

Interface and Hardware Component Command Reference for Cisco ASR 9000 Series Routers

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Preface

This command reference describes the Cisco IOS XR Interfaces commands.

From Release 6.1.2 onwards, Cisco introduces support for the 64-bit Linux-based IOS XR operating system. Extensive feature parity is maintained between the 32-bit and 64-bit environments. Unless explicitly marked otherwise, the contents of this document are applicable for both the environments. For more details on Cisco IOS XR 64 bit, refer to the Release Notes for Cisco ASR 9000 Series Routers, Release 6.1.2 document.

The preface for the *Interface and Hardware Component Command Reference for Cisco ASR 9000 Series Routers* contains the following sections:

- Changes to This Document, on page xxiii
- Communications, Services, and Additional Information, on page xxiv

Changes to This Document

Note *This software release has reached end-of-life status. For more information, see the* End-of-Life and End-of-Sale Notices.

Table 1: Changes to This Document

Date	Summary
Nov 2017	Initial release of the cumulative command reference document that covers all updates from Release 4.3.0 onwards.
March 2018	Republished for Release 6.3.2
March 2018	Republished for Release 6.4.1
July 2018	Republished for Release 6.5.1
December 2018	Republished for Release 6.6.1
January 2019	Republished for Release 6.5.2

Date	Summary
May 2019	Republished for Release 6.6.25
August 2019	Republished for Release 7.0.1
December 2019	Republished for Release 6.6.3
January 2020	Republished for Release 7.1.1
August 2020	Republished for Release 7.1.2
November 2020	Republished for Release 7.1.3
February 2021	Republished for Release 7.3.1
July 2021	Republished for Release 7.4.1
November 2021	Republished for Release 7.5.1
July 2022	Republished for Release 7.7.1
November 2022	Republished for Release 7.8.1
March 2023	Republished for Release 7.5.4
April 2023	Republished for Release 7.9.1
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March 2024	Republished for Release 24.1.1
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March 2025	Republished for Release 25.1.1
June 2025	Republished for Release 25.2.1
September 2025	Republished for Release 25.3.1
December 2025	Republished for Release 25.4.1
February 2026	Republished for Release 26.1.1

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Preface



Coherent Optics Commands

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ampli-control-mode

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

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

Syntax Description

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

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 25.3.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

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

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

controller coherentDSP

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

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

Syntax Description

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

Command Default

None.

Command Modes

Coherent DSP controller configuration

Command History

Release	Modification
Release 7.3.2	This command was introduced.

Example

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

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

controller optics

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

controller optics *R/S/I/P* [**DAC-Rate** *rate* | **cd-max** *cd-max* | **cd-min** *cd-min* | **cd-low-threshold** *cd-low* | **cd-high-threshold** *cd-high* | **dgd-high-threshold** *dgd-value* | **dwdm-carrier** *channel-grid* | **lbc-high-threshold** *lbc-value* | **osnr-low-threshold** *osnr-value* **description** *description* | **fec** *fec-mode* | **sec-admin-state {maintenance | normal}** | **shutdown** | **transmit-power** *transmit-power* | **perf-mon** { **enable** | **disable** } | **host** { **auto-squelch** } { **disable** } | **pm** { **30-sec |15-min | 24-hour** } { **optics** } { **report | threshold** } *pm-parameter value*]

Syntax Description

R/S/I/P	Rack/Slot/Instance/Port of the optics controller.
DAC-Rate *rate*	Sets the DAC (digital to analog conversion) sampling rate for this controller. The sampling rate options available are: • 1x1 • 1x1.25
cd-max *cd-max*	(Only for trunk optics controllers) Maximum chromatic dispersion. For QDD-400G-ZR-S optical module, the range is 0 to +2400. For QDD-400G-ZRP-S optical module, the range is 0 to +80000 ps/nm.
cd-min *cd-min*	(Only for trunk optics controllers) Minimum chromatic dispersion. For QDD-400G-ZR-S optical module, the range is -2400 to 0. For QDD-400G-ZRP-S optical module, the range is -80000 to 0 ps/nm.
cd-low-threshold *cd-low*	(Only for trunk optics controllers) Minimum acceptable chromatic dispersion value. The CD alarm is raised if the chromatic dispersion goes below this value. This is an alarm threshold parameter. For QDD-400G-ZR-S optical module, the range is -2400 to 0. For QDD-400G-ZRP-S optical module, the range is -80000 to 0 ps/nm.
cd-high-threshold *cd-high*	(Only for trunk optics controllers) Maximum acceptable chromatic dispersion value. The CD alarm is raised if the chromatic dispersion exceeds this value. This is an alarm threshold parameter. For QDD-400G-ZR-S optical module, the range is 0 to +2400. For QDD-400G-ZRP-S optical module, the range is 0 to +80000 ps/nm.
dgd-high-threshold *dgd-value*	(Only for trunk optics controllers) Configures the maximum acceptable Differential Group Delay (DGD) value. The DGD alarm is raised if DGD exceeds this value. This is an alarm threshold parameter. The range is 0 to 18000 (in the units of 0.01 ps).
dwdm-carrier *channel-grid*	Configures the DWDM carrier channel. Options are: • 100MHz-grid • 50GHz-grid

