, for the specified *duration*.
day	Day of the week. Valid values are: • Monday • Tuesday • Wednesday • Thursday • Friday • Saturday • Sunday

hh:mm hh:mm[:*s s*]	Time of day in 24 hour time: • *hh:mm* = hour:minutesexample: 22:30 • *hh:mm:ss* = hour:minutes:seconds example: 12:30:10(seconds are optional)
duration	Duration of probe. The ranges are : • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 24 hours • 1 day • 1 week
number	Number of **hours** or **minutes**. • Valid values for hours are the factors of 24: 1, 2, 3, 4, 6, 8, 12 • Valid values for minutes are the factors of 1440 (up to 90): 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 30, 32, 36, 40, 45, 48, 60, 80, 90

Command Default

The default is every hour. If the **at** keyword is not specified, the start time of each operation is distributed uniformly within the duration of the probe. If the **for** keyword is not specified, only one single burst is sent.

Command Modes

SLA profile configuration (config-sla-prof)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.

Usage Guidelines

Schedules are optional, but a profile may contain only one schedule.

Note Any change to a schedule causes all stored data for that operation to be deleted.

Changing a schedule is equivalent to deleting an operation and creating a new operation.

The **for** *duration* option must be specified if (and only if) the probe is configured to send multiple packets (or bursts of packets), using the **send packet every** or **send burst every** configuration of the **send (SLA)** command. If the **send (SLA)** command is not configured for the probe, or if **send burst once** is configured, the **for** *duration* option must not be used. If it is used in those cases, an error is returned.

The **for** *duration* option must not exceed the **schedule every** {**week | day | number**} option.

When the "**first at** *hh*:*hh*[:*ss*]" option is used, the configured time is used to calculate an offset after midnight when the first probe should be sent each day. The offset is calculated by taking the configured time plus the interval. Thus, probes may be sent before the configured time.

For example, if you configure "**schedule every 6 hours first at 11:15**," then the offset after midnight will be 5:15 (11:15 plus 6:00) and probes will be sent each day at 05:15, 11:15, 17:15 and 23:15.

Note The schedule start time starts after the configuration is committed and not at the time when the operation is configured.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following examples show how to schedule operation probes in a profile:

Example 1: Weekly Scheduling on a Specified Day at a Specified Time and Duration

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# schedule every week on Monday at 23:30 for 1
hour
```

Example 2: Daily Scheduling at a Specified Time and Duration

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# schedule every day at 11:30 for 5 minutes
```

Example 3: Hourly Scheduling Beginning at a Specified Time

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# schedule every 2 hours first at 13:45:01
```

Example 4: Hourly Scheduling for a Specified Duration

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# schedule every 6 hours for 2 hours
```

Related Commands

Command	Description
send (SLA), on page 366	Configures the number and timing of packets sent by a probe in an operations profile.

send (SLA)

To configure the number and timing of packets sent by a probe in an operations profile, use the **send** command in SLA profile probe configuration mode. To return to the default, use the **no** form of the command.

send burst {**every** *number* {**seconds** | **minutes** | **hours**} | **once**} **packet count** *packets* **interval** *number* {**seconds** | **milliseconds**}
send packet {**every** *number* {**milliseconds** | **seconds** | **minutes** | **hours**} | **once**}

Syntax Description

burst every *number* {**seconds** | **minutes** | **hours**}	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**
burst once	Sends a single burst one time.
packet count *packets*	Specifies the number of *packets* in each burst. The range is 2 to 600.
interval *number* {**seconds** | **milliseconds**}	Specifies the time interval (in seconds or milliseconds) between each packet in a burst, where *number* is in the following range: • 1–30 **seconds** • 50–30000 **milliseconds**
packet every *number* {**milliseconds** | **seconds** | **minutes** | **hours**}	Sends one packet every specified number of milliseconds, seconds, minutes, or hours, where *number* is in the following range: • 1–3600 **seconds** • 1–1440 **minutes** • 1–168 **hours** • 50–10000 **milliseconds**
packet once	Sends a single packet one time.

Command Default

If the operation is configured to measure jitter or data packet loss, the default is to send a single burst of 2 packets with a second interval between the packets.

If the operation is configured to measure synthetic packet loss, the default is to send a single burst of 10 packets with a 100 millisecond interval between the packets.

If the operation does not calculate jitter, data, or synthetic packet loss, the default is to send a single packet one time.

Command Modes

SLA profile probe configuration (config-sla-prof-pb)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.
Release 4.3.0	The statistics measurement for Y.1731 Synthetic Loss Measurement was included.

Usage Guidelines

Note The total length of a burst is the packet count multiplied by the interval and must not exceed 1 minute.

The minimum **interval** supported is platform and packet-type dependent, so certain a configuration may cause an error even if it falls within the specified limits. In the case of Ethernet SLA, the shortest interval for packet types not used for synthetic loss measurement is 100ms.

When **burst once** is sent, a single burst is sent at the start of the probe. If the schedule defines a duration for the probe, a configuration warning is flagged. The same is true if the default is in effect.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

These examples show how to configure the types of packets sent by a probe in an operations profile:

Example 1: Sending a Burst of a Number of Packets With a Specified Interval Every Specified Number of Seconds

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)# send burst every 60 seconds packet count 30
interval 1 second
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)#
```

Example 2: Sending a Burst of a Number of Packets With a Specified Interval One Time

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)# send burst once packet count 2 interval
1 second
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)#
```

Example 3: Sending a Single Packet Every Specified Number of Seconds

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
```

```
RP/0/RP0RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)# send packet every 1 second
```

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*} [{**id** | [**string** *text*] | [**number** *number*] | [**vlan-id** *id-number*] | [**vpn-id** *oui-vpnid*]}]
service *service-name* {**bridge group** *bridge-domain-group* **bridge-domain** *bridge-domain-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: • **bridge** • **down-meps** • xconnect
bridge	Specifies the use of a bridge domain. Used in conjunction with **group** and **bridge-domain**. **Note** When **bridge** is specified, all MEPs are up and MIPs are permitted.
group *bridge-domain-group*	Specifies the name of the bridge domain group.
bridge-domain *bridge-domain-name*	Specifies the name of the bridge domain and enters the Ethernet CFM domain service mode.
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: • **icc-based** *icc-string umc-string*—ITU-based Carrier Code format, with the total ICC and Unique MEG ID Code (UMC) string length no greater than 13 characters. • **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 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 4.1.0	This command was modified. The **icc-based** keyword was added.
Release 5.3.1	This command was modified to enable CFM on multipoint-to-multipoint cross connects.

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.

When configuring the **service** command, consider the following restrictions:

- The **bridge group** and **bridge-domain** keyword options appear in the software, but they are unsupported.
- The **service xconnect group p2p** form of the command is not supported for L2TPv3 cross-connect types. The following example shows a sample L2TPv3 configuration that is not supported when used with the **service xconnect group** command:

  In this example, a corresponding CFM configuration of the **service xconnect group 1 p2p 1** command will not work.

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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
```

```
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1
bridge-domain B1
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Serv_1 down-meps
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p
X1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)#
```

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

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_2 xconnect group XG2 mp2mp
 X2 ce-id 201 remote-ce-id 202
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)#
```

Related Commands

Command	Description
bridge group (VPLS)	Creates a bridge group to contain bridge domains.
bridge-domain (VPLS)	Establishes a bridge domain and enters L2VPN bridge group bridge domain configuration mode.
domain, on page 270	Creates and names a container for all domain configurations and enter the CFM domain configuration mode.
ethernet cfm (global), on page 276	Enters Ethernet CFM configuration mode.
p2p	Enters p2p configuration mode to configure point-to-point cross-connects.
show ethernet cfm configuration-errors, on page 379	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 385	Displays all the maintenance points that have been created.

Command	Description
show ethernet cfm local meps, on page 388	Displays information about local MEPs.
show ethernet cfm peer meps, on page 394	Displays other MEPs detected by a local MEP.
xconnect group	Configures a cross-connect group.

show error-disable

To display the error-disabled state of interfaces, use the **show error-disable** command in the EXEC mode.

show error-disable [**recovery**] [**interface** <*interface*>]

Syntax Description

recovery	Enables error disabled recovery on an interface.
interface	Displays error-disable state for a single interface.

Command Default

This command includes all the error-disabled interfaces.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
interface	read

Example

The following example shows how to display the error disable information.

```
show error-disable
    [ recovery ]
    [ interface <interface> ]

Interface             Error-Disable reason            Retry (s)  Time disabled
--------------------  ------------------------------  ---------  --------------
           Gi0/1/0/3  ethernet-oam-link-fault           1020000  17:12:23 04/31
           Gi0/2/0/1  ethernet-oam-critical-event           ---  20:04 04/31/06
   Gi10/11/0/12.1234  ethernet-oam-high-threshold           245  20:02:42
show error-disable trace
    [ essential | non-essential ]
```

Related Commands

Command	Description
error-disable recovery cause , on page 274	Enables error disabled recovery on an interface.
clear error-disable, on page 236	Clears all error disabled conditions on an interface.

show efd database

To display complete information about all interfaces brought down due to **EFD**, use the show efd database command in EXEC mode.

show efd database [**server** | **client**] [**interface**]

Syntax Description

client	Displays all interfaces brought down by EFD filtered by a specific client protocol.
server	Displays all interfaces brought down by EFD filtered by interface owner.
interface	Displays a specific EFD state for the EFD state, if applicable.

Command Default

This command display all interfaces brought down by EFD.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	read

Example

The following example shows how to display the error disable information.

```
# show efd database
Client CFM
===========
Interface         Since             Success  Msg Req  Del
-----------------------------------------------------------
GigE0/0/0/0.0     07/08/09 14:53    Yes      No       No

Server VLAN MA
==============
Interface         Clients
-------------------------
GigE0/0/0/0.0     CFM
```

show efd interface

To display all interfaces that are shut down because of Ethernet Fault Detection (EFD), or to display whether a specific interface is shut down because of EFD, use the **show efd interface** command in EXEC modeXR EXEC mode

show efd interface [*type interface-path-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.

Command Default

If no parameters are specified, all interfaces that are shut down because of EFD are displayed.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.1	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

If this command is issued when no EFD errors are detected, the system displays the following message:

```
< date time >
No matching interfaces with EFD-shutdown triggered
```

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to display all interfaces that are shut down because of Ethernet Fault Detection (EFD):

```
RP/0/RP0RSP0/CPU0:router# show efd interfaces

Server VLAN MA
==============
Interface         Clients
--------------------------
```

```
GigE0/0/0/0.0      CFM
```

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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/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 10: 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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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 all the CFM configuration errors on all domains:

```
RP/0/RP0RSP0/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 276	Enters CFM configuration mode.
ethernet cfm (interface), on page 277	Enters interface CFM configuration mode.
traceroute ethernet cfm, on page 463	Sends Ethernet CFM traceroute messages to generate a basic.

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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.1	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/RP0RSP0/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 11: 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
ais transmission, on page 229	Configures AIS transmission for a CFM domain service.
log ais, on page 325	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
ais transmission up, on page 231	Configures AIS transmission on a CFM interface.
show ethernet cfm local meps, on page 388	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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.3.1	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/RP0RSP0/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
```

```
RP/0/RP0RSP0/CPU0:router# show ethernet cfm interfaces statistics
Location 0/0/CPU0:

Interface         Malformed   Dropped Last Malformed Reason
----------------- --------- --------- --------------------
Gi100/0/0/0              10         2 Packet malformed - SLM is too short or too long
Gi100/0/0/3               4         1 Host: Packet malformed - invalid source MAC address
                                      Satellite: Packet malformed - the format of one or
more timestamps is invalid
```

Table 12: 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 238	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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/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 13: 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
show ethernet cfm local meps, on page 388	Displays information about local MEPs.
show ethernet cfm peer meps, on page 394	Displays information about maintenance end points (MEPs) for peer MEPs.

Command	Description
traceroute cache, on page 461	Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries.
traceroute ethernet cfm, on page 463	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet cfm local meps

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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	This command was introduced.
Release 3.9.1	New output fields were added for AIS.
Release 4.3.1	The **show ethernet cfm local meps detail** and **show ethernet cfm local meps verbose** command outputs were modified to include CCM interval information.

Release	Modification
Release 5.3.1	The **show ethernet cfm local meps verbose** command output is modified to include counts for more packet types (DMM, DMR, SLM, SLR, LMM, LMR), and exclude rows in which the sent and received packet count is zero.

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/RP0RSP0/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 14: 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/RP0RSP0/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/RP0RSP0/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/RP0RSP0/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 385	Displays a list of local maintenance points.
show ethernet cfm peer meps, on page 394	Displays information about maintenance end points (MEPs) for peer MEPs.
traceroute ethernet cfm, on page 463	Sends Ethernet CFM traceroute messages to generate a basic.

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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/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 15: 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/RP0RSP0/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 16: 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, on page 385	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 388	Displays information about local MEPs.
traceroute ethernet cfm, on page 463	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet cfm summary

To display summary information about CFM, use the **show ethernet cfm summary** command in the EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.3.1	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/RP0RSP0/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 EXEC modeXR 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	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/RP0RSP0/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 17: 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/RP0RSP0/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
traceroute cache, on page 461	Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries.
clear ethernet cfm traceroute-cache, on page 244	Removes the contents of the traceroute cache.
traceroute ethernet cfm, on page 463	Sends Ethernet CFM traceroute messages to generate a basic.

show ethernet lmi interfaces

To display Ethernet Local Management Interface (E-LMI) information for an interface, including protocol status and error and event statistics, use the **show ethernet lmi interfaces** command in EXEC modeXR EXEC mode.

show ethernet lmi interfaces [*type interface-path-id*][**brief** | **detail**]
show ethernet lmi interfaces [**brief** | **detail**][**location** *location*]

Syntax Description

brief	(Optional) Displays summary information about the E-LMI protocol status, number of EVCs and errors, and CE-VLAN/EVC map type.
detail	(Optional) Displays the configured and operational state of E-LMI on the interface, with counts for reliability and protocol errors and elapsed time since various events have occurred, including details about subinterfaces and EVC status.
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 E-LMI information for the designated node. The *location* argument is entered in the *rack*/*slot*/*module* notation. **Note** The location cannot be specified when you specify an interface type.

Command Default

The output displays the configured and operational state of E-LMI on the interface, with counts for reliability and protocol errors and elapsed time since various events have occurred since the protocol was enabled on the interface or counters were cleared.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

If Protocol Errors are seen in the output, then the CE device is sending packets to the PE device, but the PE does not understand those packets. This suggests an incorrect implementation of the E-LMI protocol on the

CE side, or corruption of the packets on the path between the CE and PE. E-LMI packets have a strictly defined structure in the MEF 16 standard, and any deviation from that results in a protocol error. The PE will not respond to any packets that are malformed and result in a protocol error.

The Reliability Error counters can indicate that messages are being lost between the PE and CE devices. The timers in the last block of the output should indicate that messages are being sent and received by the PE device. Consider the following actions when these Reliability Errors occur:

- Status Enq Timeouts—If this counter is continuously incrementing, it indicates that the Polling Timer on the CE is configured to a greater value than the PVT configuration on the PE. Status Enquiry messages will be sent less frequently than the PVT expects them and PVT timeouts occur. Be sure that the value of the PVT (specified by the **polling-verification-timer** command on the PE) is greater than the Polling Timer value on the CE device.
- Invalid Sequence Number—Indicates that messages from the PE are not being received by the CE. Be sure that the correct interface on the CE device is connected to the corresponding E-LMI interface on the PE device, so that communication can take place. Verify that both interfaces are Up.
- Invalid Report Type—This error can occur under the following conditions:
  - If the protocol is in the process of a status update and an "E-LMI Check" type of STATUS ENQUIRY is received by the PE, then the PE ignores the ENQUIRY and records an error.
  - If the protocol is not in the process of a status update and a "Full Status Continued" type of STATUS ENQUIRY is received by the PE, then the PE ignores the ENQUIRY and records an error.

Note If the protocol is in the process of a status update and a "Full Status" type of STATUS ENQUIRY is received by the PE, then the PE restarts the status update but does not record any error.

Task ID

Task ID	Operation
ethernet-services	read

The following example shows sample output for the default form of the command:

```
RP/0/RP0RSP0/CPU0:router# show ethernet lmi interfaces
Interface: GigabitEthernet0/0/0/0
  Ether LMI Link Status: Up
  UNI Id: PE1-CustA-Slot1-Port0
  Line Protocol State: Up
  MTU: 1500 (2 PDUs reqd. for full report)
  CE-VLAN/EVC Map Type: Bundling (1 EVC)
  Configuration: Status counter 4, Polling Verification Timer 15 seconds
  Last Data Instance Sent: 1732
  Last Sequence Numbers: Sent 128, Received 128

  Reliability Errors:
    Status Enq Timeouts                 19 Invalid Sequence Number             0
    Invalid Report Type                  0

  Protocol Errors:
    Malformed PDUs                       0 Invalid Protocol Version           0
    Invalid Message Type                 0 Out of Sequence IE                 0
    Duplicated IE                        0 Mandatory IE Missing               0
```

```
  Invalid Mandatory IE                0 Invalid non-Mandatory IE           0
  Unrecognized IE                     0 Unexpected IE                      0

Full Status Enq Rcvd     00:00:10 ago   Full Status Sent      00:00:10 ago
PDU Rcvd                 00:00:00 ago   PDU Sent              00:00:00 ago
LMI Link Status Changed  10:00:00 ago   Last Protocol Error      never
Counters cleared            never
```

Table 18: show ethernet lmi interfaces Field Descriptions

Field	Description
Interface:	Name of the interface running the E-LMI protocol.
Ether LMI Link Status:	Status of the E-LMI protocol on the interface. Possible values are Up, Down, or Unknown (PVT disabled).
UNI Id:	Name of the UNI as configured by the **ethernet uni id** command. This output field does not appear if the UNI ID is not configured.
Line Protocol State:	Status of the interface line protocol. Possible values are Up, Down, or Admin-Down.
MTU (*x* PDUs reqd for full report)	Maximum Transmission Unit of the interface and the number (*x*) of E-LMI PDUs of that size required to send one full status report.
CE-VLAN/EVC Map Type: *type* (*x* EVCs)	Map type, which describes how CE VLAN IDs are mapped to specific EVCs. Possible valued for *type* are Bundling, All to One Bundling, or Service Multiplexing with no bundling. The number *x* of EVCs in the map are displayed in parentheses.
Configuration: Status counter	Value of the MEF N393 Status Counter as configured by the **status-counter** command.
Polling Verification Timer	Value of the MEF T392 Polling Verification Timer (in seconds) as configured by the **polling-verification-timer** command. Displays "disabled" if the PVT is turned off.
Last Data Instance Sent:	Current value of the Data Instance.
Last Sequence Numbers: Sent *x*, Received *y*	Values of the last sent (*x*) and received (*y*) sequence numbers as reported in sent PDUs.

Field	Description
Reliability Errors:	Number of times the specified types of reliability errors have occurred since the protocol was enabled on the interface or counters were cleared: • Status Enq Timeouts—Increments every time the Polling Verification Timer (PVT) expires. • Invalid Report Type—Increments if the Report Type is not appropriate to the protocol's current state. There are four Report Types defined by the E-LMI Standard, and only three of them can appear in Status Enquiry messages that the PE receives. These are: E-LMI Check, Full Status and Full Status Continued. • Invalid Sequence Number—Increments whenever the received sequence number in a Status Enquiry from the CE does not match the last sent sequence number in the PE response. Indicates that messages from the PE are not being received by the CE. The PE continues to respond with the requested Report Type. For more information about possible actions, see the "Usage Guidelines" section.
Protocol Errors: (Malformed PDUs, Invalid Message Type, Duplicated IE, and others)	Number of times the specified types of protocol errors have occurred since the protocol was enabled on the interface or counters were cleared.
Full Status Enq Rcvd, PDU Rcvd, LMI Link Status Changed, Counters cleared, Full Status Sent, PDU Sent, and Last Protocol Error.	Elapsed time (hrs:mins:secs ago) since the specified events last occurred or counters were cleared. Displays "never" if the event has not occurred since the protocol was enabled on the interface or counters were cleared.

The following example shows sample output for the **show ethernet lmi interfaces brief** form of the command:

```
RP/0/RP0RSP0/CPU0:router# show ethernet lmi interfaces brief
                     ELMI   LineP      #            CE-VLAN/
Interface            State  State      EVCs  Errors EVC Map
-------------------------------------------------------------------------------
Gi0/0/0/0            Up     Up            3      19 Multiplexing, no bundling
Gi0/0/0/1            Down   Admin-down    1       0 All to One Bundling
```

Table 19: show ethernet lmi interfaces brief Field Descriptions

Field	Description
Interface	Name of the interface running the E-LMI protocol.

Field	Description
ELMI State	Status of the E-LMI protocol. Possible values are Up, Down, or N/A if the Polling Verification Timer is disabled.
LineP State	Status of the interface line protocol. Possible values are Up, Down, or Admin-Down.
# EVCs	Total number of EVCs in the CE-VLAN/EVC map.
Errors	Total number of reliability and protocol errors encountered since the protocol was enabled on the interface or counters were cleared.
CE-VLAN/EVC Map	Map type, which describes how CE VLAN IDs are mapped to specific EVCs. Possible values are Bundling, All to One Bundling, or Multiplexing, no bundling.

The following example shows sample output for the **show ethernet lmi interfaces detail** form of the command:

```
RP/0/RP0RSP0/CPU0:router #show ethernet lmi interfaces detail
Interface: GigabitEthernet0/0/0/0
  Ether LMI Link Status: Up
  UNI Id: PE1-CustA-Slot1-Port0
  Line Protocol State: Up
  MTU: 1500 (2 PDUs reqd. for full report)
  CE-VLAN/EVC Map Type: Bundling (1 EVC)
  Configuration: Status counter 4, Polling Verification Timer 15 seconds
  Last Data Instance Sent: 1732
  Last Sequence Numbers: Sent 128, Received 128

  Reliability Errors:
    Status Enq Timeouts                19 Invalid Sequence Number             0
    Invalid Report Type                 0

  Protocol Errors:
    Malformed PDUs                      0 Invalid Protocol Version            0
    Invalid Message Type                0 Out of Sequence IE                  0
    Duplicated IE                       0 Mandatory IE Missing                0
    Invalid Mandatory IE                0 Invalid non-Mandatory IE            0
    Unrecognized IE                     0 Unexpected IE                       0

  Full Status Enq Rcvd     00:00:10 ago   Full Status Sent      00:00:10 ago
  PDU Rcvd                 00:00:00 ago   PDU Sent              00:00:00 ago
  LMI Link Status Changed  10:00:00 ago   Last Protocol Error      never
  Counters cleared            never

  Sub-interface: GigabitEthernet0/0/0/0.1
    VLANs: 1,10,20-30, default, untagged/priority tagged
    EVC Status: New, Partially Active
    EVC Type: Multipoint-to-Multipoint
    OAM Protocol: CFM
      CFM Domain: Global (level 5)
      CFM Service: CustomerA
    Remote UNI Count: Configured = 2, Active = 1

    Remote UNI Id                                                  Status
```

```
-------------                                                   ------
PE2-CustA-Slot2-Port2                                           Up
PE2-CustA-Slot3-Port3                                           Unreachable
```

Table 20: show ethernet lmi interfaces detail Field Descriptions

Field	Description
Interface:	Name of the interface running the E-LMI protocol.
Ether LMI Link Status:	Status of the E-LMI protocol on the interface. Possible values are Up, Down, or Unknown (PVT disabled).
UNI Id:	Name of the UNI as configured by the **ethernet uni id** command. This output field does not appear if the UNI ID is not configured.
Line Protocol State:	Status of the interface line protocol. Possible values are Up, Down, or Admin-Down.
MTU (*x* PDUs reqd for full report)	Maximum Transmission Unit of the interface and the number (*x*) of E-LMI PDUs of that size required to send one full status report.
CE-VLAN/EVC Map Type: *type* (*x* EVCs)	Map type, which describes how CE VLAN IDs are mapped to specific EVCs. Possible valued for *type* are Bundling, All to One Bundling, or Service Multiplexing with no bundling. The number *x* of EVCs in the map are displayed in parentheses.
Configuration: Status counter	Value of the MEF N393 Status Counter as configured by the **status-counter** command.
Polling Verification Timer	Value of the MEF T392 Polling Verification Timer (in seconds) as configured by the **polling-verification-timer** command. Displays "disabled" if the PVT is turned off.
Last Data Instance Sent:	Current value of the Data Instance.
Last Sequence Numbers: Sent *x*, Received *y*	Values of the last sent (*x*) and received (*y*) sequence numbers as reported in sent PDUs.
Reliability Errors: (Status Enq Timeouts, Invalid Report Type, and Invalid Sequence Number)	Number of times the specified types of reliability errors have occurred since the protocol was enabled on the interface or counters were cleared.
Protocol Errors: (Malformed PDUs, Invalid Message Type, Duplicated IE, and others)	Number of times the specified types of protocol errors have occurred since the protocol was enabled on the interface or counters were cleared.

Field	Description
Full Status Enq Rcvd, PDU Rcvd, LMI Link Status Changed, Counters cleared, Full Status Sent, PDU Sent, and Last Protocol Error.	Elapsed time (hrs:mins:secs ago) since the specified events last occurred or counters were cleared. Displays "never" if the event has not occurred since the protocol was enabled on the interface or counters were cleared.
Subinterface:	Name of the subinterface corresponding to the EVC.
VLANs:	VLAN traffic on the interface that corresponds to the EFPs encapsulation, with the following possible values: • Numbers of the matching VLAN IDs **Note** If Q-in-Q encapsulation is configured, only the outer tag is displayed. • default—Indicates that Default tagging is configured, or the encapsulation specifies to match "any." • none—No matches for the configured encapsulation have occurred on the interface. • untagged/priority—Traffic is either untagged or has priority tagging. **Note** If the message "EVC omitted from Full Status due to encapsulation conflict" is displayed above the VLAN output, a misconfiguration has occurred with two or more EFPs having a conflicting encapsulation.
EVC Status:	State of the EVC, with the following possible values: • Active—E-LMI is operational for this EVC. • Inactive—All of the remote UNIs are unreachable or down. • New—The EVC has not yet been reported to the CE device. • Not yet known—E-LMI is still waiting to receive the status from CFM. This condition should not persist for more than a few seconds. • Partially Active—One or more of the remote UNIs is unreachable or down.
EVC Type:	Type of the EVC, with the following possible values: "Point-to-Point," "Multipoint-to-Multipoint," or "EVC type not yet known."

Field	Description
OAM Protocol:	The OAM protocol from which the EVC status and type are derived. Possible values are either "CFM" or "None."
CFM Domain:	Name of the CFM domain for this EVC.
CFM Service:	Name of the CFM service for this EVC.
Remote UNI Count: Configured = *x*, Active = *y*	Number of configured or expected remote UNIs (*x*) and the number of active remote UNIs (*y*) within the EVC.
Remote UNI Id:	ID of each remote UNI, including both configured and active remote UNIs where these two sets are not identical. If the number of configured and active remote UNIs is zero, no table is displayed. **Note** Where no ID is configured for a remote UNI using the **ethernet uni id** command, then the CFM remote MEP ID is displayed, for example, "<Remote UNI Reference Id: *x*>"
Status	Status of each remote UNI, with the following possible values: "Up," "Down," "Admin Down," "Unreachable (a configured remote UNI is not active or missing)," or "Unknown (a remote UNI is active but not reporting its status)."

Related Commands

Command	Description
clear ethernet lmi interfaces, on page 246	Clears Ethernet LMI statistics on one or all interfaces.

show ethernet loopback active

To display the loopback sessions that are currently active, use the **show ethernet loopback active** command in the EXEC modeXR EXEC mode.

show ethernet loopback active {**interface***interface name* | **brief**}

Syntax Description

interface *interface name*	Displays the active loopback sessions for this specified interface.
brief	Displays a brief information of the active loopback sessions on all interfaces.

Command Default

Displays the information of active loopback sessions on all interfaces.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 5.1	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 a sample output of the **show ethernet loopback active brief** command:

```
RP/0/RP0RSP0/CPU0:routershow ethernet loopback active brief

Interface                 ID    Direction    Time left    Status
------------------------------------------------------------------
GigabitEthernet0/0/0/0    1     External     01:23:45   Starting
TenGigE0/1/0/0.200        1     Internal     00:01:17     Active
TenGigE0/1/0/0.200        2     External     00:00:00   Stopping
```

Each row in the table corresponds to a loopback session which is currently active. For each session, these fields are displayed:

- Interface: The interface on which the loopback session is running.
- ID: The session ID allocated to the session when it was started.
- Direction: The direction of the loopback session.
- Time left: The amount of time left until the loopback session is automatically stopped.
- Status: The status of the loopback session.

show ethernet loopback permitted

To display all the interfaces which are permitted to run loopback sessions, use the **show ethernet loopback permitted** command in the EXEC mode.

show ethernet loopback permitted

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

EXEC(#)

Command History

Release	Modification
Release 5.1	This command was introduced.

Task ID

Task ID	Operation
ethernet-services	execute

Example

This example shows a sample output of the **show ethernet loopback permitted** command:

```
RP/0/RP0RSP0/CPU0:routershow ethernet loopback permitted

Interface                      Direction
-----------------------------------------------
GigabitEthernet0/0/0/0         External
GigabitEthernet0/0/0/1.100     Internal
TenGigE0/1/0/0.200             External, Internal
```

These are the description of the fields in the command output:

- **Interface**: Specifies the interface on which loopback is permitted.
- **Direction**: Specifies the direction in which the loopback is permitted on that interface.

show ethernet oam configuration

To display the current active Ethernet OAM configuration on an interface, use the **show ethernet oam configuration** command in EXEC modeXR EXEC mode.

show ethernet oam configuration [**interface** *type* *interface-path-id*]

Syntax Description

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.

Command Default

If no parameters are specified, the configurations for all Ethernet OAM interfaces is displayed.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The “Uni-directional link-fault detection enabled” output field was added. The “Uni-directional link-fault detection enabled” field is not supported in this release. Therefore, the field will always display “N.”
Release 5.0.0	This command was introduced.

Usage Guidelines

This command displays the Ethernet OAM configuration information for all interfaces, or a specified interface.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display Ethernet OAM configuration information for a specific interface:

```
RP/0/RP0RSP0/CPU0:router# show ethernet oam configuration interface gigabitethernet 0/4/0/0

Thu Aug  5 21:54:34.050 DST
GigabitEthernet0/4/0/0:
  Hello interval:                                          1s
  Link monitoring enabled:                                  Y
  Remote loopback enabled:                                  N
  Mib retrieval enabled:                                    N
```