lbc-high-threshold *lbc-value*	Configures the high laser bias current threshold. This is an alarm threshold parameter. The range is 0 to 100%
osnr-low-threshold *osnr-value*	(Only for trunk optics controllers) Configures the minimum acceptable Optical Signal-to-Noise ratio (OSNR) value. The OSNR alarm is raised if OSNR goes below this value. This is an alarm threshold parameter. The range is 0 to 4000 (in units of 0.01db).
description *description*	Description of the optics controller.
fec *fec-mode*	Configures Forward Error Correction (FEC) modes.
sec-admin-state	Configures the administrative state of the controller. The values are maintenance or normal.
shutdown	Disables the configuration of the controller.
pm { **30-sec** | **15-min** | **24-hour** } { **optics** } { **report** | **threshold** } *pm-parameter value*	Configures performance monitoring parameters for 30-second, 15-minute, and 24-hour intervals. The **report** keyword configures threshold crossing alerts (TCA) reporting status for the PM parameters. The **threshold** keyword configures threshold values for the PM parameters. The PM parameters that can be configured are: • cd (chromatic dispersion) • dgd (differential group delay) • low-freq-off (low signal frequency offset) • opr (optical power RX) • osnr (optical signal-to-noise ratio) • pcr (polarization change rate) • pdl (polarization dependent loss) • rx-sig (receiving signal power) • snr (signal-to-noise ratio) • sopmd (second order polarization mode dispersion)
transmit-power *transmit-power*	(Only for trunk optics controllers) Configures the transmit power. The range is -190 to 50 dBm (in the units of 0.1 dBm).
host { **auto-squelch** } { **disable** }	Disable squelch for host.
perf-mon { **enable** | **disable** }	Enables or disables performance monitoring.

Command Default

Table 2: Supported Line Cards and Modes

Line Card	Default Port Speed	Supported Front Panel Ports	1x400G Transponder Mode	4x100G Muxponder Mode	3x100G Muxponder Mode	2x100G Muxponder Mode	1x100G Transponder Mode
A9K-20HG-FLEX-SE / A9K-20HG-FLEX-TR	1x100G	0, 7, 8, 12, 19	Yes	Yes	No	No	Yes
A9K-8HG-FLEX-SE / A9K-8HG-FLEX-TR	1x100G	0, 7	Yes	Yes	No	No	Yes
A99-10X400GE-X-SE / A99-10X400GE-X-TR	1x400G	3, 5, 6, 7, 9	Yes	Yes	No	Yes	Yes
A9903-20HG-PEC	1x100G	0, 4, 8, 12, 16	Yes	No	No	No	Yes

Command History

Release	Modification
Release 7.3.2	This command was introduced.
Release 7.10.1	The following keyword was introduced: • **host auto-squelch disable**

Command Modes

Optics controller configuration

Usage Guidelines

The configurations for chromatic dispersion, cd-low-threshold, and cd-high-threshold must be performed only after the **hw-module** configuration. These configurations must be removed before the **no hw-module** configuration. Default values are set to optimize the power consumption by the QDD-400G-ZR-S and QDD-400G-ZRP-S modules.

Example

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

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

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

```
Router#configure
Router(config)#controller optics 0/0/1/1
Router(config-optics)#perf-mon enable
```

```
Router(config-optics)#pm 24-hour optics threshold osnr max 345
Router(config)#commit
```

This example shows how to disable laser squelching for host on controller optics:

```
router#config
router(config)#controller 0/0/0/0
router(config-Optics)#host auto-squelch disable
router(config-Optics)#commit
```

controller ots (QDD OLS)

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

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

Syntax Description

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

Command Default

None.