```
  Uni-directional link-fault detection enabled:                N
  Configured mode:                                        Active
  Connection timeout:                                          5
  Symbol period window:                                        0
  Symbol period low threshold:                                 1
  Symbol period high threshold:                             None
  Frame window:                                             1000
  Frame low threshold:                                         1
  Frame high threshold:                                     None
  Frame period window:                                      1000
  Frame period low threshold:                                  1
  Frame period high threshold:                              None
  Frame seconds window:                                    60000
  Frame seconds low threshold:                                 1
  Frame seconds high threshold:                             None
  High threshold action:                                    None
  Link fault action:                                         Log
  Dying gasp action:                                         Log
  Critical event action:                                     Log
  Discovery timeout action:                                  Log
  Capabilities conflict action:                              Log
  Wiring conflict action:                           Error-Disable
  Session up action:                                         Log
  Session down action:                                       Log
  Remote loopback action:                                    Log
  Require remote mode:                                    Ignore
  Require remote MIB retrieval:                                N
  Require remote loopback support:                             N
  Require remote link monitoring:                              N
```

The following example shows how to display the configuration for all EOAM interfaces:

```
RP/0/RP0RSP0/CPU0:router# show ethernet oam configuration
Thu Aug  5 22:07:06.870 DST
GigabitEthernet0/4/0/0:
  Hello interval:                                             1s
  Link monitoring enabled:                                     Y
  Remote loopback enabled:                                     N
  Mib retrieval enabled:                                       N
  Uni-directional link-fault detection enabled:                N
  Configured mode:                                        Active
  Connection timeout:                                          5
  Symbol period window:                                        0
  Symbol period low threshold:                                 1
  Symbol period high threshold:                             None
  Frame window:                                             1000
  Frame low threshold:                                         1
  Frame high threshold:                                     None
  Frame period window:                                      1000
  Frame period low threshold:                                  1
  Frame period high threshold:                              None
  Frame seconds window:                                    60000
  Frame seconds low threshold:                                 1
  Frame seconds high threshold:                             None
  High threshold action:                                    None
  Link fault action:                                         Log
  Dying gasp action:                                         Log
  Critical event action:                                     Log
  Discovery timeout action:                                  Log
  Capabilities conflict action:                              Log
  Wiring conflict action:                           Error-Disable
  Session up action:                                         Log
  Session down action:                                       Log
```

```
Remote loopback action:                                    Log
Require remote mode:                                    Ignore
Require remote MIB retrieval:                              N
Require remote loopback support:                           N
Require remote link monitoring:                            N
```

Related Commands

Command	Description
show ethernet oam discovery, on page 421	Displays the current status of Ethernet OAM sessions.
show ethernet oam statistics, on page 427	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

show ethernet oam discovery

To display the currently configured OAM information of Ethernet OAM sessions on interfaces, use the **show ethernet oam discovery** command in EXEC modeXR EXEC mode.

show ethernet oam discovery [{**brief** | **interface** *type interface-path-id* [**remote**]}]

Syntax Description

brief	Displays minimal, currently configured OAM information in table form.
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.
remote	(Optional) Retrieves and displays information from a remote device, as if the command was run on the remote device.

Command Default

Displays detailed information for Ethernet OAM sessions on all interfaces.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	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 minimal, currently configured OAM information for Ethernet OAM sessions on all interfaces:

```
RP/0/RP0RSP0/CPU0:router# show ethernet oam discovery brief

Sat Jul  4 13:52:42.949 PST
Flags:
    L - Link Monitoring support
    M - MIB Retrieval support
    R - Remote Loopback support
    U - Unidirectional detection support
```

```
    * - data is unavailable

Local                  Remote         Remote
Interface              MAC Address    Vendor Mode    Capability
---------------------- -------------- ------ ------- ----------
Gi0/1/5/1              0010.94fd.2bfa 00000A Active  L
Gi0/1/5/2              0020.95fd.3bfa 00000B Active  M
Gi0/1/6/1              0030.96fd.6bfa 00000C Passive L R
Fa0/1/3/1              0080.09ff.e4a0 00000C Active  L R
```

The following example shows how to display detailed, currently configured OAM information for the Ethernet OAM session on a specific interface:

```
RP/0/RP0RSP0/CPU0:router# show ethernet oam discovery interface gigabitethernet 0/1/5/1

Sat Jul  4 13:56:49.967 PST
GigabitEthernet0/1/5/1:
Local client
------------
  Administrative configuration:
    PDU revision:                          1
    Mode:                             Active
    Unidirectional support:                N
    Link monitor support:                  Y
    Remote loopback support:               N
    MIB retrieval support:                 N
    Maximum PDU size:                   1500
    Mis-wiring detection key:           5E9D

Operational status:
    Port status:                Active send
    Loopback status:                   None
    Interface mis-wired:                   N

Remote client
-------------
  MAC address:               0030.96fd.6bfa
  Vendor (OUI):            00.00.0C (Cisco)

  Administrative configuration:
    PDU revision:                          5
    Mode:                            Passive
    Unidirectional support:                N
    Link monitor support:                  Y
    Remote loopback support:               Y
    MIB retrieval support:                 N
    Maximum PDU size:                   1500
```

Related Commands

Command	Description
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam statistics, on page 427	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

show ethernet oam event-log

To display the most recent OAM event logs per interface, use the **show ethernet oam event-log** command in EXEC modeXR EXEC mode.

show ethernet oam event-log [**interface** *interface*][**detail**]

Syntax Description

interface *interface*	Filters the output to only include events for the specified interface.
detail	Displays additional details like threshold value, breaching value, total running errors and window size of a particular interface.

Command Default

This command displays event logs for all interfaces which have OAM configured.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.3.1	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 event logs for all interfaces which have OAM configured:

```
RP/0/RP0RSP0/CPU0:router# show ethernet oam event-log
Wed Jan 23 06:16:46.684 PST
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

GigabitEthernet0/1/0/0
================================================================================
Time                      Type           Loc'n  Action Threshold Breaching Value
------------------------- -------------- ------ ------ --------- ---------------
Wed Jan 23 06:13:25 PST   Symbol period  Local  N/A            1               4
Wed Jan 23 06:13:33 PST   Frame          Local  N/A            1               6
Wed Jan 23 06:13:37 PST   Frame period   Local  None           9              12
Wed Jan 23 06:13:45 PST   Frame seconds  Local  N/A            1              10
Wed Jan 23 06:13:57 PST   Dying gasp     Remote Logged       N/A             N/A

GigabitEthernet0/1/0/1
================================================================================
Time                      Type           Loc'n  Action Threshold Breaching Value
------------------------- -------------- ------ ------ --------- ---------------
Wed Jan 23 06:26:14 PST   Dying gasp     Remote Logged       N/A             N/A
Wed Jan 23 06:33:25 PST   Symbol period  Local  N/A            1               4
Wed Jan 23 06:43:33 PST   Frame period   Remote N/A            9              12
```

```
Wed Jan 23 06:53:37 PST   Critical event Remote Logged       N/A            N/A
Wed Jan 23 07:13:45 PST   Link fault     Remote EFD          N/A            N/A
Wed Jan 23 07:18:23 PST   Dying gasp     Local  Logged       N/A            N/A
```

Related Commands

Command	Description
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 421	Displays the current status of Ethernet OAM sessions.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

show ethernet oam interfaces

To display the current state of Ethernet OAM interfaces, use the **show ethernet oam interfaces** command in EXEC modeXR EXEC mode.

show ethernet oam interfaces [**interface** *type interface-path-id*]

Syntax Description

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

No parameters displays the current state for all Ethernet OAM interfaces.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	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 current state for all Ethernet OAM interfaces:

```
RP/0/RP0RSP0/CPU0:router# show ethernet oam interfaces
GigabitEthernet0/0/0/0
In REMOTE_OK state
Local MWD key: 80081234
Remote MWD key: 8F08ABCC
EFD triggered: Yes (link-fault)
```

Table 21: show ethernet oam interfaces Field Descriptions

Field	Description
In *type* state	The possible discovery state *type* values are: • ACTIVE_SEND_LOCAL—The interface is configured in active mode (the default), but no Information PDUs have been received from the peer (except possibly link-fault PDUs). Information PDUs are sent. • FAULT—A local unidirectional link fault has been detected. Link-fault PDUs are sent. • INACTIVE—The interface is down. • PASSIVE_WAIT—The interface is configured in passive mode (**mode passive** command) but no Information PDUs have been received from the peer (except possibly link-fault PDUs). No PDUs are sent. • REMOTE—(Also known as SEND_LOCAL_REMOTE). Information PDUs are being sent and received, but the local device is not satisfied with the remote peer's capabilities (for example, because there is a 'require-remote' configuration and the peer does not have the required capabilities). • REMOTE_OK—(Also known as SEND_LOCAL_REMOTE_OK). Information PDUs are being sent and received, and the local device is satisfied with the peer's capabilities, but the remote peer is not satisfied with the local device capabilities (for example, because there is a 'require-remote' configuration on the peer device). • SEND_ANY—The discovery process has completed, both devices are satisfied with the configuration and the session is up. All types of PDU can be sent and received.
EFD triggered	Indicates if an Ethernet Fault Detection (EFD) event has occurred on the interface and the type of fault that triggered the interface to be moved to the down state for the line protocol. The possible EFD trigger events are: • capabilities-conflict • discovery-timeout • link-fault • session-down • wiring-conflict

Related Commands

Command	Description
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 421	Displays the current status of Ethernet OAM sessions.
show ethernet oam statistics, on page 427	Displays the local and remote Ethernet OAM statistics for interfaces.

show ethernet oam statistics

To display the local and remote Ethernet OAM statistics for interfaces, use the **show ethernet oam statistics** command in EXEC modeXR EXEC mode.

show ethernet oam statistics [**interface** *type* *interface-path-id* [**remote**]]

Syntax Description

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.
remote	(Optional) Retrieves and displays information from a remote device, as if the command was run on the remote device.

Command Default

No parameters displays statistics for all Ethernet OAM interfaces.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	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 Ethernet OAM statistics for a specific interface:

```
RP/0/RP0RSP0/CPU0:router# show ethernet oam statistics interface gigabitethernet 0/1/5/1

GigabitEthernet0/1/5/1:
Counters
--------
    Information OAMPDU Tx                       161177
    Information OAMPDU Rx                       151178
    Unique Event Notification OAMPDU Tx              0
    Unique Event Notification OAMPDU Rx              0
    Duplicate Event Notification OAMPDU Tx           0
    Duplicate Event Notification OAMPDU Rx           0
```

```
    Loopback Control OAMPDU Tx                      0
    Loopback Control OAMPDU Rx                      0
    Variable Request OAMPDU Tx                      0
    Variable Request OAMPDU Rx                      0
    Variable Response OAMPDU Tx                     0
    Variable Response OAMPDU Rx                     0
    Organization Specific OAMPDU Tx                 0
    Organization Specific OAMPDU Rx                 0
    Unsupported OAMPDU Tx                          45
    Unsupported OAMPDU Rx                           0
    Frames Lost due to OAM                         23
    Fixed frames Rx                                 1

Local event logs
----------------
    Errored Symbol Period records                   0
    Errored Frame records                           0
    Errored Frame Period records                    0
    Errored Frame Second records                    0

Remote event logs
-----------------
    Errored Symbol Period records                   0
    Errored Frame records                           0
    Errored Frame Period records                    0
    Errored Frame Second records                    0
```

Related Commands

Command	Description
show ethernet oam configuration, on page 418	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 421	Displays the current status of Ethernet OAM sessions.
show ethernet oam interfaces, on page 425	Displays the current state of Ethernet OAM interfaces.

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 EXEC modeXR 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 Modes

EXEC modeXR EXEC mode

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
```

show ethernet sla configuration-errors

To display information about errors that are preventing configured Ethernet Service Level Agreement (SLA) operations from becoming active, as well as any warnings that have occurred, use the **show ethernet sla configuration-errors** command in EXEC modeXR EXEC mode.

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

Syntax Description

domain *domain-name*	Displays information for the specified domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain where the SLA operation is configured.
interface *type*	(Optional) Displays information for 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.
profile *profile-name*	(Optional) Displays information for the specified profile name.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	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 display information about errors that are preventing configured SLA operations from becoming active:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla configuration-errors

Errors:
```

```
-------
  Profile 'gold' is not defined but is used on Gi0/0/0/0.0
  Profile 'red' defines a test-pattern, which is not supported by the type
```

The following example shows the errors from configured Ethernet SLA operations that cannot be represented correctly in the MEF-SOAM-PM-MIB:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla configuration-errors
Mon Aug 18 12:21:31.355 CEST

Profile 'gold': This operation cannot be fully represented in the MEF-SOAM-PM-MIB due to
burst configuration being present

Profile 'red': This operation cannot be fully represented in the MEF-SOAM-PM-MIB due to the
 use of bin configuration for loss measurement
```

Note The operations will still work and statistics will still be gathered and retrievable using **show** commands. However, you cannot retrieve all profile data from the MIB.

The following configuration errors reflect profiles that work but have no data retrievable from the MIB:

- `This operation cannot be represented in the MEF-SOAM-PM-MIB as not all metrics have the same bucket size`
- `This operation cannot be represented in the MEF-SOAM-PM-MIB as the probe interval is not the probe duration and there are multiple buckets per probe`

The following configuration errors reflect profiles that are only partially represented in the MIB:

Error	Description
`This operation cannot be fully represented in the MEF-SOAM-PM-MIB as the probe interval is not the probe duration and there are multiple probes per bucket`	The breakdown of the bucket into multiple probes is not represented in the MIB, but the statistics data is present.
`This operation cannot be fully represented in the MEF-SOAM-PM-MIB as it contains multiple delay/jitter metrics with differing numbers of bins`	The bin count (a per-session per-“metric class” parameter in the MIB) is not displayed in the MIB, but all remaining configuration (including per-metric bin configuration) and all statistics (including per-bin statistics) are displayed.
`This operation cannot be fully represented in the MEF-SOAM-PM-MIB due to burst configuration being present`	The burst configuration itself cannot be represented in the MIB, but the statistics for the operation are available in the MIB.
`This operation cannot be fully represented in the MEF-SOAM-PM-MIB due to the use of bin configuration for loss measurement`	The bin configuration and the per-bin results cannot be exported by the MIB, but the remaining configuration and per-bucket results are available.

Error	Description
`This operation cannot be fully represented in the MEF-SOAM-PM-MIB due to the use of a padding pattern other than all zeros or all ones`	The configured padding pattern will not be represented in the MIB.

show ethernet sla operations

To display information about configured Ethernet Service Level Agreement (SLA) operations, use the **show ethernet sla operations** command in EXEC modeXR EXEC mode.

show ethernet sla operations [**detail**] [**domain** *domain-name*] [**interface** *type interface-path-id*] [{**on-demand** {**all***id*} | **profile** {*profile-name* | **all**}}]

Syntax Description

detail	(Optional) Displays detailed information.
domain *domain-name*	(Optional) Displays information for the specified domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain where the SLA operation is configured.
interface *type*	(Optional) Displays information for the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Displays information for the specified 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.
on-demand all	(Optional) Displays information for all on-demand operations.
on-demand *id*	(Optional) Displays information for the specified on-demand operation, where *id* is the number of the operation.
profile *profile-name*	(Optional) Displays information for the specified profile name.
profile all	(Optional) Displays information for all profiles.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The **on-demand** {**all** | *id*} and **profile all** keyword options were added.
Release 4.0.0	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

Examples

The following example shows how to display information about configured SLA operations in brief:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla operations

Profile               Instance
--------------------  ------------------------------------------------------------
gold                  Gi0/0/0/0, dom d,     to MEP-ID 200                       !
business-gold         Gi0/0/0/0, dom mydom, to 00ab.cdef.1234
business-gold         Gi0/0/0/0, dom mydom, to MEP-ID 2
```

Note If the SLA operation has a configuration error, an exclamation point (!) is displayed at the end of the line in the command output.

The following example shows how to display information about configured SLA operations in detail:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla operations detail

Source: Interface GigabitEthernet0/0/0/0, Domain d
Destination: Target MEP-ID 200
================================================================================
Profile 'gold'
Profile is not configured

Source: Interface GigabitEthernet0/0/0/0, Domain mydom
Destination: Target MAC Address 00ab.cdef.1234
================================================================================
Profile 'business-gold'
Probe type 'cfm-delay-measurement':
    burst sent every 1min, each of 20 packets sent every 100ms
Measures RT Delay: 5 bins; 1 buckets/probe; 75 of 100 archived
Measures RT Jitter (interval 1): no aggregation; 5 probes/bucket; 10 of 10 archived
Scheduled to run every 5min first at 00:02:00 UTC for 2min (2 bursts)
    last run at 07:32:00 PST Tue 19 January 2010

Source: Interface GigabitEthernet0/0/0/0, Domain mydom
Destination: Target MEP-ID 2
================================================================================
Profile 'business-gold'
Probe type 'cfm-delay-measurement':
    burst sent every 1min, each of 20 packets sent every 100ms
Measures RT Delay: 5 bins; 1 buckets/probe; 75 of 100 archived
Measures RT Jitter (interval 1): no aggregation; 5 probes/bucket; 10 of 10 archived
Scheduled to run every 5min first at 00:02:00 UTC for 2min (2 bursts)
    last run at 07:32:00 PST Tue 19 January 2010
```

The following example shows how to display information about on-demand SLA operations in detail:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla operations detail on-demand

Source: Interface GigabitEthernet0/0/0/0.0, Domain mydom
Destination: Target MAC Address 00ab.cdef.1234
================================================================================
On-demand operation ID #6
Probe type 'cfm-loopback':
    burst sent every 10s, each of 10 packets sent every 1s
    packets padded to 1024 bytes with pattern 0xabcd56ef
    packets use priority value of 3
Measures RT Delay: no aggregation; 1 buckets/probe; 1 of 100 archived
Started at 12:01:49 GMT Tue 02 March 2010, runs every 1hr for 1hr (360 bursts)
    repeats 10 times, ends at 22:01:49 GMT Tue 02 March 2010
```

The following example shows how to display information about configured and on-demand SLA operations on a specific interface:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla operations interface gigabitethernet 0/0/0/0.0
 detail

Interface GigabitEthernet 0/0/0/0.0
Domain mydom Service myser to 00AB.CDEF.1234
--------------------------------------------------------------------------------
Profile 'business-gold'
Probe type CFM-delay-measurement:
    bursts sent every 1min, each of 20 packets sent every 100ms
    packets padded to 1500 bytes with zeroes
    packets use priority value of 7
Measures RTT: 5 bins 20ms wide; 2 buckets/ probe; 75/100 archived
Measures Jitter (interval 1): 3 bins 40ms wide; 2 buckets/probe; 50 archived
Scheduled to run every Sunday at 4am for 2 hours:
    last run at 04:00 25/05/2008
```

show ethernet sla statistics

To display the contents of buckets containing Ethernet Service Level Agreement (SLA) metrics collected by probes, use the **show ethernet sla statistics** command in EXEC modeXR EXEC mode.

show ethernet sla statistics [{**current** | **history**}] [**detail**] [**domain** *domain-name*] [**interface** *type interface-path-id*] [{**on-demand** {**all***id*} | **profile** {*profile-name* | **all**}}] [**statistic** *stat-type*]

Syntax Description

current	(Optional) Displays the content of buckets currently being filled.
history	(Optional) Displays the content of all full buckets.
detail	(Optional) Displays detailed content of buckets.
domain *domain-name*	(Optional) Displays the content of buckets for the specified domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain where the SLA operation is configured.
interface *type*	(Optional) Displays the content of buckets for the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Displays the content of buckets for the specified 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.
on-demand all	(Optional) Displays the content of buckets for all on-demand operations.
on-demand *id*	(Optional) Displays the content of buckets for the specified on-demand operation, where *id* is the number of the operation.
profile *profile-name*	(Optional) Displays the content of buckets for the specified profile name.
profile all	(Optional) Displays the content of buckets for all profiles.
statistic *stat-type*	(Optional) Displays only the specified type of statistic. Valid values are: • **one-way-delay-ds**—Displays only one-way (destination-to-source) delay. • **one-way-delay-sd**—Displays only one-way (source-to-destination) delay. • **one-way-jitter-ds**—Displays only one-way (destination-to-source) jitter. • **one-way-jitter-sd**—Displays only one-way (source-to-destination) jitter. • **round-trip-delay**—Displays only round-trip delay. • **round-trip-jitter**—Displays only round-trip jitter. • **one-way-loss-ds**—Displays only one-way (destination-to-source) loss. • **one-way-loss-sd**—Displays only one-way (source-to-destination) loss.

Command Default No default behavior or values

Command Modes EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	• The **one-way-delay-ds**, **one-way-delay-sd**, **one-way-jitter-ds**, and **one-way-jitter-sd** statistics type keywords were added. • The **on-demand all** and **on-demand** *id*keyword options and arguments were added. • When the **detail** keyword is used, the "occurred at" field was added to the display output to show when the last Min/Max statistic happened.
Release 4.0.0	This command was introduced.
Release 4.3.0	The **one-way-loss-ds**, **one-way-loss-sd** statistic type keywords were added.

Usage Guidelines See the Usage Guidelines in the **buckets size** command for a description of buckets.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples This example shows how to display the current contents of buckets containing SLA metrics collected by probes in brief:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla statistics

Source: Interface GigabitEthernet0/0/0/0, Domain mydom
Destination: Target MEP-ID 2
================================================================================
Profile 'business-gold', packet type 'cfm-delay-measurement'
Scheduled to run every 5min first at 00:02:00 UTC for 2min

Round Trip Delay
~~~~~~~~~~~~~~~
1 buckets per probe

Bucket started at 07:47:00 PST Tue 19 January 2010 lasting 2min
    Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
    Min: 0.24ms; Max: 0.49ms; Mean: 0.34ms; StdDev: 0.05ms

Bucket started at 07:52:00 PST Tue 19 January 2010 lasting 2min
    Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
    Min: 0.24ms; Max: 0.69ms; Mean: 0.34ms; StdDev: 0.12ms


Round Trip Jitter
~~~~~~~~~~~~~~~~
1 buckets per probe
```

```
Bucket started at 07:47:00 PST Tue 19 January 2010 lasting 2min
    Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
    Min: -0.25ms; Max: 0.13ms; Mean: -0.01ms; StdDev: 0.08ms

Bucket started at 07:52:00 PST Tue 19 January 2010 lasting 2min
    Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
    Min: -0.38ms; Max: 0.38ms; Mean: -0.02ms; StdDev: 0.14ms
```

This example shows how to display the current contents of buckets containing SLA metrics collected by probes in detail:

Note In this example, the round-trip-delay measurement is configured with aggregation (and hence bins are displayed), whereas the round-trip-jitter measurement is configured with no aggregation (and hence individual samples are displayed).

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla statistics detail
Source: Interface GigabitEthernet0/0/0/0, Domain mydom
Destination: Target MEP-ID 2
================================================================================
Profile 'business-gold', packet type 'cfm-delay-measurement'
Scheduled to run every 5min first at 00:02:00 UTC for 2min

Round Trip Delay
~~~~~~~~~~~~~~~~
1 buckets per probe

Bucket started at 07:47:00 PST Tue 19 January 2010 lasting 2min
    Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
    Min: 0.24ms, occurred at 07:47:29 on Tue 19 Jan 2010 UTC
    Max: 0.49ms, occurred at 07:48:04 on Tue 19 Jan 2010 UTC
    Mean: 0.34ms; StdDev: 0.05ms

    Bins:
    Range            Samples   Cum. Count   Mean
    -----------  -----------  -----------  -----
     0 to 20 ms  20 (100.0%)  20 (100.0%)  0.34ms
    20 to 40 ms   0   (0.0%)  20 (100.0%)      -
    40 to 60 ms   0   (0.0%)  20 (100.0%)      -
    60 to 80 ms   0   (0.0%)  20 (100.0%)      -
    > 80     ms   0   (0.0%)  20 (100.0%)      -

Bucket started at 07:52:00 PST Tue 19 January 2010 lasting 2min
    Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
    Min: 0.24ms, occurred at 07:53:10 on Tue 19 Jan 2010 UTC
    Max: 0.69ms, occurred at 07:53:42 on Tue 19 Jan 2010 UTC
    Mean: 0.34ms; StdDev: 0.12ms

    Bins:
    Range            Samples   Cum. Count   Mean
    -----------  -----------  -----------  -----
     0 to 20 ms  20 (100.0%)  20 (100.0%)  0.34ms
    20 to 40 ms   0   (0.0%)  20 (100.0%)      -
    40 to 60 ms   0   (0.0%)  20 (100.0%)      -
    60 to 80 ms   0   (0.0%)  20 (100.0%)      -
    > 80     ms   0   (0.0%)  20 (100.0%)      -


Round Trip Jitter
```

```
~~~~~~~~~~~~~~~~
1 buckets per probe

Bucket started at 07:47:00 PST Tue 19 January 2010 lasting 2min
    Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
    Min: -0.25ms, occurred at 07:47:53 on Tue 19 Jan 2010 UTC
    Max: 0.13ms, occurred at 07:48:11 on Tue 19 Jan 2010 UTC
    Mean: -0.01ms; StdDev: 0.08ms

    Samples:
    Time sent   Result  Notes
    ----------  ------  ----------
    07:47:00.0     ...
    07:47:00.1  -0.12ms
    07:47:00.2  0.06ms
    07:47:00.3  0.00ms
    07:47:00.4  -0.06ms
    07:47:00.5  0.00ms
    07:47:00.6  0.00ms
    07:47:00.7  0.00ms
    07:47:00.8  0.06ms
    07:47:00.9  0.00ms
    07:48:00.0  0.11ms
    07:48:00.1  -0.25ms
    07:48:00.2  0.13ms
    07:48:00.3  0.00ms
    07:48:00.4  -0.06ms
    07:48:00.5  0.00ms
    07:48:00.6  0.06ms
    07:48:00.7  -0.06ms
    07:48:00.8  0.00ms
    07:48:00.9  0.00ms

Bucket started at 07:52:00 PST Tue 19 January 2010 lasting 2min
    Pkts sent: 20; Lost: 0 (0.0%); Corrupt: 0 (0.0%); Misordered: 0 (0.0%)
    Min: -0.38ms, occurred at 07:52:13 on Tue 19 Jan 2010 UTC
    Max: 0.38ms, occurred at 07:53:26 on Tue 19 Jan 2010 UTC
    Mean: -0.02ms; StdDev: 0.14ms

    Samples:
    Time sent   Result  Notes
    ----------  ------  ----------
    07:52:00.0     ...
    07:52:00.1  -0.38ms
    07:52:00.2  0.00ms
    07:52:00.3  -0.05ms
    07:52:00.4  0.00ms
    07:52:00.5  0.05ms
    07:52:00.6  0.00ms
    07:52:00.7  0.00ms
    07:52:00.8  0.00ms
    07:52:00.9  0.00ms
    07:53:00.0  0.38ms
    07:53:00.1  -0.32ms
    07:53:00.2  0.00ms
    07:53:00.3  -0.13ms
    07:53:00.4  0.06ms
    07:53:00.5  0.00ms
    07:53:00.6  0.00ms
    07:53:00.7  0.00ms
    07:53:00.8  0.06ms
    07:53:00.9  0.00ms
```

This example shows how to display the current contents of buckets containing SLA metrics collected by probes on a specific interface:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla statistics current interface GigabitEthernet
0/0/0/0.0

Interface GigabitEthernet 0/0/0/0.0
Domain mydom Service myser to 00AB.CDEF.1234
================================================================================
Profile 'business-gold', packet type 'cfm-superpacket'
Scheduled to run every Sunday at 4am for 2 hours

Round Trip Delay
~~~~~~~~~~~~~~~~
2 buckets per probe

Bucket started at 04:00 Sun 17 Feb 2008 lasting 1 hour:
    Pkts sent: 2342; Lost 2 (0%); Corrupt: 0 (0%); Misordered: 0 (0%)
    Min: 13ms; Max: 154ms; Mean: 28ms; StdDev: 11ms

Round Trip Jitter
~~~~~~~~~~~~~~~~~
2 buckets per probe

Bucket started at 04:00 Sun 17 Feb 2008 lasting 1 hour:
    Pkts sent: 2342; Lost: 2 (0%); Corrupt: 0 (0%); Misordered: 0 (0%)
    Min: -5ms; Max: 8ms; Mean: 0ms; StdDev: 3.6ms
```

This example shows how to display a history detail of buckets containing SLA metrics collected by probes on a specific interface:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla history detail GigabitEthernet 0/0/0/0.0

Interface GigabitEthernet 0/0/0/0.0
Domain mydom Service myser to 00AB.CDEF.1234
================================================================================
Profile 'business-gold', packet type 'cfm-loopback'
Scheduled to run every Sunday at 4am for 2 hours

Round Trip Delay
~~~~~~~~~~~~~~~~
2 buckets per probe

Bucket started at 04:00 Sun 17 Feb 2008 lasting 1 hour:
    Pkts sent: 2342; Lost: 2 (0%); Corrupt: 0 (0%); Misordered: 0 (0%)
    Min: 13ms, occurred at 04:43:29 on Sun 22 Aug 2010 UTC
    Max: 154ms, occurred at 05:10:32 on Sun 22 Aug 2010 UTC
    Mean: 28ms; StdDev: 11ms

    Results suspect as more than 10 seconds time drift detected
    Results suspect as scheduling latency prevented some packets being sent

    Samples:
    Time sent       Result  Notes
    ------------  --------  ----------
    04:00:01.324      23ms
    04:00:01.425      36ms
    04:00:01.525         -  Timed Out
    ...