Command Modes

Global Configuration

Command History

Release	Modification
Release 25.3.1	This command was introduced.

Usage Guidelines

None.

Task ID

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

Example

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

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

egress-ampli-gain

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

egress-ampli-gain *gain-value*

Syntax Description

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

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 25.3.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

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

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

egress-ampli-osri

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

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

Syntax Description

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

Command Default

None

Command Modes

controller ots

Command History

Release	Modification
Release 25.3.1	This command was introduced.

Usage Guidelines

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

Task ID

Task ID	Operation
dwdm	read, write

Example

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

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

egress-ampli-power

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

egress-ampli-power *power-value*

Syntax Description

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

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 25.3.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

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

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

egress-ampli-safety-control-mode

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

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

Syntax Description

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

Command Default

None

Command Modes

controller ots

Command History

Release	Modification
Release 25.3.1	This command was introduced.

Usage Guidelines

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

Task ID

Task ID	Operation
dwdm	read, write

Example

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

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

hw-module location

To configure breakout, use the **hw-module location** command in the global configuration mode.

hw-module location *node-id* **[bay** *bay-number* **] port** *port-number* **breakout** *muxponder-mode*

Syntax Description

location *node-id*	Specify the node location.
bay *bay-number*	Applicable only for Cisco ASR 9903 router. The *bay-number* is always 1.
port *port-number*	Specify the port number.
breakout *breakout-mode options*	Configures the breakout for this controller. The router displays these breakout mode options: • 1x400GbE • 1x100GbE • 2x100GbE • 4x100GbE • 2x40GbE • 1x40GbE • 4x25GbE • 4x10GbE • 1x10GbE

Command Default

None.

Command Modes

Global Configuration

Command History

Release	Modification
Release 7.3.2	This command was enhanced to support QDD-400G-ZR-S and QDD-400G-ZRP-S optical modules.
Release 24.3.1	This command was enhanced to support the 1x10GbE breakout mode on the Cisco ASR 9903 router and Cisco A9K-20HG-FLEX-SE line cards with SFP-10G-ER, SFP-10G-ZR, and SFP-10G-LR hot-pluggable transceiver modules.

Usage Guidelines

For additional information, see the "Configuring Breakout" section in the "Configuring 400G Digital Coherent Optics" chapter of *Interface and Hardware Component Configuration Guide for Cisco ASR 9000 Series Routers*.

Example

This example shows how to configure the 4x100 muxponder mode using the **hw-module location** command:

```
Router#configure
Router(config)#hw-module port 1 location 0/1/0/3 breakout 4xHundredGigE
Router(config)#commit
```

This example shows how to configure the 1x10GbE breakout mode using the **hw-module location** command:

```
Router#configure
Router(config)#hw-module location 0/0/CPU0 bay 1 port 9 breakout 1xTenGbE
Router(config)#commit
```

rx-low-threshold

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

rx-low-threshold *rx-low*

Syntax Description

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

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 25.3.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

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

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

show controllers coherentDSP

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

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

Syntax Description

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

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.2	This command was introduced.

Example

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

```
Router#show controllers coherentDSP 0/19/0/3

Port                                          : CoherentDSP 0/19/0/3
Controller State                              : Up
Inherited Secondary State                     : Normal
Configured Secondary State                    : Normal
Derived State                                 : In Service
Loopback mode                                 : None
BER Thresholds                                : SF = 1.0E-5  SD = 1.0E-7
Performance Monitoring                        : Enable
Bandwidth                                     : 100.0Gb/s

Alarm Information:
LOS = 0 LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0        SF_BER = 0
SD_BER = 0      BDI = 0 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0     FLEXO_GIDM = 0
FLEXO-MM = 0    FLEXO-LOM = 0   FLEXO-RDI = 0
FLEXO-LOF = 1
Detected Alarms                               : None

Bit Error Rate Information
```

```
PREFEC  BER                                     : 0.0E+00
POSTFEC BER                                     : 0.0E+00
Q-Factor                                        : 16.50 dB

Q-Margin                                        : 9.90dB

OTU TTI Received

FEC mode                                        : O_FEC
```

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

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

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

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

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

show controllers optics

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

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

Syntax Description

R/S/I/P	Rack/Slot/Instance/Port of the optics controller.
pm	Displays performance monitoring parameters for the controller.
current	Displays the current performance monitoring data in 30 second, 15 minute, and 24 hour intervals.
history	Displays the historical performance monitoring data in 30 second, 15 minute, and 24 hour intervals.
optics	Displays the PM data for optics controller.
lane-number	Displays the performance monitoring data for the applicable lanes in the optical module. The lane number is always 1.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.4.1	This command was introduced.
Release 7.3.2	This command was updated to reflect the QDD-400G-ZR-S and QDD-400G-ZRP-S changes in the output.