Round Trip Jitter
```

```
~~~~~~~~~~~~~~~~~
2 buckets per probe

Bucket started at 04:00 Sun 17 Feb 2008, lasting 1 hour:
    Pkts sent: 2342; Lost: 2 (0%); Corrupt: 0 (0%); Misordered: 0 (0%)
    Min: -5ms, occurred at 04:15:03 on Sun 22 Aug 2010 UTC
    Max: 10ms, occurred at 05:29:15 on Sun 22 Aug 2010 UTC
    Mean: 0ms; StdDev: 3.6ms

    Samples:
    Time sent       Result  Notes
    ------------  --------  ----------
    04:00:01.324         -
    04:00:01.425      13ms
    04:00:01.525         -  Timed out
    ...
```

This example shows how to display statistics for all full buckets for on-demand operations in detail:

```
RP/0/RP0RSP0/CPU0:router# show ethernet sla statistics history detail on-demand

Interface GigabitEthernet0/0/0/0.1
Domain mydom Service myser to 0123.4567.890A
================================================================================
On-demand operation ID #1, packet type 'cfm-delay-measurement'
Started at 15:38 on 06 July 2010 UTC, runs every 1 hour for 1 hour

Round Trip Delay
~~~~~~~~~~~~~~~~
1 bucket per probe

Bucket started at 15:38 on Tue 06 Jul 2010 UTC, lasting 1 hour:
    Pkts sent: 1200; Lost: 4 (0%); Corrupt: 600 (50%); Misordered: 0 (0%)
    Min: 13ms, occurred at 15:43:29 on Tue 06 Jul 2010 UTC
    Max: 154ms, occurred at 16:15:34 on Tue 06 Jul 2010 UTC
    Mean: 28ms; StdDev: 11ms

    Bins:
    Range              Samples    Cum. Count      Mean
    ------------  ------------  ------------  --------
     0 - 20 ms       194 (16%)     194 (16%)      17ms
    20 - 40 ms       735 (61%)     929 (77%)      27ms
    40 - 60 ms       212 (18%)    1141 (95%)      45ms
    > 60    ms        55  (5%)    1196            70ms

Bucket started at 16:38 on Tue 01 Jul 2008 UTC, lasting 1 hour:
    Pkts sent: 3600; Lost: 12 (0%); Corrupt: 1800 (50%); Misordered: 0 (0%)
    Min: 19ms, occurred at 17:04:08 on Tue 06 Jul 2010 UTC
    Max: 70ms, occurred at 16:38:00 on Tue 06 Jul 2010 UTC
    Mean: 28ms; StdDev: 11ms

    Bins:
    Range              Samples    Cum. Count      Mean
    ------------  ------------  ------------  --------
     0 - 20 ms       194 (16%)     194 (16%)      19ms
    20 - 40 ms       735 (61%)     929 (77%)      27ms
    40 - 60 ms       212 (18%)    1141 (95%)      45ms
    > 60    ms        55  (5%)    1196            64ms
```

This example shows how to display the current contents of buckets containing SLM metrics collected by probes on a specific interface:

```
RP/0/RP0RSP0/CPU0:router#show ethernet sla statistics current interface GigabitEthernet
0/0/0/0.0

Interface GigabitEthernet0/0/0/0.0
Domain mydom Service myser to 00AB.CDEF.1234
------------------------------------------------------------------------------
Profile 'business-gold', packet type 'cfm-synthetic-loss-measurement'

Scheduled to run every day at 11:50 UTC for 10min (10 bursts)
Frame Loss Ratio calculated every 1min

One-Way Frame Loss (Source->Dest)
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
1 probes per bucket

Bucket started at 11:50:00 UTC  Fri 01 January 2010 lasting 10min
    Pkts sent: 600; Lost: 62 (10.3%); Corrupt: 0 (0.0%);
                    Misordered: 56 (9.3%); Duplicates: 0 (0.0%)
    Min: 1.67%; Max: 21.67%; Mean: 10.05%; StdDev: 2.34%; Overall: 10.03%

Bucket started at 11:50:00 UTC  Sat 02 January 2010 lasting 10min
    Pkts sent: 600; Lost: 23 (3.8%); Corrupt: 0 (0.0%);
                    Misordered: 56 (9.3%); Duplicates: 0 (0.0%)
    Min: 1.67%; Max: 11.67%; Mean: 3.08%; StdDev: 1.34%; Overall: 3.03%
```

This example shows how to display statistics for all full buckets for on-demand operations in detail:

```
RP/0/RP0RSP0/CPU0:router#show ethernet sla statistics history detail on-demand

Interface GigabitEthernet0/0/0/0.1
Domain mydom Service myser to 0123.4567.890A
------------------------------------------------------------------------------
On-demand operation ID #1, packet type 'cfm-synthetic-loss-measurement'
Started at 15:38 on 01 July 2008, runs every 1 hour for 1 hour
Frame Loss Ratio calculated every 10min

One-Way Frame Loss (Source->Dest)
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
1 probes per bucket

Bucket started at 15:38 on Tue 01 Jul 2008, lasting 1 hour:
    Pkts sent: 1200; Lost: 132 (11%); Corrupt: 0 (0%);
                  Misordered: 129 (10.8%); Duplicate: 0 (0%)
    Min: 8.00%, occurred at 15:43:29 on Tue 01 Jul 2008 UTC
    Max: 12.12%, occurred at 16:15:34 on Tue 01 Jul 2008 UTC
    Mean: 10.02%; StdDev: 0.98%; Overall: 10.00%

    Bins:
    Range           Count  Cum. Count     Mean
    ---------  ---------  ----------  -------
     0 to- 5%     0 (0%)     0 (0%)
     5 to- 10%    2 (33%)    2 (33%)     9.4%
    10 to- 15%    4 (67%)    6 (100%)    10.5%
     > 15%       0 (0%)     6 (100%)

Bucket started at 16:38 on Tue 01 Jul 2008, lasting 1 hour:
    Pkts sent: 1200; Lost: 32 (2.6%); Corrupt: 0 (0%);
                  Misordered: 129 (10.8%); Duplicate: 0 (0%)
    Min: 0.60%, occurred at 16:43:29 on Tue 01 Jul 2008 UTC
    Max: 5.12%, occurred at 17:15:34 on Tue 01 Jul 2008 UTC
    Mean: 2.02%; StdDev: 0.58%; Overall: 2.00%

Bins:
    Range           Count  Cum. Count     Mean
    ---------  ---------  ----------  -------
```

```
 0 to- 5%      5 (83%)     5 (83%)      1.8%
 5 to- 10%     1 (17%)     6 (100%)     5.12%
10 to- 15%     0 (0%)      6 (100%)
 > 15%        0 (0%)      6 (100%)
```

Related Commands

Command	Description
buckets size, on page 234	Configures the size of the buckets in which statistics are collected.

show ethernet udld interfaces

To display the ethernet interfaces configured with unidirectional link detection protocol, use the **show ethernet udld interfaces** in the ethernet interface configuration mode.

show ethernet udld interfaces {**brief**}

Syntax Description

brief	Displays a brief summary of the ethernet udld interfaces.

Command Default

No parameters displays the current state for all udld interfaces.

Command Modes

Ethernet Interface Configuration

Command History

Release	Modification
Release 4.2.0	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 a sample output of the **show ethernet udld interfaces** command:

```
RP/0/RP0RSP0/CPU0:router# show ethernet udld interfaces

Device ID:               00:0c:cc:cc:01:02
Device name:             harpenden2.cisco.com

GigabitEthernet0/1/0/2
  Port state:            Up
  Main FSM state:        Advertisement
  Detection FSM state:   Bidirectional
  Message interval:      60 seconds
  Timeout interval:      5 seconds

  Neighbor 1
    Device ID:           00:0a:0b:0c:cc:cc
    Device name:         cambridge53.cisco.com
    Port ID:             Gi0/12
    Message interval:    7 seconds
    Timeout interval:    4 seconds
    Echo 1:              00:0c:cc:cc:01:02, Gi0/1/0/2
    Echo 2:              00:0a:0b:0c:dd:dd, GE100
  Neighbor 2
    Device ID:           00:0a:0b:0c:dd:dd
    Device name:         cambridge54.cisco.com
    Port ID:             GE100
    Message interval:    7 seconds
```

```
    Timeout interval:    4 seconds
    Echo 1:              00:0c:cc:cc:01:02, Gi0/1/0/2
    Echo 2:              00:0a:0b:0c:cc:cc, Gi0/12
```

This example shows a sample output of the **show ethernet udld interfaces** command with the brief keyword:

```
RP/0/RP0RSP0/CPU0:router# show ethernet udld interfaces brief

Port           State          Neighbor Device                 N'bor port
  -------------  -------------- ------------------------------- -------------
  Gi0/1/0/1      Bidirectional  london-xr22.cisco.com           Gi3/12/0/24
  Gi0/1/0/2      Bidirectional  [2 neighbors]                   -
  Gi0/1/0/3      Unknown        -                               -
  Gi0/1/0/4      Unidirectional sj-ios25.cisco.com              Gi3/5
  Te0/12/0/10    Admin Down     -                               -
  Te0/12/0/11    N'bor Mismatch long-device.cisco.com           LongPortNam>>
```

Table 22: show ethernet udld interfaces Field Descriptions

Admin Down	Indicates that the port is administratively down (shutdown configuration is in effect).
Error Disabled	Specifies that the port is in Error Disabled state for a non-UDLD reason, or the port has been disabled by UDLD but the daemon has restarted and does not have a record of the cause.
Down	Indicates that the port is operationally down but not Error Disabled.
Initializing	Indicates that the port is not yet operating the UDLD protocol.
Detecting	Indicates that the port is in the detection phase and is synchronizing the data with its peers.
Loopback	Specifies that the port has been detected to be in loopback.
Unidirectional	Indicates that the port was unidirectional and was disabled by UDLD.
N'bor Mismatch	Indicates that the port has been disabled by UDLD due to mismatched neighbors.
No Neighbors	Specified that the port does not have an active UDLD session with any of the neighbors.
Bidirectional	Indicates that the port is up and has been detected to be bidirectional.
Device ID	Specifies the ID advertised by the device to its peers. This is a MAC address.
Device name	Specifies the string identifier for the device sent to peers. This is a concatenation of the hostname with the configured IP domain (if present), separated by a dot.

Related Commands

Command	Description
show ethernet udld statistics, on page 447	Displays statistics on state machine transitions and packets sent and received for an UDLD interface.

show ethernet udld statistics

To display the statistics of state machine transitions and packets exchanged on an interface running UDLD protocol, use the **show ethernet udld statistics** command in the ethernet interface configuration mode.

show ethernet udld statistics[**interface** *type* |**unaccounted-drops**]

Syntax Description

interface *type*	(Optional) Displays information about the specified interface type. If an interface is specified, only the interface-specific counters are shown and not the node counters.
unaccounted-drops	(Optional) Displays information for only the node counters.

Command Default

No default behavior or values

Command Modes

Ethernet Interface Configuration

Command History

Release	Modification
Release 4.2.0	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 a sample output of the **show ethernet udld statistics** command:

```
RP/0/RP0RSP0/CPU0:router# show ethernet udld statistics interface
GigabitEthernet 0/10/0/11

Interface GigabitEthernet0/10/0/11
  Counters last cleared:              01:12:11 ago
  Main FSM transitions (to each state)
    Link up:                                    1
    Detection:                                 12
    Advertize:                                 12
    Port shutdown:                              0
    UDLD inactive:                              0
  Detection FSM transitions (to each state)
    Unknown:                                   12
    Bidirectional:                             12
    Unidirectional:                             0
    Neighbor mismatch:                          0
    Loopback:                                   0
  Rx packet counts
    Probe:                                      1
    Echo:                                    1819
    Flush:                                      5
    Invalid packets (dropped):                154
```

```
  Tx packet counts
    Probe:                                        1
    Echo:                                      1824
    Flush:                                        0
    Unable to send (dropped):                     0

Node 0/10/CPU0
  Counters last cleared:                01:12:11 ago
  Received on ports without UDLD configured
    Total packet count:                          12
    Last port:                             Gi0/10/0/5
  Rx port could not be determined:                0
```

sla operation

To create an operation instance from a maintenance end point (MEP) to a specified destination, use the **sla operation** command in interface CFM MEP configuration mode. To remove the operation, use the **no** form of this command.

sla operation profile *profile-name* **target** {**mep-id** *id* | **mac-address** *mac-address*}

Syntax Description

profile *profile-name*	Name of the profile to assign this operation.
target mep-id *id*	Destination MEP ID. The range is 1 to 8191.
mac-address *mac-address*	Destination MAC address in standard hexadecimal format, hh:hh:hh:hh:hh:hh.

Command Default

No operations are configured

Command Modes

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

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	This command was introduced.

Usage Guidelines

The **sla operation** command is supported on all Ethernet interfaces.

Multiple SLA operation instances may be configured under each MEP, and may have different targets, and may be assigned to different profiles.

If an operation is assigned to a nonexistent profile, a warning message is issued, and the offending configuration is shown in the output of the related show commands.

Changing the configuration of an SLA operation is equivalent to deleting the operation and creating a new operation. All stored data for the operation is discarded.

When **target mep-id** is specified, the operation is activated only if that MEP is in the peer MEP database. You can verify that a MEP is in the database, using the **show ethernet cfm peer meps** command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to create an SLA operation instance using a profile named "Profile_1" to a destination MEP with the specified MAC address:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
```

```
RP/0/RP0RSP0/CPU0:router(config-if-cfm-mep)# sla operation profile Profile_1 target
mac-address 01:23:45:67:89:ab
```

Related Commands

Command	Description
show ethernet cfm peer meps, on page 394	Displays information about maintenance end points (MEPs) for peer MEPs.

snmp-server traps ethernet cfm

To enable SNMP traps for Ethernet Connectivity Fault Management (CFM), use the **snmp-server traps ethernet cfm** command in Global Configuration modeXR Config mode.

snmp-server traps ethernet cfm

Syntax Description

This command has no keywords or arguments.

Command Default

Ethernet OAM event traps are not enabled.

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

If a Local MEP is receiving Wrong Level CCMs, then a transient timeout might occur when correct Level CCMs are received again.

Task ID

Task ID	Operations
snmp	read, write

Examples

The following example shows how to enable SNMP server traps on an Ethernet OAM interface.

```
RP/0/RP0RSP0/CPU0:router #configure
RP/0/RP0RSP0/CPU0:router(config)# snmp-server traps ethernet cfm
```

snmp-server traps ethernet oam events

To enable SNMP traps for Ethernet OAM events, use the **snmp-server traps ethernet oam events** command in Global Configuration modeXR Config mode.

snmp-server traps ethernet oam events

Syntax Description

This command has no keywords or arguments.

Command Default

Ethernet OAM event traps are not enabled.

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
snmp	read, write

Examples

The following example shows how to enable SNMP server traps on an Ethernet OAM interface.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# snmp-server traps ethernet oam events
```

statistics measure

To enable the collection of Ethernet Service Level Agreement (SLA) statistics, and enter the SLA profile statistics configuration mode, use the **statistics measure** command in SLA profile configuration mode. To disable statistics collection, use the **no** form of this command.

statistics measure {**one-way-delay-ds** | **one-way-delay-sd** | **one-way-jitter-ds** | **one-way-jitter-sd** | **round-trip-delay** | **round-trip-jitter** | **one-way-loss-sd** | **one-way-loss-ds**}
no statistics measure {**one-way-delay-ds** | **one-way-delay-sd** | **one-way-jitter-ds** | **one-way-jitter-sd** | **round-trip-delay** | **round-trip-jitter** | **one-way-loss-sd** | **one-way-loss-ds**}

Syntax Description

one-way-delay-ds	(CFM delay measurement profile type only) Enables the collection of statistics that measure delay in one direction, from destination to source.
one-way-delay-sd	(CFM delay measurement profile type only) Enables the collection of statistics that measure delay in one direction, from source to destination.
one-way-jitter-ds	(CFM delay measurement profile type only) Enables the collection of statistics that measure delay variance in one direction, from destination to source.
one-way-jitter-sd	(CFM delay measurement profile type only) Enables the collection of statistics that measure delay variance in one direction, from source to destination.
round-trip-delay	(CFM delay measurement and CFM loopback profile types only) Enables the collection of statistics that measure the delay in the round trip of a packet.
round-trip-jitter	(CFM delay measurement and CFM loopback profile types only) Enables the collection of statistics that measure the amount of delay variance in the round trip of a packet.
one-way-loss-sd	(CFM loss measurement profile type only) Enables the collection of statistics that measure the synthetic loss in one direction, from source to destination.
one-way-loss-ds	(CFM loss measurement profile type only) Enables the collection of statistics that measure the synthetic loss in one direction, from destination to source.

Command Default

No statistics are collected

Command Modes

SLA profile configuration (config-sla-prof)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	These keyword options were added: • **one-way-delay-ds** • **one-way-delay-sd** • **one-way-jitter-ds** • **one-way-jitter-sd**
Release 4.0.0	This command was introduced.

Release	Modification
Release 4.3.0	• **one-way-loss-sd** **one-way-loss-ds** These keyword options were added:

Usage Guidelines

For statistics to be collected, at least one statistics entry must be present in each profile. To measure more than one type of statistic, this command may be configured more than once in a single profile.

The one-way delay and jitter statistics are available for CFM delay measurement profile types only (**profile (SLA)** command with the **type cfm-delay-measurement** keywords).

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to enable the collection of round-trip-delay statistics, and enter the SLA profile statistics configuration mode:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RP0RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RP0RSP0/CPU0:router(config-sla-prof-stat-cfg)#
```

Related Commands

Command	Description
ethernet sla, on page 284	Enters the Ethernet SLA configuration mode.
profile (SLA), on page 356	Creates an SLA operation profile and enter the SLA profile configuration mode.

status-counter

To set the Metro Ethernet Forum (MEF) N393 Status Counter value that is used to determine Ethernet Local Management Interface (E-LMI) operational status, use the **status-counter** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

status-counter *threshold*

Syntax Description

threshold	Number from 2 to 10. The default is 4.

Command Default

The N393 Status Counter is set to 4.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

If the E-LMI protocol status is currently Up, the Status Counter specifies how many consecutive times the PVT must expire before the status is changed to Down. If the E-LMI status is currently Down, the Status Counter specifies how many STATUS ENQUIRY messages must be received without the PVT expiring before the status is changed to Up. If the PVT is disabled, the status counter has no effect.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to set the MEF Status Counter for E-LMI to 6:

```
RP/0/RP0RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RP0RSP0/CPU0:router(config-if-elmi)# status-counter 6
```

Related Commands

Command	Description
interface (Ethernet), on page 92	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 279	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.
show ethernet lmi interfaces, on page 408	Displays E-LMI information for an interface, including protocol status and error and event statistics.

symbol-period threshold

To configure the thresholds that trigger an Ethernet OAM symbol-period error event, use the **symbol-period threshold** command in Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

symbol-period threshold { **ppm** | { [**low** *threshold*] | [**high** *threshold*] } | **symbols** | { [**low** *threshold* [**thousand** | **million** | **billion**]] | [**high** *threshold* [**thousand** | **million** | **billion**]] } }

Syntax Description

low *threshold*	(Optional, at least one of high and low must be specified) Low threshold value, in symbols or ppm (errors per million symbols), that triggers a symbol-period error event. If specified in ppm, the range is 1 to 1000000, and if specified in symbols, the range is 1 to the maximum window size, seesymbol-period window.
high *threshold*	(Optional, at least one of high and low must be specified) High threshold value, in symbols or ppm (errors per million symbols), that causes a symbol-period error event to trigger an action. The range is 1 to 60000000. The high threshold must not be smaller than the low threshold. If specified in ppm, the range is 1 to 1000000, and if specified in symbols, the range is 1 to the maximum window size, seesymbol-period window.
thousand | **million** | **billion**	Configures thousands, millions, or billions of the specified units.

Command Default

The default low threshold is 1 symbol.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 6.1.2	Allowed high threshold without low threshold. Added choice of units.
Release 7.4.1	Low and high threshold is deprecated for **symbol-period threshold**.

Usage Guidelines

When the low threshold is passed, a symbol-period error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions. The high threshold is optional and is configurable only in conjunction with the low threshold.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the symbol-period low and high thresholds that trigger a symbol-period error event:

```
Router(config)# ethernet oam profile Profile_1
Router(config-eoam)# link-monitor
Router(config-eoam-lm)# symbol-period threshold low 100 high 6000
```

symbol-period window

To configure the window size for an Ethernet OAM symbol-period error event, use the **symbol-period window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

symbol-period window {**milliseconds** *window* | **symbols** *window*[**thousand** |**million** |**billion**]}

Syntax Description

window	Size of the window for symbol-period error in milliseconds or symbols. The range is 1000 to 60000, if specified in milliseconds. If not specified as a multiple of 1 second, the actual window used will be rounded up to the nearest second, with thresholds scaled accordingly. If specified in symbols, the range is interface speed dependent (must be between the maximum number of symbols that could be received in 1 second and the maximum number of symbols that could be received in 1 minute). Again the actual window used is rounded up to the nearest second, with thresholds scaled accordingly.

Command Default

The default value is 1000 milliseconds.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The IEEE 802.3 standard defines the window size as a number of symbols rather than a time duration. These two formats can be converted either way by using a knowledge of the interface speed and encoding.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the window size for a symbol-period error.

```
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RP0RSP0/CPU0:router(config-eoam-lm)# symbol-period window 60000
```

synthetic loss calculation packets

To configure the number of packets that must be used to calculate each Frame Loss Ratio (FLR) calculation, use the **synthetic loss calculation packets** command in the Ethernet SLA profile probe configuration mode.

synthetic loss calculation packets *number*

Syntax Description

number	Specifies the number of packets that must be used to calculate each FLR. The range is 10 – 12096000.

Note The value must be a divisor of the number of packets per probe. If bursts are configured, the value must be a multiple of the number of packets per burst.

Command Default

The default value is the number of packets in the probe, that is each probe results in a single FLR calculation.

Command Modes

SLA profile probe configuration (config-sla-prof-pb)

Command History

Release	Modification
Release 4.3.0	This command was introduced.

Usage Guidelines

The **synthetic loss calculation packets** command can only be configured for packet types that support synthetic loss measurement.

Note An FLR value is calculated for each discrete block of packets. For instance, if a value of 10 is configured, then the first FLR value is calculated based on packets 0 to 9, the second FLR value is calculated based on packets 10 to 19, and so on.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to configure the number of packets to be used to calculate FLR using the **synthetic loss calculation packets** command:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet sla
RP/0/RP0RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-synthetic-loss-measurement

RP/0/RP0RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RP0RSP0/CPU0:router(config-sla-prof-pb)# synthetic loss calculation packets 1250
```

tags

To set the number of outer tags in CFM packets sent from up MEPs in a CFM domain service, use the **tags** command in CFM domain service configuration mode. To return the number of tags in CFM packets to the default value, use the **no** form of this command.

tags *number*

Syntax Description

number	Specifies the number of tags in CFM packets from up MEPs. Currently, the only valid value is 2.

Command Default

When not configured, CFM packets are sent with the same number of tags as customer data traffic, according to the encapsulation and rewrite configuration.

Command Modes

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

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

This command allows you to set the number of tags in CFM packets from up MEPs to 1, so that the system can differentiate between CFM packets and data packets. When not configured, CFM packets from UP MEPs have the same number of tags as data packets, and consequently, may not be forwarded to the appropriate route.

Tags can be configured only for services that are associated with a bridge domain or cross-connect.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to set the number of tags in CFM packets from up MEPs in a CFM domain service:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn)# service S2 bridge group BG1 bridge-domain BD2
RP/0/RP0RSP0/CPU0:router(config-cfm-dmn-svc)# tags 1
```

traceroute cache

To set the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries, use the **traceroute cache** command in CFM configuration mode. To return the traceroute cache to its default limits, use the **no** form of this command.

traceroute cache hold-time *minutes* **size** *entries*

Syntax Description

hold-time *minutes*	Timeout value in minutes that entries are held in the Ethernet CFM traceroute cache table before being cleared. Range is 1 minute or greater.
size *entries*	Maximum number of entries that are stored in the Ethernet CFM traceroute cache table. An entry is a single traceroute reply. Range is 1 to 5000.

Command Default

hold-time: 100

size: 100

Command Modes

CFM configuration (config-cfm)

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

A separate cache is managed for each node that sends a traceroute request. All replies to a single traceroute request are cached at once. The **hold-time** begins when the last reply to a request is received. When the **hold-time** limit is reached, all replies to that request are cleared. The size of each traceroute reply is limited by the MTU of the interface.

When the maximum number of entries (**size** *entries*) is exceeded, all replies for the oldest request are deleted.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to set the **hold-time** and the **size** of a traceroute cache.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet cfm
RP/0/RP0RSP0/CPU0:router(config-cfm)# traceroute cache hold-time 1 size 3000
```

Related Commands

Command	Description
ethernet cfm (global), on page 276	Enters CFM configuration mode.

Command	Description
traceroute ethernet cfm, on page 463	Sends Ethernet CFM traceroute messages to generate a basic.

traceroute ethernet cfm

To send Ethernet connectivity fault management (CFM) traceroute messages to generate a basic, targeted, or exploratory traceroute, use the **traceroute ethernet** command in EXEC modeXR EXEC mode .

traceroute ethernet cfm domain *domain-name* **service** *service-name* {**mac-address** *target-mac-address* | **mep-id** *target-mep-id* | **explore** [**all-ports**] [**from** *from-mac-address*]} **source** [**mep-id** *source-mep-id*] **interface** *type interface-path-id* [**asynchronous**] [**timeout** *seconds*] [**filtering-db-only**] [**cos** *cos-no*] [**ttl** *ttl*] [**detail**]

Syntax Description

domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the destination MEP resides. (Basic traceroute)
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the destination MEP belongs. (Basic traceroute)
mac-address *target-mac-address*	Identifies the 6-byte MAC address (in hexadecimal H.H.H format) of the destination MEP. (Targeted traceroute)
mep-id *target-mepid*	Destination maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191. (Targeted traceroute)
explore	(Optional) Specifies that an exploratory traceroute is performed.
all-ports	(Optional) Specifies an exploratory traceroute of all ports.
from *from-mac-address*	(Optional) Specifies an exploratory traceroute beginning at the specified MAC address (in hexadecimal H.H.H format).
source	Specifies source information for the traceroute.
mep-id *source-mep-id*	(Optional) Source maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *type*	Source 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.
asynchronous	(Optional) Specifies that the traceroute is performed asynchronously, where control is returned to the command prompt immediately, and no results are displayed. The results can be displayed later using the **show ethernet cfm traceroute-cache** command.

timeout *seconds*	(Optional) Timeout value (in seconds) for the specified interface. For a basic traceroute, the timeout is a fixed value that defaults to 5 seconds. For an exploratory traceroute, a logarithmic algorithm is used unless this value is specified.
filtering-db-only	(Optional) Sets whether or not the remote maintenance points should base their responses on the filtering database only. The default is no—use both the filtering and MIP-CCM databases. **Note** The **filtering-db-only** option is only available for basic traceroute (when the MAC address or MEP ID is specified). It is not available with the **explore** option.
cos *cos-no*	(Optional) Identifies the class of traffic of the source MEP by setting a Class of Service (CoS) value. The valid values are from 0 to 7.
ttl *ttl*	Specifies the initial time-to-live (TTL) value (from 1 to 255) for the traceroute message. The default is 64.
detail	(Optional) Specifies that details are displayed in the output for the traceroute.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

By default, this command pauses until the traceroute operation is complete, then displays the results. If the **asynchronous** option is used, this command returns immediately and no results are displayed. Results are placed placed the traceroute cache and can be retrieved using the **show ethernet cfm traceroute-cache** command.

An exploratory traceroute, by default uses a **timeout** value that is calculated by a logarithmic delay algorithm. If the **timeout** value is specified, the specified value is used.

The display output of this command is similar to the output of the **show ethernet cfm traceroute-cache** command.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows how generate a basic traceroute:

```
RP/0/RP0RSP0/CPU0:router# traceroute ethernet cfm domain bar service bar mep-id 1 source
interface gigabitethernet 0/0/0/0
```

```
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
```

Related Commands

Command	Description
traceroute cache, on page 461	Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries.
clear ethernet cfm traceroute-cache, on page 244	Removes the contents of the traceroute cache.
show ethernet cfm traceroute-cache, on page 402	Displays the contents of the traceroute cache.

uni-directional link-fault detection

To enable detection of a local, unidirectional link fault and send notification of that fault to an Ethernet OAM peer, use the **uni-directional link-fault detection** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode.

uni-directional link-fault detection [**disable**]

Syntax Description

disable	Disable detection of local, unidirectional link faults. Can be used in Interface Ethernet OAM configuration mode to override the setting of unidirectional link fault detection from an Ethernet OAM profile, and disable it for this interface only.

Command Default

Detection and sending notification of local, unidirectional link faults is disabled.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 6.1.2	Removed restriction disallowing **disable** keyword in Ethernet OAM configuration mode.

Usage Guidelines

This command does not affect how the receipt of link-fault messages are handled by the router. Actions to be taken for the receipt of link-fault messages are configured using the **action uni-directional link-fault** command.

Consider the following guidelines when configuring the **uni-directional link-fault detection** command:

- You can configure unidirectional link-fault detection for multiple interfaces that share a similar configuration using the command within an Ethernet OAM profile and attaching the profile to the interfaces to which it applies.
- You can override the profile configuration for unidirectional link-fault detection using the command in interface Ethernet OAM configuration.
- The **disable** keyword can be used in interface Ethernet OAM configuration mode to override the feature set by the profile, and disable it for a particular interface. For example, if unidirectional link-fault detection is enabled within a profile that is attached to an interface, you can override that configuration to disable it at the interface using the uni-directional link-fault detection disable command in interface Ethernet OAM configuration mode.
- You can use the **no** form of the command in either the profile or interface configuration:
  - Running the **no** form of the command within the profile removes the configuration of the uni-directional command in the profile, effectively disabling the feature for all interfaces.
  - Running the **no** form of the command within interface Ethernet OAM configuration removes the override setting of the command at the interface and uses the profile setting.
- The **show ethernet oam configuration** command output will show either Y or N and (Overridden) depending on whether the interface is driving the configuration of the feature, or the profile is driving it. “Overriden” means that the configuration is being applied by the interface.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable detection of a local, unidirectional link fault and send notification of that fault to an Ethernet OAM peer within an Ethernet OAM profile that can be attached to multiple interfaces:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-eoam)# uni-directional link-fault detection
```

The same profile can be applied to multiple interfaces. The following example shows how to attach the Ethernet OAM profile to an interface:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# commit
```

Consider that you have decided that you do not want unidirectional link-fault detection enabled at this particular interface, but you do want to keep the other attached profile settings. The following example shows how to disable link-fault detection at this interface only:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# uni-directional link-fault detection disable
RP/0/RP0RSP0/CPU0:router(config-if-eoam)# commit
```

Related Commands

Command	Description
action uni-directional link-fault, on page 223	Configures what action is taken on an interface when a link-fault notification is received from the remote Ethernet OAM peer.
ethernet oam profile, on page 283	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 280	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 355	Attaches an Ethernet OAM profile to an interface.

Global Interface Commands

This module describes the global command line interface (CLI) commands for configuring interfaces on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 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.

bandwidth (global)

To configure the bandwidth of an interface, use the **bandwidth** command in interface configuration mode. Bandwidth defines the maximum tramission speed for a given interface. For example, you can use the allocate lower bandwidth for a lower bandwidth consumption service, such as voice calling. And use higher bandwidth for video calling service.

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 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router# interface TenGigE 0/4/1/0
RP/0/RP0RSP0/CPU0:router# bandwidth 4000000
```

Related Commands

Command	Description
shutdown (global), on page 500	Disables an interface (forces an interface to be administratively down).

clear interface

To clear interface statistics or packet counters, use the **clear interface** command in EXEC modeXR 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

XR EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

For the *interface-path-id* argument, use these 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 a virtual interface, the number range varies, depending on interface type.

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/RP0RSP0/CPU0:router# clear interface loopback 2
```

Related Commands

Command	Description
shutdown (global), on page 500	Disables an interface (forces an interface to be administratively down).

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 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/CPU0:router(config)# interface TenGigE 0/4/0/0
RP/0/RP0RSP0/CPU0:router(config-if))# dampening
```

Related Commands

Command	Description
show im dampening, on page 486	Displays the state of all interfaces on which dampening has been configured.

interface (global)

To configure an interface or to create or configure a virtual interface, use the **interface** command in Global Configuration modeXR 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

Global Configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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 a virtual interface, the number range varies, depending on interface type.

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 POS card in location 0/2/0/1, and interface configuration mode is entered for that interface:

```
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/2/0/1
```

Related Commands

Command	Description
clear interface, on page 472	Clears interface statistics or packet counters.
shutdown (global), on page 500	Disables an interface (forces an interface to be administratively down).

lacp system

To set the default system parameters for the Link Aggregation Control Protocol (LACP) bundles, use the **lacp system** command in Global Configuration modeXR 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

Global Configuration

Command History

Release	Modification
Release 4.0.0	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/RP0RSP0/CPU0:router(config)lacp system mac 000c.15c0.bd15
```

mlacp reset priority

To reset operational priorities of mlacp members to their configured mLACP prorities, use the **mlacp reset priority** command in EXEC modeXR 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

EXECXR EXEC

Command History

Release	Modification
Release 4.0	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/RP0RSP0/CPU0:router #mlacp reset priority bundle-ether 10
```

mlacp switchback

To force a switchback to the local mlacp device for a specified bundle, use the **mlacp switchback** command in the EXEC modeXR 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

EXECXR EXEC

Command History

Release	Modification
Release 4.0	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/RP0RSP0/CPU0:router#mlacp switchback bundle-ether 20 at march 21 08:30:10
```

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 4.0.0	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/RP0RSP0/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 4.0.0	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/RP0RSP0/CPU0:router(config-if)#mlacp switchover type brute-force
```

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 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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

Note All serial links in a Multilink Point-to-Point Protocol (MLPPP) bundle or a Multilink Frame Relay (MFR) bundle inherit the default MTU value from the multilink bundle. If a serial interface has a nondefault MTU value, the Cisco IOS XR software blocks that serial interface from being added to an MLPPP or MFR bundle. Therefore, you must not configure the MTU value on a serial interface until you have added that serial interface to an MLPPP or MFR bundle.

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/RP0RSP0/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/RSP0RP0/CPU0/0            up            up              ARPA  1514    100000

RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 6/0/0/0
RP/0/RP0RSP0/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/RP0RSP0/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/RSP0RP0/CPU0/0          up           up               ARPA  1514    100000
```

Related Commands

Command	Description
shutdown (global), on page 500	Disables an interface (forces an interface to be administratively down).

show im dampening

To display the state of all interfaces on which dampening has been configured, use the **show im dampening** command in EXEC modeXR 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

XR EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/CPU0:router(config)# interface TenGigE 0/4/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# no shutdown
RP/0/RP0RSP0/CPU0:router(config-if)# dampening
RP/0/RP0RSP0/CPU0:router# show im dampening

Interface               Proto              Caps               Penalty Suppressed

---------               -----              ----               ----------------
TenGigE0/4/0/0              0                 0                   0       NO

RP/0/RP0RSP0/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/RP0RSP0/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/RP0RSP0/CPU0:router# show im dampening

Interface                  Protocol           Capsulation          Pen   Sup
-------------------------- ------------------ -------------------- ----- ---
GigabitEthernet0/0/0/0                                             629 NO
GigabitEthernet0/0/0/1                                            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/RP0RSP0/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 23: 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 474	Turns on event dampening.
shutdown (global), on page 500	Disables an interface (forces an interface to be administratively down).

show interfaces

To display statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node, use the **show interfaces** command in EXEC modeXR EXEC mode.

show interfaces [**summary** | [*type interface-path-id* | **all** | **local**] [**non-dynamic**] [**brief** | **description** | **detail** | **sparse** | **accounting**]] [**location** *node-id*]

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 brief** command to see a list of all interfaces 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.
sparse	(Optional) Displays sparse per interface information excluding interface statistics.
non-dynamic	(Optional) Displays interface information excluding dynamic interfaces.

Command Default

By default, executing **show interface** command without any option works similar as **show interface all**, and it displays the information for all interfaces in the system.

Command Modes

EXEC

XR EXEC

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 3.8.4	The err-disable interface state was added as a possible interface state output value for bundle member links that have been administratively shut down.
Release 3.9.0	The err-disable interface state was added as a possible Interface state output value for bundle member links that have been administratively shut down.
Release 4.0.0	Added QoS drops to total input drops and total output drops statistics.
Release 4.2.0	Support for Bundle-POS and CEM interfaces was included.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **show interfaces** command displays statistics, state and other information such as mac address etc. for the network interfaces.

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 Executing **show interfaces** command without filters obtains and displays interface statistics for all interfaces. Hence, it is recommended to execute the command with filters to select specific interfaces or interface types of interest for a faster response. Executing **show interfaces** with options **brief** or **sparse** excludes interface statistics thus providing a faster response.

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.

```
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:

```
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** *interface-path-id* **sparse** command.

```
Router#show interfaces gigabitEthernet 0/1/0/0 sparse
Wed Apr 5 18:05:34.000 IST
```

```
Interface name : GigabitEthernet0/1/0/0
Operational state : administratively down
Admin state : administratively down
MAC address : 02:7d:42:e9:bd:36
Burned In Address : 027d.42e9.bd36
IPv4 Address : 2.2.2.2/24
Max. Bandwidth (Kbit) : 1000000
Effective Bandwidth (Kbit) : 1000000
MTU (in bytes) : 1514
Duplexity : Full-duplex
Link type : force-up
```

Table 24: 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.
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).

Field	Description
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.
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.

Field	Description
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.

Field	Description
output flow control	Whether output flow control is enabled on the interface.
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*.
Input rate	Average number of bits and packets received per second during the load-interval. If the interface is not in promiscuous mode, it senses network traffic that it sends and receives (rather than all network traffic). **Note** Load duration is based on load-interval configured under the interface. The default load duration is 5 minutes, if load-interval is not configured under the interface. **Note** The input rate should be used only as an approximation of traffic per second during a given load duration. This rate is exponentially weighted average with a time constant of load duration. 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. **Note** This does not include FCS bytes.
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.

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. Compare this to total input drops, which counts packets that were not delivered despite containing no errors.
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. **Note** This does not include FCS bytes.
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.

Related Commands

Command	Description
show controller interface	Displays information that is specific to the interface hardware statistics for all interfaces configured on the networking device.

show mlacp inconsistencies

To check and highlight inconsistencies and misconfigurations in mlacp setup, use the **show mlacp inconsistencies** command in EXEC modeXR EXEC mode .

show mlacp inconsistencies

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values.

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 4.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
bundle	read

Example

The followig example shows how to view mlacp inconsistencies:

```
RP/0/RP0RSP0/CPU0:router # show mlacp inconsistencies
```

shutdown (global)

To disable an interface (to force an interface to be administratively down), use the **shutdown** command in interface configuration mode. To enable an interface that has been shut down, use the **no** form of this command.

shutdown

Syntax Description

This command has no keywords or arguments.

Command Default

The interface is enabled by default and is disabled only when shutdown is configured.

Note When you add an interface to the system, or when all the configuration for an interface is lost or deleted, the interface is put in the shutdown state by the system adding the interface.

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

Use the **shutdown** command to move the state of an interface to administratively down, which stops traffic flowing through the interface. This state does not stop other action from happening on the interface such as changes in configuration, protocols, capsulations, and so forth.

The **shutdown** command also marks the interface as unavailable. To check whether the state of an interface is down, use the **show interfaces** command in EXEC mode, which displays the current state of the interface. An interface that has been shut down is shown as administratively down in the display from the **show interfaces** command.

Task ID

Task ID	Operations
interface	read, write

Examples

In this example, TenGigE interface 0/4/0/2 is turned off:

```
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/4/0/2
RP/0/RP0RSP0/CPU0:router(config-if)# shutdown
```

Related Commands

Command	Description
show interfaces, on page 489	Displays statistics for all interfaces configured on the router or on a specific node.
show ip interface	Displays IPv4 interface status and configuration.

GRE Tunnel Interface Commands

GRE Tunnel Interface Commands

This module describes the command line interface (CLI) commands for configuring GRE tunnel interfaces on the Cisco NCS 6000 Series Router.

For information on configuring GRE tunnels, see the *Interface and Hardware Component Configuration Guide for Cisco NCS 6000 Series Routers*.

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

Release	Modification
Release 7.2.1	This command was introduced.

Example

The following example shows how you can configure an IP-in-IP tunnel interface.

```
RP/0/RP0RSP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0RSP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0RSP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0RSP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0RSP0/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

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure the tunnel mode for an IP-in-IP tunnel interface.

```
RP/0/RP0RSP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0RSP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0RSP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0RSP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0RSP0/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

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure the Loopback 0 interface as the tunnel source for an IP-in-IP tunnel interface.

```
RP/0/RP0RSP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0RSP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0RSP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0RSP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0RSP0/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* }
no tunnel destination { *ipv4-address* | *ipv4 address/subnet-mask* | *ipv6-address* }

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.

Command Default

None

Command Modes

Tunnel interface configuration mode

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure an IPv4 address with subnet mask as the tunnel destination for an IP-in-IP tunnel interface.

```
RP/0/RP0RSP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0RSP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0RSP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0RSP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0RSP0/CPU0:router(config-if)# tunnel destination 50.10.1.2/32
```

Link Bundling Commands

This module provides command line interface (CLI) commands for configuring Link Bundle interfaces on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 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.

backbone interface

To configure interchassis group ICCP backbone interface, use the **backbone interface** command in the redundancy group ICCP configuration mode. To return to the default behavior, use the **no** form of this command.

backbone 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

None

Command Modes

Redundancy group ICCP configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read, write

Examples

This example shows how to configure interchassis group ICCP backbone interface:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)# backbone interface GigabitEthernet
 0/2/1/0
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)#
```

Related Commands

Command	Description
redundancy iccp group, on page 560	Configures Inter Chassis Communication Protocol (ICCP) parameters.

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 6.1.1	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/RP0RSP0/CPU0:router(config)# int bundle-ether 1
RP/0/RP0RSP0/CPU0:router(config-if)##bundle lacp-delay ?
<1000-15000>  Lacp-delay timeout in milliseconds
RP/0/RP0RSP0/CPU0:router(config-if)##bundle lacp-delay 6000
RP/0/RP0RSP0/CPU0:router(config-if)##commit
```

Related Commands

Command	Description
bundle maximum-active links, on page 526	
show bundle, on page 562	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 EXEC modeXR EXEC mode.

bundle-hash {**Bundle-Ether** *bundle-id* | **Bundle-POS** **bundle-id** | **members** {**GigabitEthernet** | **TenGigabitEthernet** | **HundredGigabitEthernet** | **POS**} *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.
Bundle-POS *bundle-id*	Specifies a POS bundle for which you want to calculate load balancing. Range is 1- 65535.
members	Identifies specific bundle member links for which you want to calculate load balancing.
GigabitEthernet	Specifies the 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.
HundredGigE	Specified the 100 Gigabit Ethernet interface for which you want to calculate load balancing.
POS	Specifies the POS 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.6.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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.

Table 25: bundle-hash Command Options, on page 514 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 in Table 25: bundle-hash Command Options, on page 514.

Table 25: 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
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

```
Compute destination address set for all members [y|n]:
```

If you enter y(es), several sample IPv4 addresses in the destination subnet are generated, and the link is calculated for each sample address. During this calculation, the destination network address is derived from the destination IPv4 address and the subnet prefix.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows the **members** keyword prompts and options:

```
RP/0/RP0RSP0/CPU0:router# bundle-hash members pos  0/2/0/1

Thu Aug 20 20:19:21.241 DST
Single SA/DA pair or range: S/R [S]: s
Enter source IP V4 address: 10.10.10.10
Enter source IP V4 address: 10.10.10.10
Enter destination IP V4 address: 20.20.20.20
Compute destination address set for all members? [y/n]: y
Enter subnet prefix for destination address set: 8
Enter bundle IP V4 address [10.10.10.10]: 10.10.10.11

Link hashed [hash:0] to is POS0/2/0/1 member id 0 ifh 0x3000f00

Destination address set for subnet 20.0.0.0:
  20.0.0.1 [hash:4] hashes to link POS0/2/0/1

Another? [y]:
```

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/RP0RSP0/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 GigabitEthernet0/6/5/7

Destination address set for subnet 10.0.0.0:
  10.0.0.6 hashes to link GigabitEthernet0/1/5/6
  10.0.0.8 hashes to link GigabitEthernet0/6/5/5
  10.0.0.12 hashes to link GigabitEthernet0/6/5/6
  10.0.0.2 hashes to link GigabitEthernet0/6/5/7
  10.0.0.1 hashes to link GigabitEthernet0/1/5/7
```

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/RP0RSP0/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]: 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 GigabitEthernet0/1/5/6 has 6 hits
Member GigabitEthernet0/6/5/5 has 2 hits
Member GigabitEthernet0/6/5/6 has 2 hits
Member GigabitEthernet0/6/5/7 has 9 hits
Member GigabitEthernet0/1/5/7 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/RP0RSP0/CPU0:router# bundle-hash bundle-ether 202

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): l4
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: [ POS | GigabitEthernet | TenGigE ]R/S/I/P
  - bundle interface format:   [ Bundle-Ether | Bundle-POS ]bundle-id
  Enter ingress interface: GigabitEthernet0/2/0/3

  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 GigabitEthernet0/3/3/6

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: [ POS | GigabitEthernet | TenGigE ]R/S/I/P
  - bundle interface format:   [ Bundle-Ether | Bundle-POS ]bundle-id
  Enter ingress interface [GigabitEthernet0/2/0/3]: GigabitEthernet0/2/0/3

  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 GigabitEthernet0/3/3/6

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 GigabitEthernet0/3/3/6
  S/D pair 172.20.180.167:1000/172.30.15.6:2000 hashes to link GigabitEthernet0/2/0/1
  S/D pair 172.20.180.167:1000/172.30.15.3:2000 hashes to link GigabitEthernet0/2/0/2
  S/D pair 172.20.180.167:1000/172.30.15.5:2000 hashes to link GigabitEthernet0/0/3/0

Another? [y]: n
```

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 28) using the 7-tuple hash algorithm, a range of source and destinations, and IPv4 addresses:

```
RP/0/RP0/CPU0:HUCRS1#bundle-hash bundle-ether 33509
Thu May 18 00:07:56.222 EDT
Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): L4
Single SA:SP/DA:SP pair (IPv4,IPv6) or range (IPv4 only) or Entropy Label (MPLS only): S/R/E
 [S]: S
Enter bundle type IP V4 (1) or IP V6 (2): 1
Enter source IP V4 address: 45.227.0.25
Enter destination IP V4 address: 35.227.0.25
  Ingress interface handler --
  Note: interface handler can be gotten by 'sh im data interface'
  Enter ingress interface handler (hex format): 0x000841b0
    Ingress interface Bundle-Ether218
  Enter L4 protocol (TCP,UDP,SCTP,L2TPV3,NONE): NONE
  Enter L4 protocol field [0]: 253
Compute destination address set for all members? [y/n]: n
S/D pair 45.227.0.25/35.227.0.25 -- Link hashed to is TenGigE0/5/0/1
```

Note To ensure that the hashing is done correctly, do not set the L4 protocol field value to 0.

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/RP0RSP0/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 562	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 3.2	This command was introduced.
Release 3.3.0	The **bundle id** command syntax was changed from **bundle-id**.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/CPU0:router(config)# interface GigabitEthernet 0/1/5/0
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router(config)# interface GigabitEthernet 0/6/5/7
RP/0/RP0RSP0/CPU0:router(config-if)# bundle id 5 mode active
```

Related Commands

Command	Description
show bundle, on page 562	Displays information about configured bundles.
show interfaces, on page 489	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.
show lacp bundle, on page 588	Displays detailed information about LACP ports and their peers.
show lacp port, on page 598	

bundle load-balancing hash

To specify the hash function to be used for traffic being forwarded over a bundle interface, use the **bundle load-balancing hash** command in interface configuration mode. To return to the default, use the **no** form of the command.

bundle load-balancing hash {**dst-ip** | **src-ip**}

Syntax Description

dst-ip	Specifies a load-balancing hash based on destination IP address.
src-ip	Specifies a load-balancing hash based on source IP address.

Command Default

The default platform hashes for the bundle are used. For IPv4 traffic, the default hash is based on router ID, source IP, destination IP, and if available, source and destination Layer 4 port.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

Bundle load balancing hashes based on source IP address or destination IP address are used for MGSCP deployment models where traffic forwarded from the subscriber side of the network is based on source IP address, and traffic forwarded from the core side of the network is based on destination IP address.

Task ID

Task ID	Operation
bundle	read, write

The following example configures load balancing on bundle members based on source IP address:

```
RP/0/RP0RSP0/CPU0:router(config)#interface Bundle-Ether 100
RP/0/RP0RSP0/CPU0:router(config-if)# bundle load-balancing hash src-ip
```

The following example configures load balancing on bundle members based on source IP address under bundle subinterface:

```
RP/0/RP0RSP0/CPU0:router(config)#interface Bundle-Ether 100
RP/0/RP0RSP0/CPU0:router(config-if)# bundle load-balancing hash src-ip
```

Related Commands

Command	Description
interface (bundle), on page 537	Specifies or creates a new bundle and enters interface configuration mode for that bundle.
lacp cisco enable, on page 539	Enables use of Cisco-specific TLVs in addition to standard TLVs for negotiating and exchanging LACP information on link bundles.

Command	Description
show bundle, on page 562	Displays information about configured bundles.
show bundle load-balancing, on page 581	Displays load balancing information, such as the ports, usage, weight, and distribution of traffic on individual members of a link bundle interface.

bundle load-balancing hash (EFP)

To configure all egressing traffic on a particular subinterface of a bundle to flow through the same physical member link, use the **bundle load-balancing hash (EFP)** command in subinterface configuration mode. To disassociate the traffic from the physical member link, use the **no** form of the command.

bundle load-balancing hash *hash-value* [**auto**]

Syntax Description

hash-value	Numeric value that specifies the physical member link through which all egressing traffic in this bundle will flow. The values are 1 through 64.
auto	The physical member link through which all egressing traffic on this bundle will flow is automatically chosen.

Command Default

Ethernet flow point (EFP) load balancing is enabled.

Command Modes

Subinterface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The *hash-value* range was changed from an upper limit of 8 to 64.

Usage Guidelines

This command is only available on an Ethernet Bundle subinterface with Layer 2 transport (**l2transport**) enabled.

This command allows the user to configure all egressing traffic on the fixed members of a bundle to flow through the same physical member link. If the active members of the bundle change, the traffic for the bundle may get mapped to a different physical link that has a hash value that matches the configured value.

Task ID

Task ID	Operations
vlan	read, write

Examples

The following example shows how to configure all egressing traffic on the fixed members of a bundle to flow through the same physical member link automatically.

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface bundle-ether 1.1 l2transport
RP/0/RP0RSP0/CPU0:router(config-subif)# bundle load-balancing hash auto
```

The following example shows how to configure all egressing traffic on the fixed members of a bundle to flow through a specified physical member link.

```
RP/0/RP0RSP0/CPU0:router# config
```

```
RP/0/RP0RSP0/CPU0:router(config)# interface bundle-ether 1.1 l2transport
RP/0/RP0RSP0/CPU0:router(config-subif)# bundle load-balancing hash 1
```

Related Commands

Command	Description
bundle-hash, on page 513	Displays the source and destination IP addresses for the member links.
interface (bundle), on page 537	Specifies or creates a new bundle and enters interface configuration mode for that bundle.
show bundle, on page 562	Displays information about configured bundles.
show bundle load-balancing, on page 581	Displays load balancing information, such as the ports, usage, weight, and distribution of traffic on individual members of a link bundle interface.

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 3.3.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 3.8.0	The **hot-standby** keyword was added.
Release 5.0.0	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.

By default, multiple links can actively carry traffic for a bundle. However, if one of the links fails, there is no dedicated standby link to take its place. The **bundle maximum-active links** command enables you to implement the optional 1:1 link protection, which means for the specified bundle, you designate one active link and one or more standby links that can take over immediately if the active link fails.

By setting the **bundle maximum-active links** command to 1, the highest-priority link within the bundle becomes active (distributing state) and the remaining links are in standby mode. If a standby link meets one of the following criteria, it is in the collecting state:

If a standby link does not meet either of these criteria, it is in the waiting state.

If the **bundle maximum-active links** command is issued, then only the The second highest-priority link within the bundle is active becomes the standby link that takes over immediately if the active link fails. 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 must configure a higher the highest priority on (lowest value) for the link that you want to be active and the second-highest priority for the link that you want to act as a backup to the active link.

Note We recommend designating only one backup link to the active link. Although you can designate an additional backup link, maintaining two backup links consumes more bandwidth and offsets any benefits that may be gained.

Note If a link is not running LACP, the configuration of the **bundle maximum-active links** and **bundle port-priority** commands or equivalent commands must be the same on both ends of the link. If a link is running LACP, the configuration of the **bundle maximum-active links** command only must be the same on both ends of the link.

The **hot-standby** option of using an IEEE standard-based switchover (the default) or a faster proprietary optimized switchover is available only for active and standby links running LACP. For links not running LACP, the proprietary optimized switchover option is used.

When using one of the **hot-standby** options on a Cisco IOS XR device, the peer device must have a standby link configured and be one of the following:

- 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 display information about Ethernet bundle 5:

```
RP/0/RP0RSP0/CPU0:router# show bundle bundle-ether 5

State: 0 - Port is Detached. 1 - Port is Waiting.
       2 - Port is Attached. 3 - Port is Collecting.
       4 - Port is Distributing.

Bundle-Ether 5
                                Minimum active     Maximum active
  B/W (Kbps)   MAC address      Links  B/W (Kbps)  Links
  ----------   --------------   -----  ----------  -----
10000000001d.e5eb.2898111

  Port           State  Port ID          B/W (Kbps)  MAC address
  ------------   -----  --------------   ----------  --------------
  Te0/1/0/1      4      0x8000, 0x0001     10000000  0000.abab.0001
```

```
  Te0/1/0/0      3      0x8000, 0x0002     10000000  0000.abab.0000
```

In the **show bundle bundle-ether 5** command output, the state of the active link is 4, which indicates that the port is distributing. The state of the standby link is 3, which indicates that the port is collecting.

In the following example, the user implements 1:1 link protection for Ethernet bundle 5 and does not specify the **hot-standby** keyword, because the user wants to use the default IEEE standard-based switchover on the LACP-enabled active and standby links:

```
RP/0/RP0RSP0/CPU0:router(config)# interface bundle-ether 5
RP/0/RP0RSP0/CPU0:router(config-if)# bundle maximum-active links 1
```

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/RP0RSP0/CPU0:router(config)# interface bundle-ether 5
RP/0/RP0RSP0/CPU0:router(config-if)# bundle maximum-active links 1 hot-standby
```

The following example shows how to display information about Ethernet bundle 5:

```
RP/0/RP0RSP0/CPU0:router# show bundle bundle-ether 5

State: 0 - Port is Detached. 1 - Port is Waiting.
       2 - Port is Attached. 3 - Port is Collecting.
       4 - Port is Distributing.

Bundle-Ether 5
                              Minimum active     Maximum active
  B/W (Kbps)   MAC address      Links  B/W (Kbps)  Links
  ----------   --------------   -----  ----------  -----
10000000001d.e5eb.2898111

  Port           State  Port ID          B/W (Kbps)  MAC address
  ------------   -----  --------------   ----------  ---------------
  Te0/1/0/1      4      0x8000, 0x0001     10000000  0000.abab.0001
  Te0/1/0/0      10x8000, 0x0002     10000000  0000.abab.0000
```

In the **show bundle bundle-ether 5** command output, the state of the active link is 4, which indicates that the port is distributing. The state of the standby link is 1, which indicates that the port is waiting.

In the following example, the user implements 1:1 link protection for Ethernet bundle 5 and does not specify the **hot-standby** keyword, because the LACP-disabled link automatically uses the proprietary optimized switchover:

```
RP/0/RP0RSP0/CPU0:router(config)# interface bundle-ether 5
RP/0/RP0RSP0/CPU0:router(config-if)#bundle maximum-active links 1
```

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/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RP0RSP0/CPU0:router(config-if)# bundle maximum-active links 1
```

The following example shows how to display information about Ethernet bundle 5:

```
RP/0/RP0RSP0/CPU0:router# show bundle bundle-ether 5

State: 0 - Port is Detached. 1 - Port is Waiting.
       2 - Port is Attached. 3 - Port is Collecting.
       4 - Port is Distributing.

Bundle-Ether 5
                                Minimum active     Maximum active
  B/W (Kbps)   MAC address      Links  B/W (Kbps)  Links
  ----------   --------------   -----  ----------  -----
10000000001d.e5eb.2898111

  Port           State  Port ID          B/W (Kbps)  MAC address
  ------------   -----  ---------------  ----------  --------------
  Te0/1/0/1      4      0x8000, 0x0001     10000000  0000.abab.0001
  Te0/1/0/0      3      0x8000, 0x0002     10000000  0000.abab.0000
```

In the **show bundle bundle-ether 5** command output, the state of the active link is 4, which indicates that the port is distributing. The state of the standby link is 3, which indicates that the port is collecting.

Related Commands

Command	Description
bundle minimum-active links, on page 531	Sets the number of active links required to bring up a specific bundle.
show bundle, on page 562	Displays information about configured bundles.
show lacp bundle, on page 588	Displays detailed information about LACP ports and their peers.

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 varies depending on the platform and the combined bandwidths of 8 TenGigabitEthernet interfaces bundle type.

Command Default

The default setting is *kbps* = 1.

kbps: 1

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0RSP0/CPU0:router(config-if)# bundle minimum-active bandwidth 620000
```

Related Commands

Command	Description
show bundle, on page 562	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 3.3.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 3.9.0	The command range maximum was changed from 32 to 64.
Release 4.0.0	The command range maximum was changed from 8 to 64.
Release 5.0.0	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 two links must be active before the bundle can be brought up:

```
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RP0RSP0/CPU0:router(config-if)# bundle minimum-active links 2
```

Related Commands

Command	Description
bundle maximum-active links, on page 526	
show bundle, on page 562	Displays information about configured bundles.

bundle port-priority

To configure Link Aggregation Control Protocol (LACP) a port priority for a port bundle member link, 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 3.2	This command was introduced.
Release 3.3.0	The command name was changed from **lacp port-priority** to **bundle port-priority**.
Release 3.7.2	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **bundle port-priority** command enables you to determine whether or not similar ports, for example, Gigabit Ethernet ports with Link Aggregation Control Protocol (LACP) enabled or with LACP disabled, are aggregated based on the priority of the port.

The In cases where LACP is enabled on aggregated ports, the port priority value forms part of the port ID, which is transmitted within the LACP a packet when a device exchanges packets that are exchanged with the its peer. The peer uses peers use the port ID within 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.

In cases where LACP is disabled, the port priority is used locally, and a device does not communicate its priority to a peer. Therefore, the peers should have the same priority configured to avoid a mismatch in which links are used for carrying traffic. For example, you could set up the port priorities so that a device would use links 1, 3, and 4 for carrying traffic, and its peer would use links 1, 2, and 3, where links use the same numbering sequence at both ends.

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 the priority on of a port:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# bundle port-priority 1
```

Related Commands

Command	Description
bundle id, on page 520	Adds a port to an aggregated interface or bundle.
show lacp bundle, on page 588	Displays detailed information about LACP ports and their peers.
show lacp port, on page 598	
show lacp system-id, on page 601	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 5.1.3	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/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RP0RSP0/CPU0:router(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 EXEC modeXR EXEC mode.

clear lacp counters [{**bundle Bundle-Ether** *bundle-id* | **port** {**GigabitEthernet** *interface-path-id* | **TenGigE** *interface-path-id*}}]
clear lacp counters [{**bundle** {**Bundle-Ether** *bundle-id* | **Bundle-POS** *bundle-id*} | **port** {**GigabitEthernet** *interface-path-id* | **TenGigE** *interface-path-id* | **POS** *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.
Bundle-POS *bundle-id*	(Optional) POS bundle. Use the *bundle-id* argument to specify the bundle ID number of the LACP counters you want to clear. Range is from 1 through 65535.
port	(Optional) Clears all LACP counters on the specified bundle or interface.
GigabitEthernet	(Optional) Gigabit Ethernet interface. Use the *interface-path-id* argument to specify the 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.
POS	(Optional) Packet-over-SONET/SDH (POS) interface. Use the *interface-path-id* argument to specify the POS interface whose LACP counters you want to clear.
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 modeXR EXEC mode

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

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 a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
bundle	execute
basic-services	read, write

Examples

The following example shows how to clear LACP counters:

```
RP/0/RP0RSP0/CPU0:router# clear lacp counters
```

Related Commands

Command	Description
show lacp counters, on page 590	Displays LACP statistics.

interface (bundle)

To create a new bundle and enter interface configuration mode for that bundle, use the **interface (bundle)** command in Global Configuration modeXR Config mode. To delete a bundle, use the **no** form of this command.

interface Bundle-Ether {**Bundle-Ether** | **Bundle-POS** }*bundle-id*

Syntax Description

Bundle-Ether	Specifies or creates an Ethernet bundle interface.
Bundle-POS	Specifies or creates a POS bundle interface.
bundle-id	Number from 1 to 65535 that identifies a particular bundle.

Command Default

No bundle interface is configured.

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 3
RP/0/RP0RSP0/CPU0:router(config-if)#
```

This example shows how to create a new POS bundle and enter interface configuration mode:

```
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-POS 10
RP/0/RP0RSP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
show bundle, on page 562	Displays information about configured bundles.

isolation recovery-delay

To specify a delay before clearing the isolation condition after recovery from failure, use the **isolation recovery-delay** command in the redundancy group ICCP configuration mode. To return to the default value, use the **no** form of this command.

isolation recovery-delay *seconds*

Syntax Description

seconds	Recovery delay in seconds.

Command Default

By default, the delay is set to 180 seconds.

Command Modes

Redundancy group ICCP configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

This example shows how to configure ICCP parameters:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)# isolation recovery-delay 35
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)#
```

Task ID

Task ID	Operations
config-services	read, write

Related Commands

Command	Description
redundancy iccp group, on page 560	Configures Inter Chassis Communication Protocol (ICCP) parameters.