Usage Guidelines

To display the firmware version of the optical module, use the **show controllers optics** *R/S/I/P* **| inc Firmware** command.

```
Router#show controllers optics 0/0/0/3  | inc Firmware
         Firmware Version       : 61.20 (Build : 13)
```

Example

The following example displays the output of the **show controllers optics** command:

```
Router#show controllers optics 0/0/0/3
Controller State: Up
Transport Admin State: In Service
Laser State: On
LED State: Green
FEC State: FEC CFEC
 Optics Status
         Optics Type:  400G QSFP-DD ZR
         DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,
```

```
        Wavelength=1552.524nm
        Alarm Status:
        -------------
        Detected Alarms: None
        LOS/LOL/Fault Status:
        Laser Bias Current = 52.5 mA
        Actual TX Power = -8.51 dBm
        RX Power = -8.67 dBm
        RX Signal Power = -8.66 dBm
        Frequency Offset = 0 MHz
        Laser Temperature = 62.21 Celsius
        Laser Age = 0 %
        DAC Rate = 1x1

        Performance Monitoring: Enable

        THRESHOLD VALUES
        ----------------

        Parameter                 High Alarm  Low Alarm  High Warning  Low Warning
        ------------------------  ----------  ---------  ------------  -----------
        Rx Power Threshold(dBm)          1.9      -28.2           0.0        -25.0
        Tx Power Threshold(dBm)          0.0      -18.0          -2.0        -16.0
        LBC Threshold(mA)               0.00       0.00          0.00         0.00
        Temp. Threshold(celsius)       80.00      -5.00         75.00        15.00
        Voltage Threshold(volt)         3.46       3.13          3.43         3.16

        LBC High Threshold = 98 %
        Configured Tx Power = -7.00 dBm
        Configured CD High Threshold = 80000 ps/nm
        Configured CD lower Threshold = -80000 ps/nm
        Configured OSNR lower Threshold = 9.00 dB
        Configured DGD Higher Threshold = 180.00 ps
        Baud Rate =  59.8437500000 GBd
        Modulation Type: 16QAM
        Chromatic Dispersion 0 ps/nm
        Configured CD-MIN -2400 ps/nm  CD-MAX 2400 ps/nm
        Second Order Polarization Mode Dispersion = 25.00 ps^2
        Optical Signal to Noise Ratio = 36.40 dB
        Polarization Dependent Loss = 0.07 dB
        Polarization Change Rate = 0.00 rad/s
        Differential Group Delay = 1.00 ps

        Temperature = 59.00 Celsius
        Voltage = 3.31 V

Transceiver Vendor Details

        Form Factor            : QSFP-DD
        Optics type            : QSFP-DD 400G-ZR-S
        Name                   : CISCO-ACACIA
        OUI Number             : 7c.b2.5c
        Part Number            : DP04QSDD-E20-19E
        Rev Number             : 01
        Serial Number          : ACA2504002U
        PID                    : QDD-400G-ZR-S
        VID                    : ES03
        Firmware Version       : 161.20 (Build : 9)
        Date Code(yy/mm/dd)    : 21/02/03
```

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

```
Router#show controllers optics 0/0/0/7 pm current 30-sec optics 1
Optics in the current interval [07:11:30 - 07:11:33 Thu May 27 2021]
Optics current bucket type : Valid
            MIN       AVG       MAX      Operational      Configured      TCA   Operational
      Configured     TCA
                                          Threshold(min)   Threshold(min) (min) Threshold(max)
   Threshold(max) (max)
LBC[% ]      : 0.0       0.0       0.0      0.0              NA              NO   100.0
          NA              NO
OPT[dBm]     : -7.92     -7.92     -7.92    -15.09           NA              NO   0.00
          NA              NO
OPR[dBm]     : -8.20     -8.19     -8.18    -30.00           NA              NO   8.00
          NA              NO
CD[ps/nm]    : -1        -1        0        -80000           NA              NO   80000
          NA              NO
DGD[ps ]     : 4.00      4.00      4.00     0.00             NA              NO   80.00
          NA              NO
SOPMD[ps^2]  : 46.00     48.00     50.00    0.00             NA              NO   2000.00
          NA              NO
OSNR[dB]     : 36.40     36.40     36.40    9.00             NA              NO   40.00
          NA              NO
PDL[dB]      : 0.08      0.09      0.09     0.00             NA              NO   7.00
          NA              NO
PCR[rad/s]   : 0.00      0.00      0.00     0.00             NA              NO   2500000.00
       NA             NO
RX_SIG[dBm]  : -7.40     -7.40     -7.39    -30.00           NA              NO   1.00
          NA              NO
FREQ_OFF[Mhz]: -99       -93       -87      -3600            NA              NO   3600
          NA              NO
SNR[dB]      : 18.40     18.45     18.50    7.00             NA              NO   100.00
          NA              NO

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

show controllers ots (QDD OLS)

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

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

Syntax Description

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

Command Default

None.

Command Modes

XR EXEC

Command History

Release	Modification
Release 25.3.1	This command was introduced.

Usage Guidelines

None

Task ID

Task ID	Operation
interface	read

Example

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

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

 Controller State: Up

 Transport Admin State: In Service

 LED State: Yellow

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


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

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

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


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


        Temperature = 35.09 Celsius
        Voltage = 3.37 V

Optical Module Details

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

tx-low-threshold

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

tx-low-threshold *tx-low*

Syntax Description

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

Command Default

None.

Command Modes

controller ots

Command History

Release	Modification
Release 25.3.1	This command was introduced.

Usage Guidelines

None.

Task ID

Task ID	Operation
dwdm	read, write

Example

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

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



Dense Wavelength Division Multiplexing Commands

This module provides command line interface (CLI) commands for configuring dense wavelength division multiplexing (DWDM) on the Cisco ASR 9000 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, on page 27
- controller dwdm, on page 29
- g709 bdi-to-client-gais, on page 31
- g709 enable, on page 32
- g709 fec, on page 33
- g709 odu overhead tti , on page 35
- g709 odu report disable, on page 36
- g709 otu overhead tti, on page 37
- g709 otu report disable, on page 39
- g709 otu threshold, on page 41
- g709 tim-to-client-gais, on page 42
- g709 tti-processing, on page 43
- log signal, on page 44
- loopback (DWDM), on page 45
- network connection id, on page 46
- network port id, on page 47
- pm fec report enable, on page 48
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- proactive trigger window, on page 68
- show controller dwdm, on page 70
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- show vtxp-monitored ports, on page 81
- transport-mode (WAN/OTN), on page 82
- wavelength, on page 85

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** | **out-of-service**}

Syntax Description

in-service	Places the DWDM port in In Service (IS) state, to support all normal operation.
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.

Usage Guidelines

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. The DWDM cards will not operate without this configuration.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# admin-state in-service
```

```
RP/0/RSP0/CPU0:router(config-dwdm)# commit
```

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

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# admin-state out-of-service
```

controller dwdm

To configure a DWDM controller, use the **controller dwdm** command in Global Configuration 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 mode

Command History

Release	Modification
Release 3.9.0	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*/*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.
  - *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

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

Examples

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

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/6/0/0

RP/0/RSP0/CPU0:router(config)# controller dwdm 0/6/0/0 vtxp-monitor
```

Related Commands

Command	Description
show controller dwdm, on page 70	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.
show vtxp-monitored ports, on page 81	Displays ports on which VTXP attribute is enabled.

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 3.9.0	This command was introduced.

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/RSP0/CPU0:router(config)# controller dwdm 0/6/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 bdi-to-client-gais
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 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-sd-fec** | **long-haul-sd-fec**}

Syntax Description

disable	Disables FEC.
enhanced	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-sd-fec	7% CISCO SD FEC.
long-haul-sd-fec	20% CISCO SD FEC.

Command Default

Standard FEC mode is enabled by default.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 3.9.0	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.