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 4.1.0	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/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RP0RSP0/CPU0:router(config-if)# lacp cisco enable link-order signaled
```

Related Commands

Command	Description
interface (bundle), on page 537	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 5.1.3	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/RP0RSP0/CPU0:router# configure terminal
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RP0RSP0/CPU0:router(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/RP0RSP0/CPU0:router# configure terminal
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RP0RSP0/CPU0:router(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 5.1.3	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/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RP0RSP0/CPU0:router(config-if)#  lacp collector-max-delay 500
```

lacp fast-switchover

To disable the wait-while timer in the LACP state machine, use the **lacp fast-switchover** command in interface configuration mode. To re-enable the wait-while timer, use the **no** form of this command.

lacp fast-switchover

Syntax Description

This command has no keywords or arguments.

Command Default

The wait-while timer in the LACP state machine is enabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 3.8.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

If you have 1:1 link protection enabled (you set the value of the **bundle maximum-active links** command to 1) on a bundle with member links running LACP, you can optionally disable the wait-while timer in the LACP state machine. Disabling this timer causes a bundle member link in standby mode to expedite its normal state negotiations, thereby enabling a faster switchover from a failed active link to the standby link.

Regardless of the type of switchover you are using, the default IEEE standard-based or the faster proprietary optimized switchover, the state negotiations of the standby link is expedited. (For more information about the switchover types, refer to the bundle maximum-active links, on page 526 command.) However, enabling the **lacp fast-switchover** command provides a greater benefit if used with the IEEE standard-based switchover.

Examples

The following example shows how to disable the wait-while timer for LACP-enabled member links of Bundle-Ether 28:

```
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 28
RP/0/RP0RSP0/CPU0:router(config-if)# lacp fast-switchover
```

The following example shows how to re-enable the wait-while timer for LACP-enabled member links of Bundle-Ether 28:

```
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 28
RP/0/RP0RSP0/CPU0:router(config-if)# no lacp fast-switchover
```

Related Commands

Command	Description
bundle maximum-active links, on page 526	

lacp non-revertive

To configure the currently active but lower priority port to remain active port even after a higher priority port is capable of being operational, use the **lacp non-revertive** command in the bundle interface configuration mode. To revert to the default configuration, use the **no** form of this command.

lacp non-revertive

This command has no keywords or arguments.

Command Default

A higher priority port would become the active port after it becomes operational again.

Command Modes

Bundle interface configuration mode

Command History

Release	Modification
Release 5.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
	read, write

Example

The following example shows how to configure the non-revertive behaviour on an LACP bundle interface.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface bundle-ether 1
RP/0/RP0RSP0/CPU0:router(config-if)# lacp non-revertive
```

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 EXEC modeXR EXEC mode.

{**lacp packet-capture gigabitethernet** *interface-path-id* | **pos 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*] [**bundle-pos bundle-id**] [**gigabitethernet** *interface-path-id*] [**pos interface-path-id**] [**tengige** *interface-path-id*] **clear** | **stop**}

Syntax Description

bundle-ether	Ethernet bundle interface specified by *bundle-id*.
bundle-pos	Packet-over-SONET (POS) bundle interface specified by *bundle-id*.
GigabitEthernet	Gigabit Ethernet interface specified by *interface-path-id*.
POS	Packet-over-SONET (POS) interface specified by *interface-path-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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	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 POS interface:

```
RP/0/RP0RSP0/CPU0:router# lacp packet-capture pos 0/1/0/0 100
```

The following example shows how to stop capturing LACP packets on a POS interface:

```
RP/0/RP0RSP0/CPU0:router# lacp packet-capture pos 0/1/0/0 stop
```

The following example shows how to clear all captured LACP packets on a POS interface:

```
RP/0/RP0RSP0/CPU0:router# lacp packet-capture pos 0/1/0/0 clear
```

The following example shows how to capture LACP packets on a Gigabit Ethernet interface:

```
RP/0/RP0RSP0/CPU0:router# lacp packet-capture gigabitethernet 0/2/0/0 100
```

The following example shows how to stop capturing LACP packets on a Gigabit Ethernet interface:

```
RP/0/RP0RSP0/CPU0:router# lacp packet-capture gigabitethernet 0/2/0/0 stop
```

Related Commands

Command	Description
show lacp io, on page 592	Displays the LACP transmission information that used by the transmitting device for sending packets on an interface.
show lacp packet-capture, on page 595	Displays the contents of LACP packets that are sent and received on an interface.
lacp period short, on page 548	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 3.2	This command was introduced.
Release 3.9.0	This command was introduced.
Release 3.9.0	The keywords **transmit** and **receive** were added.
Release 5.0.0	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/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# lacp period short
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# lacp period short
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

Router B

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# lacp period short
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

Router A

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

Router B

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

Router A

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

Router B

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

Related Commands

Command	Description
show lacp io, on page 592	Displays the LACP transmission information that used by the transmitting device for sending packets on an interface.
show lacp packet-capture, on page 595	Displays the contents of LACP packets that are sent and received on an interface.
lacp packet-capture, on page 545	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 Global Configuration modeXR 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.

priority: 32768

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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.

When the LACP system receives priority value as zero (0) from a remote device, bundle does not come up.

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/RP0RSP0/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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0RSP0/CPU0:router(config-if)# lacp system priority 10
RP/0/RP0RSP0/CPU0:router(config-if)# lacp system mac 00c1.4c00.bd15
```

```
RP/0/RP0RSP0/CPU0:router(config-if)# commit
```

Related Commands

Command	Description
show lacp system-id, on page 601	Displays the local system ID used by the LACP.
show lacp bundle, on page 588	Displays detailed information about LACP ports and their peers.
show lacp port, on page 598	

member neighbor

To configure interchassis group ICCP members, use the **member neighbor** command in redundancy ICCP group configuration mode. To return to the default behavior, use the **no** form of this command.

member neighbor *neighbor-ip-address*
no member neighbor *neighbor-ip-address*

Syntax Description

neighbor-ip-address	Specifies the ICCP member neighbor IP address.

Command Default

None

Command Modes

Redundancy ICCP group configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

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

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to configure interchassis group ICCP members:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)# member neighbor 10.1.1.1
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)#
```

Related Commands

Command	Description
redundancy iccp group, on page 560	Configures Inter Chassis Communication Protocol (ICCP) parameters.

mlacp connect

To specify configuration options for connecting to mLACP peers, use the **mlacp connect** command in the redundancy ICCP group configuration mode. To disable this feature, use the **no** form of this command.

mlacp connect timeout *seconds*

Syntax Description

timeout	Specifies the time to wait before assuming mLACP peer is down.
seconds	Number of seconds to wait before assuming the mLACP peer is down.

Command Default

No default behavior or values

Command Modes

Redundancy ICCP group configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	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 specify configuration options for connecting to mLACP peers:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)# mlacp connect timeout 100
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)#
```

Related Commands

redundancy iccp group	Configures ICCP parameters.

mlacp iccp-group

To configure ICCP redundancy group for a bundle, use the **mlacp iccp-group** command in bundle interface configuration mode. To return to the default value, use the **no** form of this command.

mlacp iccp-group *group-id*

Syntax Description

group-id	Specifies the ICCP redundancy group in which the bundle should operate. The group-id value ranges between 1-4294967295.

Command Default

The bundle behaves as a single chassis LAG.

Command Modes

Bundle interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	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 configure an ICCP redundancy group for a bundle:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 30
RP/0/RP0RSP0/CPU0:router(config-if)# mlacp iccp-group 200
RP/0/RP0RSP0/CPU0:router(config-if)#
```

mlacp node

To configure the mLACP node ID to be used in the ICCP group, use the **mlacp node** command in the redundancy ICCP group configuration mode. To return to the default value, use the **no** form of this command.

mlacp node *node-id*

Syntax Description

node-id	Specifies the unique node ID in the ICCP group for this system. The node-id value ranges between 0 to 7.

Command Default

No default behavior or values

Command Modes

Redundancy ICCP group configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	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 configure the mLACP node ID to be used in the ICCP group:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)# mlacp node 3
```

Related Commands

redundancy iccp group	Configures ICCP parameters.

mlacp port-priority

To set the priority for all member links, use the **mlacp port-priority** command in bundle interface configuration mode. To return to the default value, use the **no** form of this command.

mlacp port-priority *priority*

Syntax Description

priority	Specifies the priority for member ports. The priority value ranges between 1-65535. A lower value indicates higher priority.

Command Default

No default behavior or values

Command Modes

Bundle interface configuration

Command History

Release	Modification
Release 4.0.0	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 priority for all member links:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface Bundle-Ether 30
RP/0/RP0RSP0/CPU0:router(config-if)# mlacp port-priority 20
```

mlacp system mac

To configure the LACP system ID to be used in an ICCP group, use the **mlacp system mac** command in the redundancy ICCP group configuration mode. To return to the default value, use the **no** form of this command.

mlacp system mac *mac-id*

Syntax Description

mac-id	Specifies the unique ID for the system.

Note A non-zero value is permitted.

Command Default

No default behavior or values

Command Modes

Redundancy ICCP group configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	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 configure the LACP system ID to be used in an ICCP group:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)# mlacp system mac 1.1.1
```

Related Commands

redundancy iccp group	Configures ICCP parameters.

mlacp system priority

To configure the LACP system priority to be used in the ICCP group, use the **mlacp system priority** command in the redundancy ICCP group configuration mode. To return to the default value, use the **no** form of this command.

mlacp system priority *priority*

Syntax Description

priority	Specifies the priority for the system. **Note** Lower value indicates higher priority.

Command Default

No default behavior or values

Command Modes

Redundancy ICCP group configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	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 configure the LACP system priority to be used in the ICCP Group:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)# mlacp system priority 10
```

Related Commands

redundancy iccp group	Configures ICCP parameters.

redundancy iccp group

To configure Inter Chassis Communication Protocol (ICCP) parameters, use the **redundancy iccp group** command in the Global Configuration mode. To return to the default, use the **no** form of this command.

redundancy iccp group *group-id*

Syntax Description

group-id	Specifies ICCP group ID.

Command Default

ICCP redundancy is disabled.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
config-services	read, write

Examples

The following example shows how to configure ICCP parameters:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RP0RSP0/CPU0:router(config-redundancy-iccp-group)#
```

redundancy one-way

To enforce one-way pseudowire redundancy behavior when the redundancy group is configured, use the **redundancy one-way** command in the L2VPN pseudowire class configuration mode. To return to the default, use the **no** form of this command.

redundancy one-way

This command has no keywords or arguments.

Command Default

One-way redundancy is disabled.

Command Modes

L2VPN pseudowire class configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
l2vpn	read, write

Examples

The following example shows how to :

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# l2vpn
RP/0/RP0RSP0/CPU0:router(config-l2vpn)# pw-class class_mpls
RP/0/RP0RSP0/CPU0:router(config-l2vpn-pwc)# encapsulation mpls
RP/0/RP0RSP0/CPU0:router(config-l2vpn-pwc-mpls)# redundancy one-way
RP/0/RP0RSP0/CPU0:router(config-l2vpn-pwc-mpls)#
```

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-POS** }*bundle-id*]
show bundle [**Bundle-EtherBundle-POS** *bundle-id*]

Syntax Description

Bundle-Ether	Displays information for the specified Ethernet bundle.
Bundle-POS	Displays information for the specified POS bundle.
bundle-id	Number from 1 to 65535 that identifies a particular bundle.

Command Default

Information is displayed for all configured bundles.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.3.0	• The output for this command was modified. • The **reasons** keyword was added.
Release 3.7.2	This command was introduced.
Release 3.8.0	The **reasons** keyword was removed.
Release 4.0.0	The output for this command was replaced with a new format.
Release 4.1.0	The following output fields were added: • Load-balancing • Link order signaling • Hash type • Cisco extensions
Release 4.2.0	Support for Bundle-POS was added.
Release 5.0.0	This command was introduced.
Release 5.3.2	The "Non-revertive" output field was added.

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*or **show bundle Bundle-POS***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/RP0RSP0/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
```

```
RP/0/RP0RSP0/CPU0:router# show bundle
Sun Mar  6 12:16:25.601 PST

Bundle-Ether10
  Status:                                  Up
  Local links <active/standby/configured>:   1 / 1 / 2
  Local bandwidth <effective/available>:     1000000 (1000000) kbps
  MAC address (source):                    f866.f213.25a8 (Gi0/1/0/16)
  Minimum active links / bandwidth:        1 / 1 kbps
  Maximum active links:                    1
  Wait while timer:                        2000 ms
  Load balancing:                          Default
  LACP:                                    Operational
    Flap suppression timer:                Off
    Cisco extensions:                      Disabled
   Non-revertive:                         Disabled
  mLACP:                                   Not configured
  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
  ------------------  ---------------  -----------  --------------  ----------
  Gi0/1/0/9           Local            Active       0x0001, 0x0001     1000000
      Link is Active
  Gi0/1/0/10          Local            Standby      0x0002, 0x0002     1000000
      Link is Standby due to maximum-active links configuration
```

Table 26: show bundle Field Descriptions

Field	Description
Bundle-*typenumber*	Full name of the bundle interface, where *type* is Ether (Ethernet) or POS, followed by the configured *number* of the bundle.

Field	Description
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. The default load balancing method for the system is used on the bundle.
Link order signaling:	Displays whether or not link order signaling is operating on the bundle, with the following possible values: • Operational—Link ordering for load balancing is working through the exchange of an additional, Cisco-specific LACP type length value (TLV) that contains the ordering information. • Not operational—A consistent set of link ordering numbers (LONs) has not been received by a higher priority partner, or the LONs to be made active are not consistent with the maximum number of active links supported by the bundle. **Note** Link order signaling is required for the deployment of Multi-Gigabit Service Control Point (MGSCP).
Hash type:	The information to be used for the load balancing hash on the bundle, with the following possible values: • Dst-IP—The load balancing on the bundle is based on the packet's destination IP address. • Src-IP—The load balancing on the bundle is based on the packet's source IP address.

Field	Description
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. mLACP is not supported on the platform.
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 27: 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 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.

Reason	Description
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.
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.

Reason	Description
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 537	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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 5.0.0	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/RP0RSP0/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
```

Table 28: show bundle brief Field Descriptions, on page 578 describes the fields shown in the display.

Table 28: show bundle brief Field Descriptions

Field	Description
Name	Abbreviated name of the bundle interface, with the following possible formats: • BE*x*—Ethernet bundle with ID number *x*. • BP*y*—POS bundle with ID number *y*.
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 562	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-POS** *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.
Bundle-POS *bundle-id*	(Optional) Specifies the number of the POS 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 3.9.0	This command was introduced.
Release 4.2.0	The **Bundle-POS** keyword 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/RP0RSP0/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/RP0RSP0/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

================================================================================

Bundle-POS3
  Type:             POS (L3)
  Members:          2
  Total Weighting: 2
  Sub-interfaces:  0

  Member Information:
    Port:          ID  BW
    ------------  --  --
    POS0/2/0/1     3   1
    POS0/4/0/0     4   1

================================================================================
```

```
RP/0/RP0RSP0/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/RP0RSP0/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 513	Displays the source and destination IP addresses for the member links.
bundle load-balancing hash (EFP), on page 524	Configures all egress traffic on a particular subinterface of a bundle to flow through the same physical member link.
show bundle, on page 562	Displays information about configured bundles.

show bundle replication bundle-ether

To display the replication status of a link bundle interface, use the **show bundle replication bundle-ether** command in EXEC modeXR EXEC mode.

show bundle replication bundle-ether *bundle_id* [**all**] [**in-progress**] [**pending**]

Syntax Description

all	Shows replication status for all nodes.
in-progress	Shows only nodes with replication in progress.
pending	Shows only nodes pending replication.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read

Examples

```
RP/0/RP0RSP0/CPU0:router# show bundle replication bundle-ether 1 all
```

show iccp group

To display information for the ICCP parameters, use the **show iccp** command in EXEC mode.

show iccp group {*group-id* | **location** *node-id*}

Syntax Description

group-id	ICCP group ID.
location	Specifies the location.
node-id	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 4.0.0	This command was introduced.
Release 4.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
mpls-ldp	read

Examples

The following example shows the output of the **show iccp group** command:

```
RP/0/RP0RSP0/CPU0:router#show iccp group

Redundancy Group 1
  member ip:2.2.2.2 (router2), up (connected)
    monitor: route-watch (up)
  backbone interface Gi0/2/0/3: up
  enabled applications: mLACP
  isolation recovery delay timer: 180 s, not running
Redundancy Group 2
  member ip:2.2.2.2 (router2), up (disconnected)
    monitor: route-watch (up)
  backbone interface Gi0/2/0/3: up
  enabled applications: mLACP
  isolation recovery delay timer: 180 s, not running


RP/0/RP0RSP0/CPU0:router#show iccp group 1
```

```
Redundancy Group 1
  member ip:2.2.2.2 (router2), up (connected)
    monitor: route-watch (up)
  backbone interface Gi0/2/0/3: up
  enabled applications: mLACP
  isolation recovery delay timer: 180 s, not running
```

show lacp bundle

To display detailed information about Link Aggregation Control Protocol (LACP) ports and their peers, enter the **show lacp bundle** command in EXEC modeXR EXEC mode.

show lacp bundle {**Bundle-Ether** | **bundle-POS**} *bundle-id*

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.
Bundle-POS *bundle-id*	(Optional) Specifies the number of the POS bundle whose information you want to display. Range is 1 through 65535.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/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 29: show lacp bundle Field Descriptions

Field	Description
Flags	Describes the possible flags that may apply to a device or port, under the “Flags” field.
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 520	Adds a port to an aggregated interface or bundle.
show bundle, on page 562	Displays information about configured bundles.

show lacp counters

To display Link Aggregation Control Protocol (LACP) statistics, enter the **show lacp counters** command in EXEC modeXR EXEC mode.

show lacp counters {**Bundle-Ether** | **bundle-POS**} *bundle-id*

Syntax Description

Bundle-Ether *bundle-id*	Specifies the Ethernet bundle whose counters you want to display. Replace *bundle-id* with a bundle identifier. Range is from 1 through 65535.
Bundle-POS *bundle-id*	Specifies the POS bundle whose counters you want to display. Replace *bundle-id* with a bundle identifier. Range is from 1 through 65535.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/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 30: 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 due to an LACP timeout. The value is the timestamp in nanoseconds relative to the Unix Epoch (Jan 1, 1970 00:00:00 UTC). • 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.

Related Commands

Command	Description
clear lacp counters, on page 535	Clears LACP counters for all members of all bundles, all members of a specific bundle, or for a specific port.

show lacp io

To display the Link Aggregation Control Protocol (LACP) transmission information that used by the transmitting device for sending packets on an interface, use the **show lacp io** command in EXEC modeXR EXEC mode.

show lacp io {**Bundle-Ether** | **bundle-POS**} *bundle-id* {**GigabitEthernet** | **POS** | **TenGigE**} *interface-path-id*

Syntax Description

Bundle-Ether *bundle-id*	(Optional) Displays information for the Ethernet bundle interface with the specified *bundle-id*. The range is 1 through 65535.
Bundle-POS *bundle-id*	(Optional) Displays information for the POS bundle interface with the specified *bundle-id*. The range is 1 through 65535.
GigabitEthernet	(Optional) Displays information for the Gigabit Ethernet interface with the specified *interface-path-id*.
TenGigE	(Optional) Displays information for the Ten Gigabit Ethernet interface with the specified *interface-path-id*.
POS	(Optional) Displays information for the POS interface with the specified *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 takes no parameters and displays information for all actively transmitting interfaces.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

This command displays information only for interfaces that are actively transmitting packets.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to display Link Aggregation Control Protocol (LACP) information for the Ethernet bundle interface with bundle ID 28.

```
RP/0/RP0RSP0/CPU0:router# show lacp io bundle-ether 28

Thu Jun 18 16:28:54.068 PST

Bundle-Ether28

Interface GigabitEthernet0/1/5/6
================================
Interface handle:       0x01180100
Interface media type:   Ethernet
Fast periodic interval: 1000ms
Source MAC address:     0015.63c0.b3b8
Actor system:   0x8000, 00-15-63-c0-b0-04
Actor key:      0x001c
Actor port:     0x8000, 0x0001
Actor state:     Act  (T/o)  Agg   Sync   Coll   Dist  (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key:    0x001c
Partner port:   0x0001, 0x0003
Partner state:   Act  (T/o)  Agg   Sync   Coll   Dist  (Def) (Exp)

Interface GigabitEthernet0/1/5/7
================================
Interface handle:       0x01180120
Interface media type:   Ethernet
Fast periodic interval: 1000ms
Source MAC address:     0015.63c0.b3b9
Actor system:   0x8000, 00-15-63-c0-b0-04
Actor key:      0x001c
Actor port:     0x8000, 0x0002
Actor state:     Act  (T/o)  Agg   Sync  (Coll) (Dist) (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key:    0x001c
Partner port:   0x0002, 0x0004
Partner state:   Act  (T/o)  Agg  (Sync) (Coll) (Dist) (Def) (Exp)
```

The following example shows how to display Link Aggregation Control Protocol (LACP) information for all actively transmitting interfaces:

```
RP/0/RP0RSP0/CPU0:router# show lacp io

Thu Jun 18 16:33:57.330 PST

Bundle-Ether28

Interface GigabitEthernet0/1/5/6
================================
Interface handle:       0x01180100
Interface media type:   Ethernet
Fast periodic interval: 1000ms
Source MAC address:     0015.63c0.b3b8
Actor system:   0x8000, 00-15-63-c0-b0-04
Actor key:      0x001c
Actor port:     0x8000, 0x0001
Actor state:     Act  (T/o)  Agg   Sync   Coll   Dist  (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key:    0x001c
Partner port:   0x0001, 0x0003
```

```
Partner state:   Act  (T/o)  Agg   Sync   Coll   Dist  (Def) (Exp)

Interface GigabitEthernet0/1/5/7
================================
Interface handle:       0x01180120
Interface media type:   Ethernet
Fast periodic interval: 1000ms
Source MAC address:     0015.63c0.b3b9
Actor system:   0x8000, 00-15-63-c0-b0-04
Actor key:      0x001c
Actor port:     0x8000, 0x0002
Actor state:     Act  (T/o)  Agg   Sync  (Coll) (Dist) (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key:    0x001c
Partner port:   0x0002, 0x0004
Partner state:   Act  (T/o)  Agg  (Sync) (Coll) (Dist) (Def) (Exp)


Bundle-POS24

Interface POS0/1/4/0
====================
Interface handle:       0x011804c0
Interface media type:   POS
Fast periodic interval: 1000ms
Actor system:   0x8000, 00-15-63-c0-b0-04
Actor key:      0x0018
Actor port:     0x8000, 0x0003
Actor state:     Act  (T/o)  Agg   Sync   Coll   Dist  (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key:    0x0018
Partner port:   0x8000, 0x0001
Partner state:   Act  (T/o)  Agg   Sync   Coll   Dist  (Def) (Exp)

Interface POS0/1/4/1
====================
Interface handle:       0x011804e0
Interface media type:   POS
Fast periodic interval: 1000ms
Actor system:   0x8000, 00-15-63-c0-b0-04
Actor key:      0x0018
Actor port:     0x8000, 0x0004
Actor state:     Act  (T/o)  Agg   Sync   Coll   Dist  (Def) (Exp)
Partner system: 0x8000, 00-15-63-58-b9-04
Partner key:    0x0018
Partner port:   0x8000, 0x0002
Partner state:   Act  (T/o)  Agg   Sync   Coll   Dist  (Def) (Exp)
```

Related Commands

Command	Description
show lacp packet-capture, on page 595	Displays the contents of LACP packets that are sent and received on an interface.
lacp period short, on page 548	Enables a short period time interval for the transmission and reception of LACP packets.
lacp packet-capture, on page 545	Captures LACP packets so that their information can be displayed.

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 EXEC modeXR EXEC mode.

show lacp packet-capture [**decoded**] [{**in** | **out**}] {**GigabitEthernet** | **POS** | **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.
GigabitEthernet	Displays packet information for the Gigabit Ethernet interface specified by *interface-path-id*.
POS	Displays packet information for the POS 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

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	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 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/RP0RSP0/CPU0:router# lacp packet-capture gigabitethernet 0/1/0/0 100
RP/0/RP0RSP0/CPU0:router# show lacp packet-capture gigabitethernet 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/RP0RSP0/CPU0:router# lacp packet-capture gigabitethernet 0/1/0/0 100
RP/0/RP0RSP0/CPU0:router# show lacp packet-capture decoded gigabitethernet 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
show lacp io, on page 592	Displays the LACP transmission information that used by the transmitting device for sending packets on an interface.
lacp period short, on page 548	Enables a short period time interval for the transmission and reception of LACP packets.
lacp packet-capture, on page 545	Captures LACP packets so that their information can be displayed.

show lacp port

To display detailed information about Link Aggregation Control Protocol (LACP) ports, enter the **show lacp port** command in EXEC modeXR EXEC mode.

show lacp port [[{**GigabitEthernet** | **POS** | **TenGigE**}] *interface_instance*]

Syntax Description

GigabitEthernet	(Optional) Gigabit Ethernet interface. Use the *interface-path-id* argument to specify the Gigabit Ethernet interface whose LACP counters you want to display.
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 display.
POS	(Optional) Packet-over-SONET/SDH (POS) interface. Use the *interface-path-id* argument to specify the POS interface whose LACP counters you want to display.
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 modeXR EXEC mode

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

For the *interface-path-id* argument, 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.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to display LACP port information for all link bundles on a router:

```
RP/0/RP0RSP0/CPU0:router# show lacp port

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 31: show lacp port Field Descriptions

Field	Description
Port	Identifies the LACP port whose information is displayed. The port number is expressed in the *rack/slot/module/port* notation.
State	Provides information about the state of the specified device or 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 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 following format: *Nxnnnn*. *N* is the port priority, and *nnnn* is the port number assigned by the sending router.

Field	Description
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 an 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 520	Adds a port to an aggregated interface or bundle.
show bundle, on page 562	Displays information about configured bundles.
show lacp bundle, on page 588	Displays detailed information about LACP ports and their peers.

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 EXEC modeXR EXEC mode.

show lacp system-id

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.2	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/CPU0:router# show lacp system-id

Priority  MAC Address
--------  -----------------
  0x8000  08-00-45-3a-65-01
```

Table 32: 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.

Related Commands

Command	Description
bundle id, on page 520	Adds a port to an aggregated interface or bundle.

Command	Description
show bundle, on page 562	Displays information about configured bundles.
show lacp bundle, on page 588	Displays detailed information about LACP ports and their peers.
show lacp port, on page 598	

show mlacp

To display the MC-LAG information configured locally and for any connected mLACP peer devices, use the **show mlacp** command in the EXEC mode.

show mlacp [{**Bundle-Ether** *interface-path-id* | **iccp-group** *group-id*}] [{**brief** | **verbose**}]

Syntax Description

Bundle-Ether *interface-path-id*	Displays the information for the ICCP group of the bundle and only the specified bundle.
iccp-group *group-id*	Displays information related to the ICCP group.
brief	Displays only the ICCP group information without any bundle information.
verbose	Displays the ICCP group, the bundle and member information.

Command Default

No default behavior or values

Command Modes

Exec

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	Read

Examples

These examples display the MC-LAG information:

```
RP/0/RP0RSP0/CPU0:router# show mlacp brief

ICCP Group 1
  Connect timer:  Off

  Node  LDP ID           State         System ID                Sync   Vers
  ----  ---------------  ------------  -----------------------  -----  ----
     1  5.4.3.1          Up            0x0001,00-0d-00-0e-00-0f  Done   1
     2  Local            Up            0x0001,00-0d-00-0e-00-0f  Done   -

RP/0/RP0/CPU0:poa2#show mlacp

ICCP Group 1
```

```
  Connect timer:  Off

  Node  LDP ID           State         System ID                 Sync   Vers
  ----  ---------------  ------------  ------------------------  -----  ----
     1  5.4.3.1          Up            0x0001,00-0d-00-0e-00-0f  Done   1
     2  Local            Up            0x0001,00-0d-00-0e-00-0f  Done   -


  Bundle-Ether1 (ROID: 0000.0001.0000.0000)
    Node  Aggregator Name       State       Agg ID  MAC Address
    ----  --------------------  ----------  ------  ---------------
       1  BE1                   Up          0x0001  0000.deaf.0000
       2  Bundle-Ether1         Up          0x0001  0000.deaf.0000

RP/0/RP0/CPU0:router#show mlacp verbose

ICCP Group 1
  Connect timer:  Off

  Node  LDP ID           State         System ID                 Sync   Vers
  ----  ---------------  ------------  ------------------------  -----  ----
     1  5.4.3.1          Up            0x0001,00-0d-00-0e-00-0f  Done   1
     2  Local            Up            0x0001,00-0d-00-0e-00-0f  Done   -


  Bundle-Ether1 (ROID: 0000.0001.0000.0000)
    Node  Aggregator Name       State       Agg ID  MAC Address
    ----  --------------------  ----------  ------  ---------------
       1  BE1                   Up          0x0001  0000.deaf.0000
       2  Bundle-Ether1         Up          0x0001  0000.deaf.0000

                                                 Priority
    Node  Port Name             State       Port    Oper   (Cfgd)
    ----  --------------------  ----------  ------  ---------------
       1  Gi0/1/0/3             Up          0x9001  0x03e8 (0x03e8)
       2  Gi0/0/0/1             Up          0xa001  0x07d0 (0x07d0)
```

show mlacp counters

To display counters relating to mLACP information transferred to and from the local device, use the **show mlacp counters** command in the EXEC mode.

show mlacp counters [{**bdl-info** | **ig-info** | **mbr-info** [{**bundle interface** | **member interface** | **iccp-group** *group-id* | **mlacp-device** *device-id* | **mlacp-interface** *foreign-member-interface*}]}]

Syntax Description

Bundle-Ether	Displays the requested information associated with the bundle interface.
member interface	Displays the requested information associated with the member interface.
counters	Displays information on the mLACP counters.
bdl-info	Displays the bundles counters.
ig-info	Displays the ICCP group counters.
mbr-info	Displays the member counters.
mlacp-device	Displays the requested information associated with the mLACP device. **Note** The **mlacp-device** and **mlacp-interface** keywords are available only when mLACP devices and mLACP interfaces are configured.
mlacp-interface	Displays the requested information associated with the mLACP interface.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	Read

Examples

These examples display MC-LAG counter information:

Note The GigabitEthernet 0/0/0/1 is configured to Bundle-Ether 1 which is within ICCP Group1. Hence, the **show mlacp counters bdl-info GigabitEthernet 0/0/0/1** command displays the counters of the bundle that GigabitEthernet 0/0/0/1 is associated with (i.e. Bundle-Ether1). The **show mlacp counters mbr-info Bundle-Ether 1** displays the counters of the members that Bundle-Ether1 is associated with (locally: GigabitEthernet 0/0/0/1, and on the foreign device: GigabitEthernet 0/1/0/3).

```
RP/0/RP0RSP0/CPU0:router# show mlacp counters bdl-info GigabitEthernet 0/0/0/1

ICCP Group 1
                                    TLVs Sent                TLVs Received
Bundle                Config     State      Priority    NAKs        Priority
--------------------  ---------------------------------  ----------------------
Local Device
Bundle-Ether1 ????????????3          4          0           0          0
mLACP Peer 5.4.3.1
Bundle-Ether1 ????????????3          4          0           0          0

                                 Sync Requests
Bundle                TLVs       (config)   (state)     Last Cleared
--------------------  ---------------------------------  ------------
Local Device
Bundle-Ether1 ???????????0          0          0        18m12s
mLACP Peer 5.4.3.1
Bundle-Ether1 ???????????0          0          0        17m57s


RP/0/0/CPU0:router#show mlacp counters mbr-info Bundle-Ether 1

Bundle-Ether1 (ICCP Group 1)
                                    TLVs Sent                TLVs Received
Port                  Config     State      Priority    NAKs        Priority
--------------------  ---------------------------------  ----------------------
Local Device
Gi0/0/0/1 ???????????????7          0          0           0          0
mLACP Peer 5.4.3.1
Gi0/1/0/3 ???????????????7          5          3           0          0

                                 Sync Requests
Port                  TLVs       (config)   (state)     Last Cleared
--------------------  ---------------------------------  ------------
Local Device
All ports ????????????????0          0          0         19m3s
Gi0/0/0/1 ????????????????0          0          0         19m3s
mLACP Peer 5.4.3.1
All ports ????????????????1          1          1        18m49s
Gi0/1/0/3 ????????????????0          0          0        18m49s
```

Management Ethernet Interface Commands

This module provides command line interface (CLI) commands for configuring Management Ethernet interfaces on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 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 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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 configure the Management Ethernet interface to operate in full duplex mode:

```
RP/0/RP0RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0RP0/CPU0/0
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0RP0/CPU0/0
RP/0/RP0RSP0/CPU0:router(config-if)# duplex half
```

The following example shows how to return a Management Ethernet interface to autonegotiated duplex mode:

```
RP/0/RP0RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0RP0/CPU0/0
RP/0/RP0RSP0/CPU0:router(config-if)# no duplex
```

Related Commands

Command	Description
interface MgmtEth, on page 610	Enters interface configuration mode for the Management Ethernet interface.

interface MgmtEth

To enter interface configuration mode for the Management Ethernet interface, use the **interface MgmtEth** command in Global Configuration modeXR 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

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

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

```
RP/0/RP0RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0RP0/CPU0/0
RP/0/RP0RSP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
duplex (Management Ethernet), on page 608	Configures duplex mode operation on a Management Ethernet interface.
mac-address (Management Ethernet), on page 614	Sets the MAC layer address of a Management Ethernet interface.

Command	Description
speed (Management Ethernet), on page 615	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) Enalbe 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 6.3.1	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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface gigabitEthernet 0/2/0/0
```

```
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface mgmtEth 0/RSP0/CPU0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ipv6 address autoconfig
```

Related Commands

Command	Description
interface MgmtEth, on page 610	Enters interface configuration mode for the Management Ethernet interface.

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 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RSP0 RP0/CPU0/0:

```
RP/0/RP0RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0RP0/CPU0/0
RP/0/RP0RSP0/CPU0:router(config-if)# mac-address 0001.2468.ABCD
```

Related Commands

Command	Description
interface MgmtEth, on page 610	Enters interface configuration mode for the Management Ethernet interface.

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 2.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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.

Table 33: Relationship Between duplex and speed Commands, on page 615 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 33: 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 Command	speed Command	Resulting System Action
duplex full	speed 1000	Forces 1000 Mbps (1 Gbps) and full duplex.
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/RP0RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0RP0/CPU0/0
RP/0/RP0RSP0/CPU0:router(config-if)# speed 1000
```

Related Commands

Command	Description
interface MgmtEth, on page 610	Enters interface configuration mode for the Management Ethernet interface.

Null Interface Commands

This module provides command line interface (CLI) commands for configuring null interfaces on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 Series Router.

interface null 0

To enter null0 interface configuration mode, use the **interface null 0** command in global configuration XR config mode.

interface null 0

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Global configuration

XR config

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

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

When you issue the **interface null 0** command in global configuration XR config 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/RP0RSP0/CPU0:router(config)# interface null 0
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router(config)# interface null 0
```

```
RP/0/RP0RSP0/CPU0:router(config-null0)#
```

show controllers null interface

To display null interface counters, use the **show controllers null interface** command in EXEC mode.

show controllers null interface

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

EXEC

XR EXEC

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

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

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/RP0RSP0/CPU0:router# show controllers null interface

Null interface:
name     : Null0
handle   : 0x00080010
rx_count : 0
tx_count : 0
drops    : 0
```

Table 34: 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.

Field	Description
rx_count	Total number of packets currently received by the interface.
tx_count	Total number of packets currently transmitted by the interface.
drops	Total number of packets dropped by the interface.

Related Commands

Command	Description
show interfaces null0, on page 622	Displays null0 interfaces.

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

EXEC

XR EXEC

Command History

Release	Modification
Release 3.6.0	This command variant was added to the existing **show interfaces** command.
Release 5.0.0	This command was introduced.

Usage Guidelines

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

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/RP0RSP0/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
```

PPP Commands

This module provides command line interface (CLI) commands for configuring Point-to-Point Protocol (PPP) on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 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.

Point-to-Point Protocol (PPP) is an encapsulation scheme that can be used on Packet-over-SONET (POS), serial, and multilink interfaces. Point-to-Point Protocol (PPP) is an encapsulation scheme that can be used on Packet-over-SONET (POS) and serial interfaces. PPP is a standard protocol used to send data over synchronous serial links. PPP also provides a Link Control Protocol (LCP) for negotiating properties of the link. LCP uses echo requests and responses to monitor the continuing availability of the link.

PPP provides the following Network Control Protocols (NCPs) for negotiating properties of data protocols that will run on the link:

- Cisco Discovery Protocol Control Protocol (CDPCP) to negotiate CDP properties
- IP Control Protocol (IPCP) to negotiate IP properties
- IP Version 6 Control Protocol (IPv6CP) to negotiate IPv6 properties
- Multiprotocol Label Switching Control Protocol (MPLSCP) to negotiate MPLS properties
- Open System Interconnection Control Protocol (OSICP) to negotiate OSI properties

clear ppp sso state

To clear the replicated Inter-Chassis Stateful Switchover (ICSSO) states for the specified standby interface or for all interfaces on the specified node, use the **clear ppp sso state** command in EXEC modeXR EXEC mode.

clear ppp sso state {**interface** *interface-path-id* | **all**} **location** *node-id*

Syntax Description

interface *interface-path-id*	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
all location *node-id*	Specifies the full qualified path of a specific node in the format *rack*/*slot*/*module*.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

This command sets the PPP sessions in the Standby-Up state to the Standby-Down state. All replicated data received from the peer is purged, and SSRP Request messages are re-sent to the peer.

Task ID

Task ID	Operations
ppp	execute

Examples

The following example shows how to clear the replicated ICSSO states for the specified standby interface:

```
RP/0/RP0RSP0/CPU0:router# clear ppp sso state interface 0/1/0/1
```

The following example shows how to clear the replicated Inter-Chassis Stateful Switchover (ICSSO) states for all interfaces on the specified node:

```
RP/0/RP0RSP0/CPU0:router# clear ppp sso state all location 1/0/1
```

clear ppp statistics

To clear all Point-to-Point Protocol (PPP) statistics for a PPP interface, use the **clear ppp statistics** command in EXEC modeXR EXEC mode.

clear ppp statistics interface *interface-path-id*

Syntax Description

interface *interface-path-id*	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	execute

Examples

The following example shows how to clear PPP statistics for a PPP interface:

```
RP/0/RP0RSP0/CPU0:router# clear ppp statistics interface 0/1/0/1
```

encapsulation ppp

To enable encapsulation for communication with routers or bridges using the Point-to-Point Protocol (PPP), use the **encapsulation ppp** command in interface configuration mode. To disable PPP encapsulation, use the **no** form of this command.

encapsulation ppp

Syntax Description

This command has no keywords or arguments.

Command Default

PPP encapsulation is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

Use the **encapsulation ppp** command to enable PPP encapsulation on an interface.

Task ID

Task ID	Operations
ppp	read, write
interface	read, write

Examples

The following example shows how to set up PPP encapsulation on interface POS 0/1/0/1:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
```

The following example shows how to set up PPP encapsulation on a serial interface:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router# interface serial 0/0/1/2/4:3
RP/0/RP0RSP0/CPU0:router# encapsulation ppp
```

Related Commands

Command	Description
show ppp interfaces (BNG), on page 666	Displays PPP state information for an interface.

group

To create a Session State Redundancy Protocol (SSRP) group and associate it with a profile, use the **group** command in Global Configuration modeXR Config mode. To remove this group, use the no form of this command.

group *group-id* **profile** *profile_name* [**default**]

Syntax Description

group-id	SSRP group identifier. The range is 1 to 65535.
profile *profile_name*	Profile to associate with this group.
default	Associates the group to the default profile.

Command Default

No default behavior or values

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

Any interfaces on this card can be configured to use this group. The group number must be unique across the router.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to create an SSRP group:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# ssrp location 0/1/cpu0
RP/0/RP0RSP0/CPU0:router(config-ssrp-node)# group 1 profile default
```

Related Commands

Command	Description
ssrp location, on page 679	specify the node on which to create a SSRP group and enter the SSRP node configuration mode.

multi-router aps

To configure Multi-Router Automatic Protection Switching (MR-APS) and enter APS redundancy configuration mode, use the **multi-router aps** command in redundancy configuration mode. To deactivate Multi-Router Automatic Protection Switching (MR-APS), use the no form of this command.

multi-router aps

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Redundancy configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	read

Examples

The following example shows how to

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# redundancy
RP/0/RP0RSP0/CPU0:router(config-redundancy)# multi-router aps
RP/0/RP0RSP0/CPU0:router(config-redundancy-aps)
```

Related Commands

Command	Description
redundancy, on page 664	Enters the redundancy configuration mode to configure MR-APS.

peer ipv4 address

To configure the IPv4 address for a Session State Redundancy Protocol (SSRP) peer, use the **peer ipv4 address** command in SSRP configuration mode. To remove the address, use the no form of this command.

peer ipv4 address *ip-address*

Syntax Description

ip-address	IP address of the peer interface whose states will be replicated by SSRP.

Command Default

No default behavior or values

Command Modes

SSRP configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to configure the IPv4 address for a Session State Redundancy Protocol (SSRP) peer:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# ssrp profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-ssrp)# peer ipv4 address 10.10.10.10
```

Related Commands

Command	Description
ssrp profile, on page 680	Configures a SSRP profile and enters the SSRP configuration mode.

ppp authentication (BNG)

To enable Challenge Handshake Authentication Protocol (CHAP), MS-CHAP, or Password Authentication Protocol (PAP), and to specify the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface, use the **ppp authentication** command in an appropriate configuration mode. To disable PPP authentication, use the **no** form of this command.

ppp authentication *protocol* [*protocol* [*protocol*]] {*list-name* | **default**}

Syntax Description

protocol	Name of the authentication protocol used for PPP authentication. See Table 35: PPP Authentication Protocols for Negotiation, on page 634 for the appropriate keyword. You may select one, two, or all three protocols, in any order.
list-name	(Optional) Used with authentication, authorization, and accounting (AAA). Name of a list of methods of authentication to use. If no list name is specified, the system uses the default. The list is created with the **aaa authentication ppp** command.
default	(Optional) Specifies the name of the list of methods created with the **aaa authentication ppp** command.

Command Default

PPP authentication is not enabled.

Command Modes

Interface configuration

Dynamic template configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.2	This command was corrected to include the possibility of specifying three protocols simultaneously.
Release 3.9.0	This command was introduced.
Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.
Release 5.0.0	This command was introduced.

Usage Guidelines

When you enable CHAP or PAP authentication (or both), the local router requires the remote device to prove its identity before allowing data traffic to flow. PAP authentication requires the remote device to send a name and a password, which is checked against a matching entry in the local username database or in the remote security server database. CHAP authentication sends a challenge message to the remote device. The remote device encrypts the challenge value with a shared secret and returns the encrypted value and its name to the local router in a response message. The local router attempts to match the remote device's name with an associated secret stored in the local username or remote security server database; it uses the stored secret to encrypt the original challenge and verify that the encrypted values match.

You can enable CHAP, MS-CHAP, or PAP in any order. If you enable all three methods, the first method specified is requested during link negotiation. If the peer suggests using the second method, or refuses the

first method, the second method is tried. Some remote devices support only one method. Base the order in which you specify methods on the remote device's ability to correctly negotiate the appropriate method, and on the level of data line security you require. PAP usernames and passwords are sent as clear text strings, which can be intercepted and reused.

To enter the dynamic template configuration mode, run **dynamic-template** command in the Global Configuration modeXR Config mode.

Note If you use a *list-name* value that was not configured with the **aaa authentication ppp** command, then authentication does not complete successfully and the line does not come up.

Table 35: PPP Authentication Protocols for Negotiation, on page 634 lists the protocols used to negotiate PPP authentication.

Table 35: PPP Authentication Protocols for Negotiation

Protocol	Description
chap	Enables CHAP on an interface.
ms-chap	Enables Microsoft's version of CHAP (MS-CHAP) on an interface.
pap	Enables PAP on an interface.

Enabling or disabling PPP authentication does not affect the ability of the local router to authenticate itself to the remote device.

MS-CHAP is the Microsoft version of CHAP. Like the standard version of CHAP, MS-CHAP is used for PPP authentication. In this case, authentication occurs between a personal computer using Microsoft Windows NT or Microsoft Windows 95 and a Cisco router or access server acting as a network access server.

Enabling or disabling PPP authentication does not affect the local router authenticating itself to the remote device.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

In this example, CHAP is enabled on POS 0/4/0/1 and uses the authentication list MIS-access:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/4/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0RSP0/CPU0:router(config-if)# ppp authentication chap MIS-access
```

This is an example of configuring the **ppp authentication** command:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0RSP0/CPU0:router(config-dynamic-template-type)# ppp authentication chap ms-chap pap
```

Related Commands

Command	Description
aaa authentication ppp	Specifies one or more AAA authentication methods for use on serial interfaces running PPP.
encapsulation	Sets the encapsulation method used by the interface.
username	Configures a new user with a username, establishes a password, and grants permissions for the user.

ppp chap password

To enable a router calling a collection of routers to configure a common Challenge Handshake Authentication Protocol (CHAP) secret password, use the **ppp chap password** command in interface configuration mode. To disable the password, use the **no** form of this command.

ppp chap password [{**clear** | **encrypted**}] *password*

Syntax Description

clear	(Optional) Specifies the cleartext encryption parameter for the password.
encrypted	(Optional) Indicates that the password is already encrypted.
password	Cleartext or already-encrypted password.

Command Default

The password is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **ppp chap password** command is sent in CHAP responses and is used by the peer to authenticate the local router. This does not affect local authentication of the peer. This command is useful for routers that do not support this command (such as routers running older Cisco IOS XR images).

The CHAP secret password is used by the routers in response to challenges from an unknown peer.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

In this example, a password (xxxx) is entered as a cleartext password:

```
RP/0/RP0RSP0/CPU0:router(config-if)# ppp chap password xxxx
```

When the password is displayed (as shown in the following example, using the **show running-config** command), the password xxxx appears as 030752180500:

```
RP/0/RP0RSP0/CPU0:router(config)# show running-config interface POS 1/0/1/0

interface POS0/1/4/2

description Connected to P1 POS 0/1/4/3
ipv4 address 10.12.32.2 255.255.255.0
encapsulation ppp
ppp authentication chap pap
ppp chap password encrypted 030752180500
```

On subsequent logins, entering any of the three following commands would have the same effect of making xxxx the password for remote CHAP authentication:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 1/0/1/0
RP/0/RP0RSP0/CPU0:router(config-if)# ppp chap password xxxx
RP/0/RP0RSP0/CPU0:router(config-if)# ppp chap password clear xxxx
RP/0/RP0RSP0/CPU0:router(config-if)# ppp chap password encrypted 1514190900
```

Related Commands

Command	Description
aaa authentication ppp	Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.
ppp authentication (BNG), on page 633	Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.
ppp chap refuse, on page 638	Refuses CHAP authentication from peers requesting it.
ppp max-bad-auth (BNG), on page 643	Configures a PPP interface not to reset itself immediately after an authentication failure but instead to allow a specified number of authentication retries.
show running-config	Displays the contents of the currently running configuration file or the configuration for a specific interface, or map class information.

ppp chap refuse

To refuse Challenge Handshake Authentication Protocol (CHAP) authentication from peers requesting it, use the **ppp chap refuse** command in interface configuration mode. To allow CHAP authentication, use the **no** form of this command.

ppp chap refuse

Syntax Description

This command has no keywords or arguments.

Command Default

CHAP authentication is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **ppp chap refuse** command specifies that CHAP authentication is disabled for all calls, meaning that all attempts by the peer to force the user to authenticate using CHAP are refused.

If outbound Password Authentication Protocol (PAP) has been configured (using the **ppp authentication** command), PAP is suggested as the authentication method in the refusal packet.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

The following example shows how to specify POS interface 0/3/0/1 and disable CHAP authentication from occurring if a peer calls in requesting CHAP authentication. The method of encapsulation on the interface is PPP.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0RSP0/CPU0:router(config-if)# ppp chap refuse
```

Related Commands

Command	Description
aaa authentication ppp	Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.
ppp authentication (BNG), on page 633	Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.
ppp max-bad-auth (BNG), on page 643	Configures a PPP interface not to reset itself immediately after an authentication failure but instead to allow a specified number of authentication retries.
ppp pap sent-username password, on page 659	Enables remote PAP support for an interface, and includes the **sent-username** and **password** commands in the PAP authentication request packet to the peer.

ppp ipcp dns

To configure the primary and secondary Domain Name System (DNS) IP addresses for the Internet Protocol Control Protocol (IPCP), use the **ppp ipcp dns** command in interface configuration mode. To remove the addresses, use the no form of this command.

ppp ipcp dns *primary-ip-address* [*sec-ip-address*]

Syntax Description

primary-ip-address	Primary DNS IP address, in the format A.B.C.D.
sec-ip-address	Secondary DNS IP address, in the format W.X.Y.Z.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to configure the primary and secondary DNS IP addresses for Internet Protocol Control Protocol (IPCP):

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ppp ipcp dns 10.10.10.10 10.10.10.11
```

ppp ipcp neighbor-route disable

To disable installation of a route to the peer address negotiated by Internet Protocol Control Protocol (IPCP), use the **ppp ipcp neighbor-route disable** command in interface configuration mode. To re-enable installation of a route to the peer address negotiated by IPCP, use the no form of this command.

ppp ipcp neighbor-route disable

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to disable installation of a route to the peer address negotiated by IPCP:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ppp ipcp neighbor-route disable
```

ppp ipcp peer-address default

To specify the default IPv4 address that is assigned to the peer by the Internet Protocol Control Protocol (IPCP), use the **ppp ipcp peer-address default** command in interface configuration mode. To remove the address, use the no form of this command.

ppp ipcp peer-address default *ip-address*

Syntax Description

ip-address	Specifies the IP address for the peer node.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to specify the default IPv4 address that is assigned to the peer by IPCP.

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ppp ipcp peer-address default 10.10.10.10
```

ppp max-bad-auth (BNG)

To configure a PPP interface not to reset itself immediately after an authentication failure but instead to allow a specified number of authentication retries, use the **ppp max-bad-auth** command in the appropriate configuration mode. To reset to the default of immediate reset, use the **no** form of this command.

ppp max-bad-auth *retries*

Syntax Description

retries	Number of retries after which the interface is to reset itself. Range is from 0 to 10. Default is 0 retries.

Command Default

retries: 0

Command Modes

Interface configuration

Dynamic template configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **ppp max-bad-auth** command applies to any interface on which PPP encapsulation is enabled.

To enter the dynamic template configuration mode, run **dynamic-template** command in the Global Configuration modeXR Config mode.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

In this example, POS interface 0/3/0/1 is set to allow two additional retries after an initial authentication failure (for a total of three failed authentication attempts):

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0RSP0/CPU0:router(config-if)# ppp authentication chap
RP/0/RP0RSP0/CPU0:router(config-if)# ppp max-bad-auth 3
```

This example shows how to allow two additional retries after an initial authentication failure in the dynamic template configuration mode:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0RSP0/CPU0:router(config-dynamic-template-type)# ppp max-configure 5
```

ppp max-configure (BNG)

To specify the maximum number of configure requests to attempt (without response) before stopping the requests, use the **ppp max-configure** command in an appropriate configuration mode. To disable the maximum number of configure requests and return to the default, use the **no** form of this command.

ppp max-configure *retries*

Syntax Description

retries	Maximum number of retries. Range is 4 through 20. Default is 10.

Command Default

retries: 10

Command Modes

Interface configuration

Dynamic template configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.
Release 5.0.0	This command was introduced.

Usage Guidelines

Use the **ppp max-configure** command to specify how many times an attempt is made to establish a Link Control Protocol (LCP) session between two peers for a particular interface. If a configure request message receives a reply before the maximum number of configure requests are sent, further configure requests are abandoned.

To enter the dynamic template configuration mode, run **dynamic-template** command in the Global Configuration modeXR Config mode.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

This example shows a limit of four configure requests:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
```

```
RP/0/RP0RSP0/CPU0:router(config-if)# ppp max-configure 4
```

This example shows how a limit of four configure requests is specified in the dynamic template configuration mode:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0RSP0/CPU0:router(config-dynamic-template-type)# ppp ipcp
```

Related Commands

Command	Description
ppp max-failure (BNG), on page 647	Configures the maximum number of consecutive CONFNAKs to permit before terminating a negotiation.

ppp max-failure (BNG)

To configure the maximum number of consecutive Configure Negative Acknowledgments (CONFNAKs) to permit before terminating a negotiation, use the **ppp max-failure** command in an appropriate configuration mode. To disable the maximum number of CONFNAKs and return to the default, use the **no** form of this command.

ppp max-failure *retries*

Syntax Description

retries	Maximum number of CONFNAKs to permit before terminating a negotiation. Range is from 2 to 10. Default is 5.

Command Default

retries: 5

Command Modes

Interface configuration

Dynamic template configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.
Release 5.0.0	This command was introduced.

Usage Guidelines

To enter the dynamic template configuration mode, run **dynamic-template** command in the Global Configuration mode.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

The **ppp max-failure** command specifies that no more than three CONFNAKs are permitted before terminating the negotiation:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
```

```
RP/0/RP0RSP0/CPU0:router(config-if)# ppp max-failure 3
```

This example shows how no more than three CONFNAKs are permitted before terminating the negotiation in the dynamic template configuration mode:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# dynamic-template type ppp p1
RP/0/RP0RSP0/CPU0:router(config-dynamic-template-type)# ppp max-failure 4
```

Related Commands

Command	Description
ppp max-configure (BNG), on page 645	Specifies the maximum number of configure requests to attempt (without response) before stopping the requests.

ppp max-terminate

To configure the maximum number of terminate requests (TermReqs) to send without reply before closing down the Link Control Protocol (LCP) or Network Control Protocol (NCP), use the **ppp max-terminate** command in interface configuration mode. To disable the maximum number of TermReqs and return to the default, use the **no** form of this command.

ppp max-terminate *number*

Syntax Description

number	Maximum number of TermReqs to send without reply before closing down the LCP or NCP. Range is from 2 to 10. Default is 2.

Command Default

number: 2

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	read, write

Examples

In the following example, a maximum of five TermReqs are specified to be sent before terminating and closing LCP or NCP:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0RSP0/CPU0:router(config-if)# ppp max-terminate 5
```

Related Commands

Command	Description
ppp max-configure (BNG), on page 645	Specifies the maximum number of configure requests to attempt (without response) before stopping the requests.
ppp max-failure (BNG), on page 647	Configures the maximum number of consecutive CONFNAKs to permit before terminating a negotiation.

ppp ms-chap hostname

To configure the hostname for MS-CHAP authentication on an interface, use the **ppp ms-chap hostname** command in interface configuration mode. To remove the hostname, use the no form of this command.

ppp ms-chap hostname *hostname*

Syntax Description

hostname	Specifies the hostname for MS-CHAP authentication.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

The following example shows how to configure the hostname for MS-CHAP authentication on an interface:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ppp ms-chap hostname Host_1
```

ppp ms-chap password

To configure a common Microsoft Challenge Handshake Authentication (MS-CHAP) secret password, use the **ppp ms-chap password** command in interface configuration mode. To disable the password, use the **no** form of this command.

ppp ms-chap password [{**clear** | **encrypted**}] *password*

Syntax Description

clear	(Optional) Specifies the cleartext encryption parameter for the password.
encrypted	(Optional) Indicates that the password is already encrypted.
password	Cleartext or already-encrypted password.

Command Default

The password is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **ppp ms-chap password** command is sent in CHAP responses and is used by the peer to authenticate the local router. This does not affect local authentication of the peer. The **ppp ms-chap password** command is useful for routers that do not support this command (such as routers running older software images).

The MS-CHAP secret password is used by the routers in response to challenges from an unknown peer.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to enter a password (xxxx) as a cleartext password:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0RSP0/CPU0:router(config-if)# ppp ms-chap password clear xxxx
```

ppp ms-chap refuse

To refuse Microsoft Challenge Handshake Authentication Protocol (MS-CHAP) authentication from peers requesting it, use the **ppp ms-chap refuse** command in interface configuration mode. To allow MS-CHAP authentication, use the **no** form of this command.

ppp ms-chap refuse

Syntax Description

This command has no keywords or arguments.

Command Default

MS-CHAP authentication is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.3.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **ppp ms-chap refuse** command specifies that MS-CHAP authentication is disabled for all calls, meaning that all attempts by the peer to force the user to authenticate using MS-CHAP are refused.

If outbound Password Authentication Protocol (PAP) has been configured (using the **ppp authentication** command), PAP is suggested as the authentication method in the refusal packet.

Task ID

Task ID	Operations
ppp	read, write

Examples

This example shows how to specify POS interface 0/3/0/1 and disable MS-CHAP authentication from occurring if a peer calls in requesting MS-CHAP authentication. The method of encapsulation on the interface is PPP.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0RSP0/CPU0:router(config-if)# ppp ms-chap refuse
```

Related Commands

Command	Description
ppp authentication (BNG), on page 633	Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.

ppp multilink multiclass

To enable multiclass multilink PPP, use the **ppp multilink multiclass** command in interface configuration mode. To disable multiclass multilink PPP, use the no form of this command.

ppp multilink multiclass

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to enable multiclass multilink PPP:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ppp multilink multiclass
```

ppp multilink multiclass local

To configure the initial number and maximum number of Multiclass Multilink PPP (MCMP) receive classes in a Conf-Request sent from a local host to its peer, use the **ppp multilink multiclass local** command in interface configuration mode. To remove these settings, use the no form of this command.

ppp multilink multiclass local initial *init-number* **maximum** *max-number*

Syntax Description

initial *init-number*	Specifies the initial number of receive classes in the Conf-Request. The range is 1 to 16.
maximum *max-number*	Specifies the maximum number of receive classes in the Conf-Request. The range is 1 to 16.

Command Default

When MCMP is enabled, the default **initial** value is 2 and the default **maximum** value is 4.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The maximum number of receive classes configures the number of transmission classes on the local host.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to configure the initial number and maximum number of Multiclass Multilink PPP (MCMP) receive classes in a Conf-Request sent from a local host to its peer:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ppp multilink multiclass local initial 1 maximum 16
```

ppp multilink multiclass remote apply

To configure the minimum number of Multiclass Multilink PPP (MCMP) receive classes that a local host will accept from its peer in a Conf-Request, use the **ppp multilink multiclass** command in interface configuration mode. To remove this setting, use the no form of this command.

ppp multilink multiclass remote apply *min-number*

Syntax Description

min-number	Specifies the minimum number of receive classes in the Conf-Request. The range is 1 to 16.

Command Default

The default is 2 if MCMP is enabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

This command is used to coerce the peer to accept a minimum number of MCMP classes. If the peer does not accept the minimum number of MCMP classes specified by this command, the local router will not bring up the PPP link.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to use the **ppp multilink multicast remove** apply command.

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ppp multilink multiclass remote apply 16
```

Related Commands

Command	Description
ppp ipcp dns, on page 640	Configures the primary and secondary DNS IP addresses for the IPCP.
ppp ipcp neighbor-route disable, on page 641	Disables installation of a route to the peer address negotiated by IPCP.
ppp ipcp peer-address default, on page 642	Specifies the default IPv4 address that is assigned to the peer by the IPCP.

Command	Description
ppp ms-chap hostname, on page 650	Configures the hostname for MS-CHAP authentication on an interface.

ppp pap refuse

To refuse Password Authentication Protocol (PAP) authentication from peers requesting it, use the **ppp pap refuse** command in interface configuration mode. To allow PAP authentication, use the **no** form of this command.

ppp pap refuse

Syntax Description

This command has no keywords or arguments.

Command Default

PAP authentication is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **ppp pap refuse** command specifies that PAP authentication is disabled for all calls, meaning that all attempts by the peer to force the user to authenticate using PAP are refused.