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 **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/RSP0/CPU0:router(config)# controller dwdm 0/6/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# admin-state out-of-service
RP/0/RSP0/CPU0:router(config-dwdm)# commit

RP/0/RSP0/CPU0:router(config-dwdm)# g709 fec standard
RP/0/RSP0/CPU0:router(config-dwdm)# commit
RP/0/RSP0/CPU0:router(config-dwdm)# admin-state in-service
RP/0/RSP0/CPU0:router(config-dwdm)# commit
```

Related Commands

Command	Description
admin-state, on page 27	Configures the transport administration state on a DWDM port.
show controller dwdm, on page 70	Displays optical parameters, G.709 alarms and counters, and register and module information for a DWDM controller.
g709 bdi-to-client-gais, on page 31	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 odu overhead tti expected test OTU 5678
```

Related Commands

Command	Description
show controller dwdm, on page 70	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** | **lck** | **oci** | **ptim** | **tim**} **disable**

Syntax Description

ais	Alarm indication signal reporting status.
bdi	Backward defect indication reporting status.
lck	Upstream connection locked reporting status.
oci	Open connection indication error reporting status.
ptim	Payload type identifier mismatch 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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 odu report oci disable
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 otu overhead tti expected test OTU 5678
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 {**bdi** | **fecmismatch** | **iae** | **lof** | **lom** | **los** | **sd-ber** | **sf-ber** | **tim**} **disable**

Syntax Description

bdi	Backward defect indication 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.
tim	Trace Identifier Mismatch reporting status.

Command Default

Reporting is enabled for all keywords.

Command Modes

DWDM configuration

Command History

Release	Modification
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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 otu report iae disable
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 3.9.0	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 set the signal fail BER rate to be 5:

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 otu threshold sf-ber 5
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 3.9.0	This command was introduced.

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/RSP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 tim-to-client-gais
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/1/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# g709 tti-processing
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 4.0.0	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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# log signal LogFile1
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# loopback internal
```

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.

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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# network connection id 1/1/1/1
```

Related Commands

Command	Description
network port id, on page 47	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.

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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# network port id 1/0/1/1
```

Related Commands

Command	Description
network connection id, on page 46	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min fec report uc-words enable
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min fec threshold uc-words 2000000
```

Related Commands

Command	Description
show controller dwdm pm, on page 76	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min optics report opt max-tca enable
```

Related Commands

Command	Description
show controller dwdm pm, on page 76	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min optics threshold opt max 2000000
```

Related Commands

Command	Description
show controller dwdm pm, on page 76	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min otn report esr-pm-fe enable
```

Related Commands

Command	Description
show controller dwdm pm, on page 76	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 3.9.0	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/RSP0/CPU0:router(config)# controller dwdm 0/0/0/0
RP/0/RSP0/CPU0:router(config-dwdm)# pm 15-min otn threshold esr-pm-ne 500000
```

Related Commands

Command	Description
show controller dwdm pm, on page 76	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 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/RSP0/CPU0:router# config
```

```
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# proactive
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# proactive revert threshold 1 9
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# proactive revert window 100000
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# proactive trigger threshold 1 9
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm 0/1/0/1
RP/0/RSP0/CPU0:router(config-dwdm)# proactive trigger window 10000
```

Related Commands

Command	Description
show controller dwdm, on page 70	Displays optical parameters, G.709 alarms and counters, and register and module information for 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 mode.

show controller dwdm interface-path-id [**g709** [**registers**] | **log** | **optics** | **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.
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 mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
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 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 3: 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 1.4, 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.
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. 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.

Field	Description
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.
Reroute BER	Not used.

See Table 4: show controllers dwdm optics Command Output Field Descriptions, on page 74 for a description of the optics fields.

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

```
RP/0/RSP0/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
```

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

Table 4: 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.
RX Power	Actual optical power at the RX port.
RX LOS Threshold	Receive loss of signal threshold. If the receive optical power is less than or equal to this 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/RSP0/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 table describes selected fields from the **show controllers dwdm** command output with the **wavelength-map** keyword.

Table 5: 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 27	Configures the transport administration state on a DWDM port.

show controller dwdm pm

To display performance monitoring information for a DWDM controller, use the **show controller dwdm pm** command in 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 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
dwdm	read

Task ID	Operations
interface	read
sonet-sdh	read

Examples

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 6: 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.

Field	Description
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.
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.

Field	Description
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	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 mode.

show vtxp-monitored ports

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

Global Configuration mode

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/RSP0/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 29	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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface 10gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# transport-mode wan
RP/0/RSP0/CPU0:router(config-if)# commit
```