If outbound Challenge Handshake Authentication Protocol (CHAP) has been configured (using the **ppp authentication** command), CHAP is suggested as the authentication method in the refusal packet.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

The following example shows how to specify POS 0/3/0/1 using PPP encapsulation on the interface. This example shows PAP authentication being specified as disabled if a peer calls in requesting PAP authentication.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0RSP0/CPU0:router(config-if)# ppp pap refuse
```

Related Commands

Command	Description
aaa authentication ppp	Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.
ppp authentication (BNG), on page 633	Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.
ppp max-bad-auth (BNG), on page 643	Configures a PPP interface not to reset itself immediately after an authentication failure but instead to allow a specified number of authentication retries.
ppp pap sent-username password, on page 659	Enables remote PAP support for an interface, and includes the **sent-username** and **password** commands in the PAP authentication request packet to the peer.

ppp pap sent-username password

To enable remote Password Authentication Protocol (PAP) support for an interface, and to use the values specified for username and password in the PAP authentication request, use the **ppp pap sent-username password** command in interface configuration mode. To disable remote PAP support, use the **no** form of this command.

ppp pap sent-username *username* **password** [{**clear** | **encrypted**}] *password*

Syntax Description

username	Username sent in the PAP authentication request.
clear	(Optional) Specifies the cleartext encryption parameter for the password.
encrypted	(Optional) Indicates that the password is already encrypted.
password	Cleartext or already-encrypted password.

Command Default

Remote PAP support is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

Use the **ppp pap sent-username password** command to enable remote PAP support (for example, to respond to the peer's request to authenticate with PAP) and to specify the parameters to be used when sending the PAP authentication request.

You must configure the **ppp pap sent-username password** command for each interface.

Task ID

Task ID	Operations
ppp	read, write
aaa	read, write

Examples

In the following example, a password is entered as a cleartext password, xxxx:

```
RP/0/RP0RSP0/CPU0:router(config-if)# ppp pap sent-username xxxx password notified
```

When the password is displayed (as shown in the following example, using the **show running-config** command), the password notified appears as 05080F1C2243:

```
RP/0/RP0RSP0/CPU0:router(config-if)# show running-config

interface POS0/1/0/0
description Connected to P1 POS 0/1/4/2
 ipv4 address 10.12.32.2 255.255.255.0
 encapsulation ppp
 ppp pap sent-username P2 password encrypted 05080F1C2243
```

On subsequent logins, entering any of the three following commands would have the same effect of making xxxx the password for remote PAP authentication:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/1/0/0
RP/0/RP0RSP0/CPU0:router(config-if)# ppp pap sent-username xxxx password notified
RP/0/RP0RSP0/CPU0:router(config-if)# ppp pap sent-username xxxx password clear notified
RP/0/RP0RSP0/CPU0:router(config-if)# ppp pap sent-username xxxx encrypted 1514190900
```

Related Commands

Command	Description
aaa authentication ppp	Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.
ppp authentication (BNG), on page 633	Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.
ppp multilink multiclass, on page 653	Refuses PAP authentication from peers requesting it
ppp timeout authentication, on page 661	Sets PPP authentication timeout parameters.
show running-config	Displays the contents of the currently running configuration file or the configuration for a specific interface, or map class information.

ppp timeout authentication

To set PPP authentication timeout parameters, use the **ppp timeout authentication** command in interface configuration mode. To reset the default value, use the **no** form of this command.

ppp timeout authentication *seconds*

Syntax Description

seconds	Maximum time, in seconds, to wait for a response to an authentication packet. Range is from 3 to 30 seconds. Default is 10 seconds.

Command Default

seconds: 10

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The default authentication time is 10 seconds, which should allow time for a remote router to authenticate and authorize the connection and provide a response. However, it is also possible that it will take much less time than 10 seconds. In such cases, use the **ppp timeout authentication** command to lower the timeout period to improve connection times in the event that an authentication response is lost.

Note The timeout affects connection times only if packets are lost.

Note Although lowering the authentication timeout is beneficial if packets are lost, sending authentication requests faster than the peer can handle them results in churn and a slower connection time.

Task ID

Task ID	Operations
ppp	read, write

Examples

In the following example, PPP timeout authentication is set to 20 seconds:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
```

```
RP/0/RP0RSP0/CPU0:router(config-if)# ppp timeout authentication 20
```

Related Commands

Command	Description
aaa authentication ppp	Specifies one or more authentication, authorization, and accounting (AAA) methods for use on serial interfaces running PPP.
ppp authentication (BNG), on page 633	Enables CHAP, MS-CHAP, or PAP, and specifies the order in which CHAP, MS-CHAP, and PAP authentication is selected on the interface.

ppp timeout retry

To set PPP timeout retry parameters, use the **ppp timeout retry** command in interface configuration mode. To reset the time value, use the **no** form of this command.

ppp timeout retry *seconds*

Syntax Description

seconds	Maximum time, in seconds, to wait for a response during PPP negotiation. Range is from 1 to 10 seconds. Default is 3 seconds.

Command Default

seconds: 3

Command Modes

Interface configuration

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **ppp timeout retry** command is useful for setting a maximum amount of time PPP should wait for a response to any control packet it sends.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows the retry timer being set to 8 seconds:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# encapsulation ppp
RP/0/RP0RSP0/CPU0:router(config-if)# ppp timeout retry 8
```

redundancy

To enter the redundancy configuration mode to configure Multi-Router Automatic Protection Switching (MR-APS), use the **redundancy** command in Global Configuration modeXR Config mode.

redundancy

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ppp	read

Examples

The following example shows how to enter the redundancy configuration mode:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# redundancy
RP/0/RP0RSP0/CPU0:router(config-redundancy)#
```

security ttl

To specify that the time-to-live (TTL) value in the IP header of the packet is used to validate that a packet is from the expected source, use the **security ttl** command in SSRP configuration mode. To remove the TTL requirement, use the no form of this command.

security ttl max-hops *number*

Syntax Description

max-hops *number*	Maximum number of hops between the peer routers.

Command Default

The **max-hops** default is 255.

Command Modes

SSRP configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

If **max-hops** is not specified, the TTL value must be 255 for a packet to be accepted.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to specify that the time-to-live (TTL) value in the IP header of a packet is used to validate that the packet is from the expected source:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# ssrp profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-ssrp)# peer ipv4 address 10.10.10.10
RP/0/RP0RSP0/CPU0:router(config-ssrp)# security ttl max-hops number 50
```

show ppp interfaces (BNG)

To display PPP state information for an interface, use the **show ppp interfaces** command in EXEC modeXR EXEC mode.

show ppp interfaces [{**brief** | **detail**}] {**all** | *type interface-path-id* | **location** *node-id*}

Syntax Description

brief	(Optional) Displays brief output for all interfaces on the router, for a specific POS interface instance, or for all interfaces on a specific node.
detail	(Optional) Displays detailed output for all interfaces on the router, for a specific interface instance, or for all interfaces on a specific node.
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.
all	(Optional) Displays detailed PPP information for all nodes.
location *node-id*	(Optional) Displays detailed PPP information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 2.0	This command was introduced.
Release 3.9.0	This command was introduced. For ICSSO, when SSRP is configured, the **show ppp interfaces** command displays the SSO-State for LCP, IPCP, and authentication layers.
Release 4.2.0	This command was supported in the dynamic template configuration mode for BNG.
Release 5.0.0	This command was introduced.

Release	Modification
Release 5.3.2	The command was modified to include a new output display field, **SRG-state**, as part of geo redundancy support for PPPoE sessions in BNG router.

Usage Guidelines

There are seven possible PPP states applicable for either the Link Control Protocol (LCP) or the Network Control Protocol (NCP).

The command output displays a summary of the interface as it is in the PPP Interface Descriptor Block (IDB). The output includes the following information (where applicable):

- Interface state
- Line protocol state
- Link Control Protocol (LCP) state
- Network Control Protocol (NCP) state
- Multilink PPP state
- Multilink PPP configuration
- Keepalive configuration
- Authentication configuration
- Negotiated MRUs
- Negotiated IP addresses

This command can display information for a single interface, all interfaces on a specified node, or all interfaces on the router.

Multilink PPP and POS are not supported for BNG Geo Redundancy.

Task ID

Task ID	Operations
ppp	read

Examples

This example shows how to display PPP state information for a POS interface:

```
RP/0/RP0RSP0/CPU0:router# show ppp interface POS 0/2/0/3

    POS0/2/0/3 is up, line protocol is up
      LCP: Open
         Keepalives enabled (10 sec)
         Local MRU: 4470 bytes
         Peer  MRU: 4470 bytes
      Authentication
         Of Us:    CHAP (Completed as 'test-user')
         Of Peer:  PAP (Completed as 'peer-user')
      CDPCP: Listen
      IPCP: Open
         Local IPv4 address: 55.0.0.1
         Peer IPv4 address:  55.0.0.2
         Peer DNS Primary:   55.0.0.254
         Peer DNS Secondary: 155.0.0.254
      IPV6CP: Open
         Local IPv6 address: fe80::3531:35ff:fe55:5747/128
         Peer IPv6 address:  fe80::3531:35ff:fe55:4213/128
```

```
      MPLSCP: Stopped
```

This example shows how to display PPP state information for a POS interface that is running as a Layer 2 attachment circuit:

```
RP/0/0/CPU0:# show ppp interface POS0/2/0/2

    POS0/2/0/2 is up, line protocol is up
      LCP: Open
         Running as L2 AC
```

This example shows how to display PPP state information for a multilink interface:

```
RP/0/RP0RSP0/CPU0:router:# show ppp interface Multilink 0/3/0/0/100

    Multilink0/3/0/0/100 is up, line protocol is down
      LCP: Open
         SSO-State: Standby-Up
         Keepalives disabled
      IPCP: Open
         SSO-State: Standby-Up
         Local IPv4 address: 100.0.0.1
         Peer IPv4 address:  100.0.0.2
      IPV6CP: Open
         Local IPv6 address: fe80::3531:35ff:fe55:4600/128
         Peer IPv6 address:  fe80::3531:35ff:fe55:3215/128
      Multilink
         Local MRRU: 1500 bytes
         Peer MRRU:  1500 bytes
         Local Endpoint Discriminator: 1234567812345678
         Peer Endpoint Discriminator:  1111222233334444
         MCMP classes: Local 4, Remote 2
         Member links: 2 active, 6 inactive (min-active 2)
           - Serial0/3/1/3/1  ACTIVE
           - Serial0/3/1/3/2  ACTIVE
           - Serial0/3/1/3/3  INACTIVE : LCP not negotiated
           - Serial0/3/1/3/4  INACTIVE : Mismatching peer endpoint
           - Serial0/3/1/3/5  INACTIVE : Mismatching peer auth name
           - Serial0/3/1/3/6  INACTIVE : MRRU option rejected by Peer
           - Serial0/3/1/3/7  INACTIVE : Mismatching local MCMP classes
           - Serial0/3/1/3/8  INACTIVE : MCMP option rejected by peer
```

This example shows how to display PPP state information for a serial interface:

```
RP/0/RP0RSP0/CPU0:router# show ppp interface Serial 0/3/1/3/1

    Serial0/3/1/3/1 is down, line protocol is down
      LCP: Open
         SSO-State: Standby-Up
         Keepalives enabled (10 sec)
         Local MRU: 1500 bytes
         Peer MRU:  1500 bytes
         Local Bundle MRRU: 1500 bytes
         Peer Bundle MRRU:  1500 bytes
         Local Endpoint Discriminator: 1234567812345678
         Peer Endpoint Discriminator:  1111222233334444
         Local MCMP Classes:  Not negotiated
         Remote MCMP Classes: Not negotiated
      Authentication
         Of Us:    CHAP (Completed as 'test-user')
         Of Peer:  PAP (Completed as 'peer-user')
```

```
     Multilink
        Multilink group id: 100
        Member status: ACTIVE
```

This is a sample output of the **show ppp interfaces** command in the BNG router, having subscriber redundancy group (SRG) in geo redundancy enabled for PPPoE sessions:

```
RP/0/RP0RSP0/CPU0:router# show ppp interfaces

Bundle-Ether2.1.pppoe16534 is down, line protocol is up
 SRG Role: Slave
  LCP: Open
     Keepalives enabled (60 sec, retry count 5)
     Local MRU: 1492 bytes
     Peer  MRU: 65531 bytes
  Authentication
     Of Peer: PAP (Completed as user1@domain.com)
     Of Us:   <None>
  IPCP: Open
     Local IPv4 address: 12.16.0.1
     Peer IPv4 address:  12.0.250.23
  IPv6CP: Initial
     Local IPv6 address: fe80::
     Peer IPv6 address:  fe80::
```

Table 36: show ppp interfaces Field Descriptions

Field	Description
Ack-Rcvd	Configuration acknowledgemt was received; waiting for peer to send configuration request.
Ack-Sent	Configuration acknowledgemt was sent; waiting for peer to respond to configuration request.
Authentication	Type of user authentication configured on the local equipment and on the peer equipment. Possible PPP authentication protocols are Challenge Handshake Authentication Protocol (CHAP), MS-CHAP, and Password Authentication Protocol (PAP).
Closed	Lower layer is up, but this layer is not required.
Closing	Shutting down due to local change.
Initial	Connection is idle.

Field	Description
IPCP	IP Control Protocol (IPCP) state. The seven possible states that may be displayed are as follows: • Initial—Lower layer is unavailable (Down), and no Open has occurred. The Restart timer is not running in the Initial state. • Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down). The Restart timer is not running in the Starting state. When the lower layer becomes available (Up), a Configure-Request is sent. • Closed— IPCP is not currently trying to negotiate. • Stopped—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. • Closing—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Upon reception of a Terminate-Ack, the Closed state is entered. Upon the expiration of the Restart timer, a new Terminate-Request is transmitted, and the Restart timer is restarted. After the Restart timer has expired Max-Terminate times, the Closed state is entered. • Stopping—A Terminate-Request has been sent and the Restart timer is running, but a IPCP-Ack has not yet been received. Req-Sent. • ACKsent—IPCP has received a request and has replied to it. • ACKrcvd—IPCP has received a reply to a request it sent. • Open—IPCP is functioning properly.
Keepalive	Keepalive setting and interval in seconds for echo request packets.
LCP	Indicates the current state of LCP. The state of the LCP will report the following states: • Initial—Lower layer is unavailable (Down), and no Open has occurred. The Restart timer is not running in the Initial state. • Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down). The Restart timer is not running in the Starting state. When the lower layer becomes available (Up), a Configure-Request is sent. • Closed— LCP is not currently trying to negotiate. • Stopped—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. • Closing—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Upon reception of a Terminate-Ack, the Closed state is entered. Upon the expiration of the Restart timer, a new Terminate-Request is transmitted, and the Restart timer is restarted. After the Restart timer has expired Max-Terminate times, the Closed state is entered. • Stopping—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Req-Sent. • ACKsent—LCP has received a request and has replied to it. • ACKrcvd—LCP has received a reply to a request it sent. • Open—LCP is functioning properly
Local IPv4 address	IPv4 address for the local interface.

Field	Description
Local MRU	Maximum receive unit. The maximum size of the information transported, in bytes, in the PPP packet received by the local equipment.
Open	Connection open.
OSICP	Open System Interconnection Control Protocol (OSICP) state. The possible states that may be displayed are as follows: • Initial—Lower layer is unavailable (Down), and no Open has occurred. The Restart timer is not running in the Initial state. • Starting—An administrative Open has been initiated, but the lower layer is still unavailable (Down). The Restart timer is not running in the Starting state. When the lower layer becomes available (Up), a Configure-Request is sent. • Closed— OSICP is not currently trying to negotiate. • Stopped—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. • Closing—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Upon reception of a Terminate-Ack, the Closed state is entered. Upon the expiration of the Restart timer, a new Terminate-Request is transmitted, and the Restart timer is restarted. After the Restart timer has expired Max-Terminate times, the Closed state is entered. • Stopping—A Terminate-Request has been sent and the Restart timer is running, but a Terminate-Ack has not yet been received. Req-Sent. • ACKsent—OSICP has received a request and has replied to it. • ACKrcvd—OSICP has received a reply to a request it sent. • Open—OSICP is functioning properly.
Peer IPv4 address	IPv4 address for the peer equipment.
Peer MRU	Maximum receive unit. The maximum size of the information transported, in bytes, in the PPP packet received by the peer equipment.
Req-Sent	Configuration request was sent; waiting for peer to respond.
Starting	This layer is required, but lower layer is down.
Stopped	Listening for a configuration request.
Stopping	Shutting down as a result of interactions with peer.

show ppp sso alerts

To display all Inter-Chassis Stateful Switchover (ICSSO) alerts that have occurred, use the **show ppp sso alerts** command in EXEC modeXR EXEC mode.

show ppp sso alerts location *node-id*

Syntax Description

location *node-id*	Specifies the full qualified path of a specific node in the format *rack*/*slot*/*module.*

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

This command displays the following information for alerts that have prevented a standby session from being brought to the Standby-Up state using replicated data.

- The interfaces on which the alerts have occurred
- The layer in which the error has occurred
- A short description of the error

Note Only one error is reported for each layer for each interface. The error displayed is the most recent error that has occurred.

Task ID

Task ID	Operations
ppp	read

Examples

The following example shows how to display all ICSSO alerts that have occurred:

```
RP/0/RP0RSP0/CPU0:router# show ppp sso errors location 0/3/cpu0

 Intf              Layer          SSO
 Name              with error     Error
 ------------------------------------------------------------------------------
 Mu0/3/0/0/100     IPCP           Unsupported IPCP option 0x07
 Se0/3/1/3/1:0     LCP            Unacceptable value for LCP MRU option
 Se0/3/1/3/2:0     of-us-auth     Incorrect Authentication protocol, CHAP
 Se0/3/1/3/3:0     of-peer-auth   Invalid CHAP Authentication options
```

```
Se0/3/1/3/4:0     LCP            Inconsistent LCP MRRU options
```

show ppp sso state

To display the Inter-Chassis Stateful Switchover (ICSSO) states of a Point-to-Point Protocol (PPP) session running under a particular Multi-Router Automatic Protection Switching (MR-APS) group, use the **show ppp sso state** command in EXEC modeXR EXEC mode.

show ppp sso state group *group-id* **location** *node-id*

Syntax Description

group *group-id*	Specifies the redundancy group number. The range is 1 to 32.
location *node-id*	Specifies the full qualified path of a specific node in the format *rack*/*slot*/*module.*

Command Default

If group is not specified, states are displayed for all redundancy groups.

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

This command shows the states of these session layers:

- LCP
- of-us authentication
- of-peer authentication
- IPCP

Note When an interface is in Standby mode, it is ready to forward traffic immediately after a switchover, if all the session layers, including IPCP, are in the S-Negd state.

Task ID

Task ID	Operations
ppp	read

Examples

The following example shows how to display the ICSSO states for PPP running under a redundancy group:

```
RP/0/RP0RSP0/CPU0:router# show ppp sso state location 0/3/cpu0

 Not-Ready : The session is not yet ready to run as Active or Standby
 S-UnNegd  : In Standby mode, no replication state received yet
 A-Down    : In Active mode, lower layer not yet up
```

```
Deact'ing : Session was Active, now going Standby
A-UnNegd  : In Active mode, not fully negotiated yet
S-Negd    : In Standby mode, replication state received and pre-programmed
Act'ing   : Session was Standby and pre-programmed, now going Active
A-Negd    : In Active mode, fully negotiated and up
-         : This layer not running

SSO-Group 1                      |            of-us     of-peer
Sess-ID    Ifname                |  LCP       auth      auth      IPCP
---------------------------------+-----------------------------------------
1          Multilink0/3/0/0/100 :  S-Negd    S-Negd    S-Negd    S-Negd

2          Multilink0/3/0/0/101 :  S-UnNegd  S-UnNegd  S-UnNegd  Not-Ready
3          Serial0/3/1/3/1      :  S-Negd    S-Negd    S-Negd    -
4          Serial0/3/1/3/2      :  A-Negd    A-Negd    A-Negd    A-UnNegd
5          Serial0/3/1/3/3      :  A-Down    Not-Ready Not-Ready -
6          Serial0/3/1/3/4      :  A-Up      A-Up      A-Up      A-Up

SSO-Group 1                      |            of-us     of-peer
Sess-ID    Ifname                |  LCP       auth      auth      IPCP
---------------------------------+-----------------------------------------
1          Multilink0/3/0/0/102 :  S-Negd    S-Negd    S-Negd    S-Negd

2          Serial0/3/1/3/5      :  S-Negd    S-Negd    S-Negd    -
3          Serial0/3/1/3/6      :  A-Negd    A-Negd    A-Negd    A-UnNegd
```

show ppp sso summary

To display the number of sessions in each Inter-Chassis Stateful Switchover (ICSSO) state for each session layer, use the **show ppp sso summary** command in EXEC modeXR EXEC mode.

show ppp sso summary location *node-id*

Syntax Description

location *node-id*	Specifies the full qualified path of a specific node in the format *rack*/*slot*/*module*.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

This command displays information for these session layers:

- LCP
- of-us
- of-peer authentication
- IPCP

Note Only sessions with Session State Redundancy Protocol (SSRP) configured are displayed.

Task ID

Task ID	Operations
ppp	read

Examples

This example shows how to display the number of sessions in each ICSSO state for each session layer.

```
RP/0/RP0RSP0/CPU0:router# show ppp sso summary location 0/3/cpu0

Not-Ready    : The session is not yet ready to run as Active or Standby
Stby-UnNegd  : In Standby mode, no replication state received yet
Act-Down     : In Active mode, lower layer not yet up
Deactivating : Session was Active, now going Standby
Act-UnNegd   : In Active mode, not fully negotiated yet
Stby-Negd    : In Standby mode, replication state received and pre-programmed
Activating   : Session was Standby and pre-programmed, now going Active
Act-Negd     : In Active mode, fully negotiated and up
```

```
-            : This layer not running

                        Not-   Stby-  Act- Deactiv- Act-   Stby-  Activ- Act
Layer         | Total   Ready  UnNegd Down   ating  UnNegd Negd   ating  Negd
--------------+------- ------ ------ ------ ------ ------ ------ ------ -----
LCP           |     20      2      5      0      0      3      6      0     4
of-us-auth    |     20     10      2      0      0      1      4      0     3
of-peer-auth  |     20     10      3      0      0      2      3      0     2
IPCP          |     10      1      2      1      0      3      2      0     1
```

ssrp group

To attach an Session State Redundancy Protocol (SSRP) group on an interface, use the **ssrp group** command in interface configuration mode. To remove the SSRP group from the interface, use the **no** form of this command.

ssrp group *group-number* **id** *id-number* **ppp**

Syntax Description

group-number	SSRP group number. The range is 1 to 65535.
id *id-number*	SSRP identifier number. The range is 1 to 4294967295.
ppp	Specifies point-to-point protocol.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The group must be configured first on a specific location (linecard) and then assigned to the interface. The redundancy ID must be unique within the group. This command specifies a list the protocols that the group can replicate. Currently only PPP is supported.

Task ID

Task ID	Operations
ppp	read, write

Examples

The following example shows how to

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# interface Multilink 0/1/0/0/1
RP/0/RP0RSP0/CPU0:router(config-if)# ssrp  group  1  id  1  ppp
```

ssrp location

To specify the node on which to create a Session State Redundancy Protocol (SSRP) group and enter the SSRP node configuration mode, use the **ssrp location** command in Global Configuration modeXR Config mode.

ssrp location *node_id*

Syntax Description

node_id	Specifies the full qualified path of a specific node in the format *rack*/*slot*/*module*.

Command Default

No default behavior or values

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The location specifies the card on which an SSRP group is created.

Task ID

Task ID	Operations
ppp	read, write

Examples

This example shows how to create an SSRP group on a specified node for use by any interface on the card:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# ssrp location 0/1/cpu0
RP/0/RP0RSP0/CPU0:router(config-ssrp-node)#
```

ssrp profile

To configure a Session State Redundancy Protocol (SSRP) profile and enter the SSRP configuration mode, use the **ssrp profile** command in Global Configuration modeXR Config mode. To remove the profile, use the **no** form of this command.

ssrp profile *profile-name*

Syntax Description

profile-name	Name of this SSRP profile.

Command Default

No default behavior or values

Command Modes

Global Configuration modeXR Config mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

A Session State Redundancy Protocol (SSRP) profile allows the same SSRP configuration to be shared across multiple groups. The same profile can be attached to multiple groups across the router. The group must be configured before the interface that uses the group can be configured. The group number is used in the TCP port number so, the group number must be unique across the router.

Task ID

Task ID	Operations
ppp	read, write

Examples

This example shows how to configure an SSRP profile:

```
RP/0/RP0RSP0/CPU0:router# config
RP/0/RP0RSP0/CPU0:router(config)# ssrp profile Profile_1
RP/0/RP0RSP0/CPU0:router(config-ssrp)#
```

VLAN Subinterface Commands

This module provides command line interface (CLI) commands for configuring IEEE 802.1Q VLANs on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 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.

The maximum VLAN limit that can be configured for a specific card is listed below:

Table 37: Maximum VLAN Limit per Slice for Below Cards

Card	VLAN MAX Limit per Slice
NC6-60X10GE-M-S	16260
NC6-10X100G-M-P	1884
NC6-10X100G-M-K	1884

dot1q native vlan

To assign the native VLAN ID of a physical interface trunking 802.1Q VLAN traffic, use the **dot1q native vlan** command in interface configuration mode. To remove the VLAN ID assignment, use the **no** form of this command.

dot1q native vlan *vlan-id*

Syntax Description

vlan-id	Trunk interface ID. Range is from 1 to 4094 inclusive (0 and 4095 are reserved).

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 5.0.0	This command was introduced.

Usage Guidelines

The **dot1q native vlan** command defines the default, or native VLAN, associated with a 802.1Q trunk interface. The native VLAN of a trunk interface is the VLAN to which all untagged VLAN packets are logically assigned.

Note The native VLAN cannot be configured on a subinterface of the trunk interface. The native VLAN must be configured with the same value at both ends of the link, or traffic can be lost or sent to the wrong VLAN.

Task ID

Task ID	Operations
vlan	read, write

Examples

The following example shows how to configure the native VLAN of a TenGigE0/2/0/4 trunk interface as 1. Packets received on this interface that are untagged, or that have an 802.1Q tag with VLAN ID 1, are received on the main interface. Packets sent from the main interface are transmitted without an 802.1Q tag.

```
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4
RP/0/RP0RSP0/CPU0:router(config-if)# dot1q native vlan 1
```

Related Commands

Command	Description
dot1q vlan, on page 684	Assigns a VLAN ID to a subinterface (or modifies the VLAN ID that is currently assigned to a subinterface).

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.

Note Effective with Cisco IOS XR Release 3.7.2, the **dot1q vlan** command is replaced by the **encapsulation dot1q** command. See the **encapsulation dot1q** command for more information.

dot1q vlan *vlan-id* [{*vlan-id2* | **any**}]

Syntax Description

vlan-id	ID of the subinterface. Range is from 1 to 4094 (0 and 4095 are reserved).
vlan-id2	(Optional) Identifies the host VLAN of a Q-in-Q VLAN pair. Replace *vlan-id2* with a number that specifies the host VLAN. Range is from 1 to 4094.
any	(Optional) Identifies the host VLAN of a Q-in any VLAN pair.

Command Default

No default behavior or values

Command Modes

Subinterface configuration

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 3.7.2	This command was introduced and was also replaced by the **encapsulation dot1q** command.
Release 5.0.0	This command was introduced.
Release 5.1.1	This command was introduced and was also replaced by the **encapsulation dot1q** command.

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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RP0RSP0/CPU0:router(config-subif)# dot1q vlan 10
RP/0/RP0RSP0/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/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RP0RSP0/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.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1 l2transport
RP/0/RP0RSP0/CPU0:router(config-subif)# dot1q vlan 10 any
```

Related Commands

Command	Description
show interfaces, on page 489	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.
show vlan interface, on page 688	Displays summarized information about VLAN subinterfaces.
show vlan tags, on page 690	Displays VLAN tagging allocation information.

interface (VLAN)

To create a VLAN subinterface, use the **interface** command in Global Configuration modeXR Config mode. To delete a subinterface, use the **no** form of this command.

interface *type interface-path-id.subinterface* [**l2transport**]

Syntax Description

type	Type of Ethernet interface on which you want to create a VLAN. Enter **GigabitEthernet**, **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.
l2transport	Enables Layer 2 transport port mode on the specified VLAN interface and enters Layer 2 transport configuration mode. The l2transport keyword creates the Vlan interface in L2 mode so that it can be used for L2VPNs and local switching.

Command Default

No default behavior or values

Command Modes

Global Configuration

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 3.7.2	This command was introduced.
Release 5.0.0	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/RP0RSP0/CPU0:router(config)# interface TenGigE 0/0/0/1.2
RP/0/RP0RSP0/CPU0:router(config-subif)# dot1q vlan 1
RP/0/RP0RSP0/CPU0:router(config-subif)# ipv4 address 50.0.0.1/24
```

This example shows how to create a VLAN subinterface with Layer 2 transport port mode enabled, and enter Layer 2 transport configuration mode under that VLAN:

```
RP/0/RP0RSP0/CPU0:router(config)# interface GigabitEthernet 0/4/0/1.1
RP/0/RP0RSP0/CPU0:router(config-if-l2)#
```

Related Commands

Command	Description
dot1q vlan, on page 684	Assigns a VLAN ID to a subinterface (or modifies the VLAN ID that is currently assigned to a subinterface).

show vlan interface

To display summarized information about VLAN subinterfaces, use the **show vlan interface** command in EXEC modeXR EXEC mode .

Note Effective with Cisco IOS XR Release 5.1.1, the**show vlan interface** command is replaced by the **show ethernet tags** command.

show vlan interface [{*type interface-path-id.subinterface* | **location** *instance*}]

Syntax Description

type	(Optional) Type of Ethernet interface whose VLAN information you want to display. Enter **GigabitEthernet**, **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.
location *instance*	(Optional) Displays VLAN subinterfaces on a particular port. The *instance* argument is entered in the *rack*/*slot*/*module*/*port* notation.

Command Default

No default behavior or values

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 5.0.0	This command was introduced.
Release 5.1.1	This command was replaced with **show ethernet tags** command.

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.

Enter the **show vlan interface** command without including any of the optional parameters to display summarized information about all VLANs configured on the router.