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

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller wanphy <>
RP/0/RSP0/CPU0:router(config)# wanmode on
RP/0/RSP0/CPU0:router(config)# commit
```

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

```
RP/0/RSP0/CPU0:router# config
```

```
RP/0/RSP0/CPU0:router(config)# interface 10gigabitethernet 0/5/0/7/0
RP/0/RSP0/CPU0:router(config-if)# transport-mode otn bit-transparent opu1e
RP/0/RSP0/CPU0:router(config-if)# commit
```

The following additional configuration is also needed:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller dwdm <>
RP/0/RSP0/CPU0:router(config)# admin-state in-service
RP/0/RSP0/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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface 10gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# no transport-mode
RP/0/RSP0/CPU0:router(config-if)# commit
```

Related Commands

Command	Description
controller wanphy, on page 918	Enters WAN physical controller configuration mode in which you can configure a 10-Gigabit Ethernet WAN PHY 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 100 for conventional band (C-band)
frequency *frequency*	Keyword that specifies the frequency for the DWDM controller. Enter the 5-digit frequency value in the range of 19115 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 channel is 96.

Command Modes

DWDM configuration

Command History

Release	Modification
Release 4.3.0	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 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
```

Related Commands

Command	Description
show controller dwdm, on page 70	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 ASR 9000 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, on page 89
- clear lldp, on page 92
- clear mac-accounting (Ethernet), on page 94
- crc-ber auto-recover, on page 96
- flow-control, on page 97
- interface (Ethernet), on page 99
- lldp, on page 101
- lldp (interface), on page 102
- lldp enable (per-interface), on page 103
- lldp holdtime, on page 104
- lldp reinit, on page 105
- lldp timer, on page 106
- lldp tlv-select disable, on page 107
- loopback (Ethernet), on page 108
- mac-accounting, on page 109
- mac-address (Ethernet), on page 111
- mtu (interface), on page 112
- negotiation auto, on page 113
- packet-gap non-standard, on page 114
- report crc-ber, on page 115
- show controllers (Ethernet), on page 116
- show lldp, on page 125
- show lldp entry, on page 127
- show lldp errors, on page 129
- show lldp interface, on page 130
- show lldp neighbors, on page 132
- show lldp traffic, on page 135
- show mac-accounting (Ethernet), on page 137

- small-frame-padding, on page 139
- speed (Fast Ethernet), on page 140
- transport-mode (UDLR) , on page 142

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.
- 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.

Note

- In the production environments, do not set the carrier-delay up value to 0 ms.
- Test the carrier-delay timer settings to confirm that they align with the specific requirements of the network environment and provide an effective balance between link stability and timely failure restoration. Further tuning may be necessary during production to adapt to evolving network conditions.
- For links with physical-layer instability, such as microwave links or long-haul optical paths with symbol errors or link fault history events, use a carrier-delay up value greater than the default to prevent control plane churn during link recovery cycles.

For interfaces on the following Cisco ASR 9000 Series Routers line cards, configure carrier-delay down to 300 ms or greater:

- A9K-16X100GE-TR
- A99-32X100GE-TR
- A99-16X100GE-X-SE
- A9K-20HG-FLEX-SE
- A9K-20HG-FLEX-TR
- A99-24HG-FLEX-SE
- A99-24HG-FLEX-TR
- A99-32X100GE-X-SE
- A99-32X100GE-X-TR
- A9K-8HG-FLEX-SE

- A9K-8HG-FLEX-TR

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 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 3.9.0	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 3.7.2	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. 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/RSP0/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/RSP0/CPU0:router(config-if)# carrier-delay up 100 down 100
```

Related Commands

Command	Description
dampening, on page 466	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/CPU0:router# clear lldp counters
RP/0/RSP0/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/RSP0/CPU0:router# clear lldp table
RP/0/RSP0/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 132	Displays information about LLDP neighbors.
show lldp traffic, on page 135	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 mode.