Task ID

Task ID	Operations
vlan	read

Table 38: show vlan interface Field Descriptions

Field	Description
interface	VLAN subinterface.
encapsulation	Encapsulation of the VLAN subinterface. Currently, this is always 802.1Q.
Outer VLAN	VLAN ID currently assigned to the subinterface. Range is from 1 to 4094 (or blank if no VLAN ID has been assigned).
2nd VLAN	VLAN ID currently assigned to the second subinterface in a pair. Range is from 1 to 4094 (or blank if no VLAN ID has been assigned). For Q-in-any VLANS, this field shows "Any."
Service	Service currently assigned to the VLAN. Possible services are L2 and L3.
MTU	Maximum transmission unit (MTU) value configured for the specified VLAN, in bytes.
LineP state	Displays the line protocol state of the VLAN interface. Possible states: up, down, admin-down. The line protocol state reflects whether a VLAN ID is configured or not.

Related Commands

Command	Description
show interfaces, on page 489	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.
show vlan trunks, on page 692	Displays information about VLAN trunks.

show vlan tags

To display VLAN tagging allocation information, use the **show vlan tags** command in EXEC modeXR EXEC mode.

show vlan tags [{*type* *interface-path-id* | **location** *node-id*}]

Syntax Description

type	Displays VLAN tagging information for a specific bundle type. **Note** Use the **show interfaces** command with the **Bundle-Ether**, **GigabitEthernet** or **TenGigE** keyword to see a list of all Ethernet bundles currently configured on the router.
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*	Displays VLAN tagging information for a specific node. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

Enter the command without any of the optional keywords or arguments to display tagging allocation information for all VLANS configured on the router.

Command Modes

EXECXR EXEC

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 5.0.0	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.

Task ID

Task ID	Operations
vlan	read

Examples

The following example shows how to display VLAN tagging allocation information for a router:

```
RP/0/RP0RSP0/CPU0:router(config-subif)# show vlan tagsl2protocol cdp drop

Interface           Outer   2nd    Service  MTU    LineP
                    VLAN    VLAN                   State
Gi0/1/5/0.1           10           L3         1518   up
Gi0/1/5/0.2           20           L3         1518   up
Gi0/1/5/0.3           30           L3         1518   up
```

Table 39: show vlan tags Field Descriptions

Field	Description
Outer Vlan	The first (outermost) 802.1Q VLAN ID. This field is empty if no VLAN ID is configured. An asterisk (*) indicate the native VLAN.
2nd Vlan	The second 802.1Q VLAN ID. This field reports “any” for a Q-in-Any service. If no VLAN ID is configured, then this field is empty.
Service	Service currently assigned to the subinterface. Can be Layer 2 (L2) or Layer 3 (L3).
MTU	Maximum transmission unit (MTU) value configured for the specified VLAN, in bytes.
LineP state	Displays the state of the VLAN interface. Possible states: up, down, admin-down.

Related Commands

Command	Description
dot1q vlan, on page 684	Assigns a VLAN ID to a subinterface (or modifies the VLAN ID that is currently assigned to a subinterface).
show vlan interface, on page 688	Displays summarized information about VLAN subinterfaces.
show vlan trunks, on page 692	Displays information about VLAN trunks.

show vlan trunks

To display information about VLAN trunks, use the **show vlan trunks** command in EXEC modeXR EXEC mode

show vlan trunks [**brief**] [**location** *node-id*] [*type interface-path-id*] [**summary**]

Syntax Description

type	(Optional) Type of Ethernet interface whose VLAN trunk information you want to display. Possible Ethernet types are **GigabitEthernet**, **TenGigE** , or **Bundle-Ether**.
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.
brief	(Optional) Displays a short summary output.
summary	(Optional) Displays a summarize output. **Note** The **summary** option can be specified only if the trunk interface is not specified.
location *node-id*	(Optional) Displays VLAN trunk information for a specific node. The *node-id* is expressed in the *rack/slot/module* notation. **Note** 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

EXECXR EXEC

Command History

Release	Modification
Release 3.0	This command was introduced.
Release 5.0.0	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 a virtual interface, the number range varies, depending on interface type.

The **show vlan trunks** command provides summary information about VLAN trunk interfaces. It is used to determine the number of configured subinterfaces and verify the state of the subinterfaces.

Task ID

Task ID	Operations
vlan	read

Examples

The following is sample output from the **show vlan trunks** command:

```
RP/0/RP0RSP0/CPU0:router# show vlan trunks

GigabitEthernet0/4/0/0 is up
  Outer VLAN tag format is Dot1Q (0x8100)
  L3 Encapsulations: Ether, 802.1Q
    Sub-interfaces: 2
      2 are up
      Single tag sub-interfaces: 2
    No native VLAN Id
  L2 Encapsulations: 802.1Q
    VLAN ACs: 1
      1 are up
      Single tag ACs: 1
```

Table 40: show vlan trunks summary Field Descriptions

Field	Description
Outer VLAN tag format	The first (outermost) 802.1Q VLAN Id. • This field is empty if no VLAN ID is configured. • An asterisk (*) indicates that a native VLAN is configured.
L3 Encapsulations	VLAN encapsulations currently used for terminated Layer 3traffic. Possible Layer 3 encapsulations are as follows: • Nat – A Native VLAN is configured. • Q – One or more sub-interfaces are configured with either 0 or 1 802.1Q VLAN tags. • 2Q – One or more sub-interfaces have been configured with two 802.1Q VLAN tags.
Sub-interfaces	The number of subinterfaces configured on the main Ethernet interface, and the current state of those subinterfaces. Possible states are up, down, and admin-down. **Note** The number of Down and Admin-down subinterfaces is only reported only if that number is greater than 0.

Field	Description
Single tag sub-interfaces:	Number of sub-interfaces configured with a single 802.1Q tag. **Note** The number of sub-interfaces is displayed only if that number is greater than 0.
No native VLAN Id	Indicate that a native VLAN ID is not configured on this interface.
L2 Encapsulations:	VLAN encapsulations currently used for terminated L2 traffic. Possible Layer 2 encapsulations are as follows: • Q – One or more single 802.1Q tag ACs are configured. • 2Q – One or more double 802.1Q tag ACs have been configured. • Qany – One or more double 802.1Q tag ACs have been configured that have a wildcard “any” innertag.
VLAN ACs	Number of ACs currently configured under the specified interface.
Single tag ACs	**Note** The number of sub-interfaces sub-interfaces configured with a single 802.1Q tag is displayed only if that number is greater than 0.

Related Commands

Command	Description
show interfaces, on page 489	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.
interface (VLAN), on page 686	Creates a VLAN subinterface.

10-Gigabit Ethernet WAN PHY Controller Commands

This module describes the commands to configure a 10-Gigabit Ethernet WAN PHY physical controller on the Cisco CRS RouterCisco ASR 9000 Series RouterCisco NCS 6000 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.

For information on 10-Gigabit Ethernet (GE) interface commands see the *Ethernet Interface Commandson* module.

clear controller wanphy

To clear the alarms counters for a specific 10-Gigabit Ethernet WAN PHY controller, use the **clear controller wanphy** command in EXEC modeXR EXEC mode.

clear controller wanphy interface-id stats

Syntax Description

interface-id	Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number. • *port*: Physical port number of the interface. For more information about the syntax for the router, use the question mark (?) online help function.
stats	Clears alarm counters for the specified 10-Gigabit Ethernet WAN PHY controller.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.5.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write, execute

Examples

This example shows how to configure a 10-Gigabit Ethernet WAN PHY controller in Slot 6:

```
RP/0/RP0RSP0/CPU0:router # clear controller wanphy 0/6/0/0 stats
```

Related Commands

Command	Description
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.

clear counters wanphy

To clear the alarms counters for a specific 10-Gigabit Ethernet WAN PHY interface, use the **clear counters wanphy** command in EXEC modeXR EXEC mode.

clear counters wanphy interface-id stats

Syntax Description

interface-id	Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number. • *port*: Physical port number of the interface. For more information about the syntax for the router, use the question mark (?) online help function.
stats	Clears alarm counters for the specified 10-Gigabit Ethernet WAN interface.

Command Default

No default behavior or values

Command Modes

EXEC modeXR EXEC mode

Command History

Release	Modification
Release 3.5.0	This command was introduced.
Release 3.9.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write, execute

Examples

This example shows how to clear the alarms counters for a 10-Gigabit Ethernet WAN interface:

```
RP/0/RP0RSP0/CPU0:router # clear counters wanphy 0/6/0/0 stats
```

Related Commands

Command	Description
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.

Command	Description
clear controller wanphy, on page 696	Clears the alarms counters for a specific 10-Gigabit Ethernet WAN PHY controller.

controller wanphy

To enter WAN physical controller configuration mode in which you can configure a 10-Gigabit Ethernet WAN PHY controller, use the **controller wanphy** command in Global Configuration modeXR Config mode . To return the 10-Gigabit Ethernet WAN PHY controller to its default WAN mode configuration, use the **no** form of this command.

controller wanphy interface-id

Syntax Description

interface-id Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation.

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the line card.
- *module*: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number.
- *port*: Physical port number of the interface.

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

Global Configuration

Command History

Release	Modification
Release 3.5.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.1	This command was introduced.

Usage Guidelines

Note After you use the **no controller wanphy** command to return a 10-Gigabit Ethernet WAN PHY controller to its default configuration, you need to cycle the power to the 10-Gigabit Ethernet SPA for the mode configuration changes to take effect.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enter WAN PHY controller configuration mode:

```
RP/0/RP0RSP0/CPU0:router # configure
RP/0/RP0RSP0/CPU0:router(config)# controller wanphy 0/6/0/0
RP/0/RP0RSP0/CPU0:router(config-wanphy)#
```

The following example shows how to configure a 10-Gigabit Ethernet WAN PHY controller in slot 6 to run in LAN mode:

```
RP/0/RP0RSP0/CPU0:router # configure
RP/0/RP0RSP0/CPU0:router(config)# controller wanphy 0/6/0/0
RP/0/RP0RSP0/CPU0:router(config-wanphy)# lanmode on
RP/0/RP0RSP0/CPU0:router(config-wanphy)# commit
RP/0/RP0RSP0/CPU0:router(config-wanphy)# exit
RP/0/RP0RSP0/CPU0:router(config)# exit
RP/0/RP0RSP0/CPU0:router(config)# hw-module subslot 0/6/0 shutdown unpowered
RP/0/RP0RSP0/CPU0:router(config)# commit
RP/0/RP0RSP0/CPU0:router(config)# no hw-module subslot 0/6/0 shutdown unpowered
```

The following example shows how to return a 10-Gigabit Ethernet WAN PHY controller in slot 6 to run in its default WAN mode:

```
RP/0/RP0/CPU0:Router # configure
RP/0/RP0/CPU0:Router(config)# no controller wanphy 0/6/0/0
RP/0/RP0/CPU0:Router(config)# commit
RP/0/RP0/CPU0:Router(config)# exit
RP/0/RP0/CPU0:router(config)# hw-module subslot 0/6/0 shutdown unpowered
RP/0/RP0/CPU0:Router(config)# commit
RP/0/RP0/CPU0:router(config)# no hw-module subslot 0/6/0 shutdown unpowered
```

Related Commands

Command	Description
lanmode on, on page 701	Configures a 10-Gigabit Ethernet WAN PHY controller to run in LAN mode for a 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA.
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.

lanmode on

To configure a 10-Gigabit Ethernet WAN PHY controller to run in LAN mode for a 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA, use the **lanmode on** command in WAN physical controller configuration mode. To return the controller to the default, use the **no** form of this command.

Note This command is not supported on 10-Gigabit Ethernet Line Cards and MPAs. It is supported with WAN PHY SPA.

lanmode on

Syntax Description

This command has no keywords or arguments.

Command Default

The 10-Gigabit Ethernet WAN PHY controller default varies depending on the installed line card:

- For the 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA, the default mode is WAN mode.
- For the 4-Port, 8-Port, 14-Port, and 20-Port 10-Gigabit Ethernet LAN/WAN-PHY PLIMs, the default mode is LAN mode.
- For the 1-Port, 2-Port 100-Gigabit Ethernet LAN/WAN-PHY SPA, the default mode is LAN mode.

Note From Cisco IOS XR Software Release 5.2.x onwards, the 100 Gigabit Ethernet interfaces A9K-2x100GE-SE, A9K-2x100GE-TR, A9K-1x100GE-SE and A9K-1x100GE-TR support these commands in LAN mode:

- **report sd-ber**
- **report sf-ber disable**
- **threshold sd-ber**
- **threshold sf-ber**

Command Modes

WAN physical controller configuration

Command History

Release	Modification
Release 3.5.0	This command was introduced.
Release 5.2.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable LAN mode on a 10-Gigabit Ethernet WAN PHY controller:

```
RP/0/RP0RSP0/CPU0:router:Router # configure
RP/0/RP0RSP0/CPU0:router:Router(config)# controller wanphy 0/6/0/0
RP/0/RP0RSP0/CPU0:router:Router(config-wanphy)# lanmode on

To complete the mode change the SPA must be power-cycled.
```

This example shows how to disable LAN mode on a 10-Gigabit Ethernet WAN PHY controller and return that controller to the default WAN mode:

```
RP/0/RP0RSP0/CPU0:router:Router # configure
RP/0/RP0RSP0/CPU0:router:Router(config)# controller wanphy 0/6/0/0
RP/0/RP0RSP0/CPU0:router:srt-crs1(config-wanphy)# no lanmode on

To complete the mode change the SPA must be power-cycled.
```

Related Commands

Command	Description
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.

report sd-ber

To enable Signal Degrade (SD) Bit Error Rate (BER) reporting, use the **report sd-ber** command in wanphy configuration mode. To disable Signal Degrade (SD) Bit Error Rate (BER) reporting, use the **no** form of this command.

report sd-ber

Syntax Description

This command has no keywords or arguments.

Command Default

Signal Degrade (SD) Bit Error Rate (BER) reporting is disabled by default.

Command Modes

Wanphy configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.1	This command was introduced.
Release 5.2.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable Signal Degrade (SD) Bit Error Rate (BER) reporting.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RP0RSP0/CPU0:router(config-wanphy)# report sd-ber
RP/0/RP0RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sf-ber disable, on page 704	Disables SF BER reporting.
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.
threshold sf-ber, on page 712	Configures the threshold of the SF BER that is used to trigger a link state change.

report sf-ber disable

To disable Signal Failure (SF) Bit Error Rate (BER) reporting, use the **report sf-ber disable** command in wanphy configuration mode. To enable Signal Failure (SF) Bit Error Rate (BER) reporting, use the no form of this command. In the case of A9K-8X100GE-SE line cards, the commands **report sf-ber** and **no report sf-ber** are used to enable and disable SF BER respectively.

report sf-ber disable

Syntax Description

This command has no keywords or arguments.

Command Default

Signal Failure (SF) Bit Error Rate (BER) reporting is enabled by default.

Command Modes

Wanphy configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.1	This command was introduced.
Release 5.2.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to disable Signal Failure (SF) Bit Error Rate (BER) reporting.

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RP0RSP0/CPU0:router(config-wanphy)# report sf-ber disable
RP/0/RP0RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sd-ber, on page 703	Enables Signal Degrade (SD) Bit Error Rate (BER) reporting.
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.
threshold sf-ber, on page 712	Configures the threshold of the SF BER that is used to trigger a link state change.

show controllers wanphy

To display alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller, use the **show controllers wanphy** command in EXEC modeXR EXEC mode.

show controller wanphy *interface-id* [{**alarms** | **all** | **registers**}]

Syntax Description

interface-id	Physical interface instance. Naming notation is *rack/slot/module/port* and a slash between values is required as part of the notation. • *rack*: Chassis number of the rack. • *slot*: Physical slot number of the line card. • *module*: Module number. A physical layer interface module (PLIM) is always 0. Shared port adapters (SPAs) are referenced by their subslot number. • *port*: Physical port number of the interface. For more information about the syntax for the router, use the question mark (?) online help function.
alarms	Displays information about any alarms that are detected by the specified 10-Gigabit Ethernet WAN PHY controller.
all	Displays registers, alarms, and module information for the specified 10-Gigabit Ethernet WAN PHY controller.
registers	Displays registers for the specified 10-Gigabit Ethernet WAN PHY controller.

Command Default

No default behavior or values

Command Modes

EXEC

XR EXEC

Command History

Release	Modification
Release 3.5.0	This command was introduced.
Release 3.9.0	This command was introduced.
Release 5.0.1	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 sample output from the **show controllers wanphy** command with the **all** keyword:

```
RP/0/RP0RSP0/CPU0:router# show controllers wanphy 0/3/4/0 all

Interface: wanphy0_3_4_0
Configuration Mode: WAN Mode
SECTION
  LOF = 1, LOS = 1, BIP(B1) = 2912
LINE
  AIS = 1, RDI = 0, FEBE = 949, BIP(B2) = 48562
PATH
  AIS = 1, RDI = 0, FEBE = 0, BIP(B2) = 0
  LOP = 0, NEWPTR = 0, PSE = 0, NSE = 0
WIS ALARMS
  SER = 9, FEPLMP = 0, FEAISP = 0
  WLOS = 1, PLCD = 0
  LFEBIP = 47260, PBEC = 949

Active Alarms[All defects]: lof,
Active Alarms[Highest Alarms]: lof
  Rx(K1/K2): N/A, Tx(K1/K2): N/A
  S1S0 = N/A, C2 = N/A
PATH TRACE BUFFER
Remote IP addr: 000.000.000.000
BER thresholds: N/A
TCA thresholds: N/A

REGISTERS
P_FEBE  : 949
L_FE_BIP: 47260
L_BIP   : 48562
P_BEC   : 949
S_BIP   : 2912
J1-Rx0  : 0x3136
J1-Rx1  : 0x352e
J1-Rx2  : 0x3234
J1-Rx3  : 0x332e
J1-Rx4  : 0x3132
J1-Rx5  : 0x3900
J1-Rx6  : 0x3138
J1-Rx7  : 0x372e
Internal Information
Operational Mode  : WAN Mode
Curent Alarms: 0x8
```

Table 41: show controllers wanphy Command Output Fields

Field	Description
Interface	Identifies the WAN physical interface, in the format *rack/slot/module/port*. • *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. Shared port adapters (SPAs) are referenced by their subslot number. • *port*: Physical port number of the interface.
Configuration Mode	Current configuration mode running on this controller. Can be WAN mode or LAN mode.

Field	Description
SECTION	Displays the following section alarms: • LOF—Number of Loss of Framing (LOF) errors on this connection section. LOF alarms are critical because they indicate that the link associated with this section is down. • LOS—Number of loss of signal (LOS) errors on this connection section. LOS alarms are critical because they indicate that the link associated with this section is down. • BIP(B1)—Number of bit interleaved parity (BIP) B1 errors on this section that exceeded the specified threshold.

LINE	Displays the following line alarms:
	• AIS—Number of AIS errors on this line. AIS alarms are critical because they indicate that the line is down.
	• RDI—Remote defect indication.
	  • Line remote defect indication is reported by the downstream LTE when it detects LOF4, LOS5, or AIS6.
	  • Path remote defect indication is reported by the downstream PTE when it detects a defect on the incoming signal.
	• FEBE—Number of far-end block errors (FEBE) on this line. Line FEBE errors are accumulated from the M0 or M1 byte, and are reported when the downstream LTE detects BIP7 (B2) errors.
	• BIP(B2)—Number of bit interleaved parity (BIP) B2 errors on this line that exceeded the specified threshold.

PATH	Displays the following path alarms: • AIS—Number of AIS errors on this path. AIS alarms are critical because they indicate that the line associated with this path is down. • RDI—Number of RDI errors on this path. Path RDI is a legacy alarm and is not supported. • FEBE—Number of FEBE errors on this path. Path FEBEs are accumulated from the G1 byte, and are reported when the downstream PTE detects BIP (B3) errors. • BIP(B2)—Number of bit interleaved parity (BIP) errors on this path that exceeded the specified threshold. • LOP—Number of loss of pointer (LOP) errors on this path. Path LOPs are reported as a result of an invalid pointer (H1, H2) or an excess number of new data flag enabled indications. • NEWPTR—Inexact count of the number of times the SONET framer has validated a new SONET pointer value (H1, H2). • PSE—Inexact count of the number of times the SONET framer has detected a positive stuff event (PSE) in the received pointer (H1, H2). • NSE—Inexact count of the number of times the SONET framer has detected a negative stuff event in the received pointer (H1, H2). **Note** For Cisco IOS XR software release 3.5.0, the following fields display no errors:RDIFEBEBIP(B2)NEWPTRPSENSE

Field	Description
WIS ALARMS	Displays the following WAN Interconnect Sublayer (WIS) layer alarms: • SER—Number of Severely Errored Frames (SER) errors • FELCDP—Number of Far End - Loss of Code-group Delineation - Path (FELCDP) errors • FEAISP—Number of Far End - AIS - Path (FEAISP) errors • WLOS—Number of WIS LOS (WLOS) errors. • PLCD—Number of Path Loss of Code-group Delineation (PLCD) errors • LFEBIP—Number of Line - Far End - BIP (LFEBI) errors • PBEC—Number of Path - Block Error Counter (PBEC) errors **Note** Alarms are applicable only when the controller is configured in WAN-PHY mode.
Active Alarms[All defects]	Total number of currently active alarms on this interface. **Note** Alarms are applicable only when the controller is configured in WAN-PHY mode.
Active Alarms[Highest Alarms]	Total number of the most significant active alarms on this interface. These alarms are likely causing all other alarms on the interface. **Note** Alarms are applicable only when the controller is configured in WAN-PHY mode.
Rx(K1/K2)	Total number of errored K1/K2 bytes from the Line OverHead (LOH) of the SONET frame that were received by this interface.
Tx(K1/K2)	Total number of errored K1/K2 bytes from the Line OverHead (LOH) of the SONET frame that were transmitted by this interface.
S1S0	Number of errored payload pointer bytes on this interface.
C2	Number of errored STS identifier (C1) bytes on this interface.
PATH TRACE BUFFER	Rx J1 trace buffer received from the far end. If the received data is valid it will be shown below the PATH TRACE BUFFER field.
Remote IP addr	Byte string containing the IP address of the remote end of this connection. If the received data is invalid, this field displays no IP address.
BER thresholds	BER threshold values of the specified alarms for a the 10-Gigabit Ethernet controller.
TCA thresholds	TCA threshold values of the specified alarms for a the 10-Gigabit Ethernet controller.

Field	Description
REGISTERS	Displays output from the following registers in hexadecimal format: • P_FEBE—Total number of Far End Block Errors (FEBEs) that occurred on the path that is associated with this interface. • L_FE_BIP—Total number of far end BIP errors that occurred on this interface. • L_BIP—Total number of local BIP errors that occurred on this interface. • P_BEC—Total BIP error count (BEC) that occurred on the path that is associated with this interface. • S_BIP—Total number of far end BIP errors that occurred on the current section. • J1-Rx0—Characters from far end IPV4 address string. • J1-Rx1—Characters from far end IPV4 address string. • J1-Rx2—Characters from far end IPV4 address string. • J1-Rx3—Characters from far end IPV4 address string. • J1-Rx4—Characters from far end IPV4 address string. • J1-Rx5—Characters from far end IPV4 address string. • J1-Rx6—Characters from far end IPV4 address string. • J1-Rx7—Characters from far end IPV4 address string. **Note** The following Serdes-WIS HW registers are used to debug counters and can be cleared only by power cycling the hardware:P_FEBEL_FE_BIPL_BIPP_BECS_BIPThe J1-Rx registers (J1-Rx0 through J1-Rx7) comprise the raw 16 bytes of data received from the Rx J1 Path Trace Buffer, and are used to debug IPV4 address sent from far end.
Internal Information	Displays the following internal information for the interface: • Operational Mode—Current operation mode for this controller. Can be WAN mode or LAN mode. Use the Operational Mode field to detect whether the hardware was power cycled after a mode configuration change. If the Operational Mode field shows output that is different from the Configuration Mode field, then the hardware was not power cycled properly after a mode configuration change. • Current Alarms—Bit map of all currently active alarms on this controller. Use this information for debugging purposes. **Note** Alarms are applicable only when the controller is configured in WAN-PHY mode.

The following example shows sample output from the **show controllers wanphy** command with the **alarms** keyword:

```
RP/0/RP0RSP0/CPU0:router# show controllers wanphy 0/3/4/0 alarms

Interface: wanphy0_3_4_0
Configuration Mode: WAN Mode
SECTION
  LOF = 1, LOS = 1, BIP(B1) = 2912
LINE
```

```
  AIS = 1, RDI = 0, FEBE = 949, BIP(B2) = 48562
PATH
  AIS = 1, RDI = 0, FEBE = 0, BIP(B2) = 0
  LOP = 0, NEWPTR = 0, PSE = 0, NSE = 0
WIS ALARMS
  SER = 9, FELCDP = 0, FEAISP = 0
  WLOS = 1, PLCD = 0
  LFEBIP = 47260, PBEC = 949

Active Alarms[All defects]:
Active Alarms[Highest Alarms]:
  Rx(K1/K2): N/A, Tx(K1/K2): N/A
  S1S0 = N/A, C2 = N/A
PATH TRACE BUFFER
Remote IP addr: 981.761.542.321
BER thresholds: N/A
TCA thresholds: N/A
```

The alarm information displayed in the **show controllers wanphy** *interface-id* **alarms** command output are described in Table 41: show controllers wanphy Command Output Fields, on page 706.

This example shows sample output from the **show controllers wanphy** command with the **registers** keyword:

```
RP/0/RP0RSP0/CPU0:router# show controllers wanphy 0/3/4/0 registers
Interface: wanphy0_3_4_0

Configuration Mode: WAN Mode
REGISTERS
P_FEBE  : 949
L_FE_BIP: 47260
L_BIP   : 48562
P_BEC   : 949
S_BIP   : 2912
J1-Rx0  : 0x3136
J1-Rx1  : 0x352e
J1-Rx2  : 0x3234
J1-Rx3  : 0x332e
J1-Rx4  : 0x3132
J1-Rx5  : 0x3900
J1-Rx6  : 0x3138
J1-Rx7  : 0x372e
Internal Information
Operational Mode  : WAN Mode
Curent Alarms: 0x0
```

The registers displayed in the **show controllers wanphy** *interface-id* **registers** command output are described in Table 41: show controllers wanphy Command Output Fields, on page 706.

Related Commands

Command	Description
clear controller wanphy, on page 696	Clears the alarms counters for a specific 10-Gigabit Ethernet WAN PHY controller.
lanmode on, on page 701	Configures a 10-Gigabit Ethernet WAN PHY controller to run in LAN mode for a 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA.

threshold sd-ber

To configure the threshold of the Signal Degrade (SD) Bit Error Rate (BER) that is used to trigger a signal degrade alarm, use the **threshold sd-ber** command in wanphy configuration mode. To return the Signal Degrade (SD) Bit Error Rate (BER) to the default value, use the **no** form of this command.

threshold sd-ber *exponent*

Syntax Description

exponent	Value of 10 raised to the *n* power, where *n* is the exponent of 10, as in10-n. Valid values are 3 to 9, meaning 10-3 to 10-9.

Command Default

The default is 6, meaning (10-6).

Command Modes

Wanphy configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.1	This command was introduced.
Release 5.2.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure sd-ber threshold:

```
RP/0/RP0RSP0/CPU0:router# configure
RP/0/RP0RSP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RP0RSP0/CPU0:router(config-wanphy)# threshold sd-ber 9
RP/0/RP0RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sd-ber, on page 703	Enables Signal Degrade (SD) Bit Error Rate (BER) reporting.
report sf-ber disable, on page 704	Disables SF BER reporting.
threshold sf-ber, on page 712	Configures the threshold of the SF BER that is used to trigger a link state change.

threshold sf-ber

To configure the threshold of the Signal Failure (SF) Bit Error Rate (BER) that is used to trigger a link state change, use the **threshold sf-ber** command in wanphy configuration mode. To return the Signal Failure (SF) Bit Error Rate (BER) to the default value, use the **no** form of this command.

threshold sf-ber *exponenet*

Syntax Description

exponent	Value of 10 raised to the *n* power, where *n* is the exponent of 10, as in10-n. Valid values are 3 to 9, meaning 10-3 to 10-9.

Command Default

The default is 3, meaning (10-3).

Command Modes

Wanphy configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 5.0.1	This command was introduced.
Release 5.2.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure the threshold of the Signal Failure (SF) Bit Error Rate (BER):

```
RP/0/RP0RSP0/CPU0:router # configure
RP/0/RP0RSP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RP0RSP0/CPU0:router(config-wanphy)# threshold sf-ber 9
RP/0/RP0RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sd-ber, on page 703	Enables Signal Degrade (SD) Bit Error Rate (BER) reporting.
report sf-ber disable, on page 704	Disables SF BER reporting.
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.

wanmode on

To configure a 10-Gigabit Ethernet WAN PHY controller to run in WAN mode for the 10-Gigabit Ethernet LAN/WAN-PHY physical layer interface modules (PLIMs), use the **wanmode on** command in WAN physical controller configuration mode. To return the controller to the default, use the **no** form of this command.

wanmode on

Syntax Description

This command has no keywords or arguments.

Command Default

The 10-Gigabit Ethernet WAN PHY controller default varies depending on the installed line card:

- For the 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA, the default mode is WAN mode. This command does not apply.
- For the 4-Port, 8-Port, 14-Port, and 20-Port 10-Gigabit Ethernet LAN/WAN-PHY PLIMs, the default mode is LAN mode.

Command Modes

WAN physical controller configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 5.0.1	This command was introduced.

Usage Guidelines

Use the **wanmode on** command to change from the default LAN mode state for all 10-Gigabit Ethernet LAN/WAN-PHY physical layer interface modules (PLIMs).

Note This command does not apply to the 1-Port 10-Gigabit Ethernet LAN/WAN-PHY SPA because the default state is WAN mode. Use the **lanmode on** and **no lanmode on** commands to change modes for that SPA.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable WAN mode on a 10-Gigabit Ethernet WAN PHY controller for a 10-Gigabit Ethernet LAN/WAN-PHY PLIM:

```
RP/0/RP0/CPU0:Router # configure
RP/0/RP0/CPU0:Router(config)# controller wanphy 0/6/0/0
RP/0/RP0/CPU0:Router(config-wanphy)# wanmode on
```

This example shows how to disable WAN mode on a 10-Gigabit Ethernet WAN PHY controller and return that controller to the default WAN mode for 10-Gigabit Ethernet LAN/WAN-PHY PLIMs:

```
RP/0/RP0/CPU0:Router # configure
RP/0/RP0/CPU0:Router(config)# controller wanphy 0/6/0/0
RP/0/RP0/CPU0:srt-crs1(config-wanphy)# no wanmode on
```

Related Commands

Command	Description
show controllers wanphy, on page 705	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.

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