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 mode

Command History

Release	Modification
Release 4.1.1	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/RSP0/CPU0:router# clear mac-accounting TenGigE 0/1/5/0 location 1/0/0/1
```

Related Commands

Command	Description
mac-accounting, on page 109	Generates accounting information for IP traffic based on the source and destination MAC addresses on LAN interfaces.
show mac-accounting (Ethernet), on page 137	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/1/0/3
RP/0/RSP0/CPU0:router(config-wanphy)# crc-ber auto-recover
RP/0/RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sf-ber disable, on page 921	Disables SF BER reporting.
show controllers wanphy, on page 922	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.
threshold sf-ber, on page 929	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 3.7.2	This command was first introduced.
Release 4.2.3	This command was supported on 1 Gigabit Ethernet optical and copper SFPs.

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/RSP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RSP0/CPU0:router(config-if)# flow-control ingress
```

interface (Ethernet)

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

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

Syntax Description

GigabitEthernet	Specifies or creates a Gigabit Ethernet (1000 Mbps) 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 mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

To specify a physical interface, use the *interface-path-id* format: *rack/slot/module/port/sub-port* (slashes are required). These are the definitions of each component:

- *rack*: Chassis number of the rack.
- *slot*: Physical slot number of the line card.
- *module*: Module number. For non-modular line cards, this is always 0. For modular line cards, use the appropriate module number as per your hardware documentation.
- *port*: Physical port number of the interface.
- *sub-port* (Optional): Breakout lane number of the logical interface when the physical port is operating in breakout mode.



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/RSP0/CPU0:router(config)# interface TenGigE 0/4/0/0
RP/0/RSP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
interface (Ethernet), on page 99	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/CPU0:router(config)# lldp
```

This example shows how to enable LLDP on subinterfaces:

```
RP/0/RSP0/CPU0:router(config)# lldp subinterfaces enable
```

Related Commands

Command	Description
show lldp, on page 125	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.

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/RSP0/CPU0:router(config)# interface GigabitEthernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lldp
RP/0/RSP0/CPU0:router(config-lldp)#
```

Related Commands

Command	Description
interface (Ethernet), on page 99	Specifies or creates an Ethernet interface and enters interface configuration mode.
lldp, on page 101	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/CPU0:router(config)# lldp holdtime 60
```

Related Commands

Command	Description
lldp, on page 101	Enables LLDP globally for both transmit and receive operation on the system.
show lldp, on page 125	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/CPU0:router(config)# lldp reinit 4
```

Related Commands

Command	Description
lldp, on page 101	Enables LLDP globally for both transmit and receive operation on the system.
show lldp, on page 125	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/CPU0:router(config)# lldp timer 60
```

Related Commands

Command	Description
lldp, on page 101	Enables LLDP globally for both transmit and receive operation on the system.
show lldp, on page 125	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/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 3.7.2	This command was first 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/RSP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RSP0/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 4.1.1	This command was introduced.

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/RSP0/CPU0:routerconfigure
RP/0/RSP0/CPU0:routerinterface bundle-ether <bundle-id>
RP/0/RSP0/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/RSP0/CPU0:routerconfigure
RP/0/RSP0/CPU0:routerinterface bundle-ether <bundle-id>
RP/0/RSP0/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 94	Clears MAC accounting statistics for an interface.
show mac-accounting (Ethernet), on page 137	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 3.7.2	This command was first 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/RSP0/CPU0:router(config)# interface TenGigE 0/1/0/0
RP/0/RSP0/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 3.7.2	This command was first introduced.
Release 4.2.3	The **negotiation auto** command was supported on 1 Gigabit Ethernet interfaces.
Release 7.4.1	This command was supported on the 1GE fiber optic plugged in Cisco ASR 9901 Router's dual-rate (1/10 GE) interface.

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/RSP0/CPU0:router(config)# interface gigabitethernet 0/0/2/0
RP/0/RSP0/CPU0:router(config-if)# negotiation auto
```

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

```
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/0/2/0
RP/0/RSP0/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 3.7.2	This command was first 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/RSP0/CPU0:router(config)# interface TenGigE 0/3/0/0
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/1/0/3
RP/0/RSP0/CPU0:router(config-wanphy)# report crc-ber
RP/0/RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sf-ber disable, on page 921	Disables SF BER reporting.
show controllers wanphy, on page 922	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.
threshold sf-ber, on page 929	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 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**]

Syntax Description

{**GigabitEthernet** | **GigabitEthCtrlr** | **HundredGigE** | **HundredGigECtrlr** | **TenGigE** | **TenGigECtrlr**|**FortyGigE**}	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.
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 mode

Command History

Release	Modification
Release 3.7.2	This command was first introduced.
Release 6.0.x	This command was modified. The **GigabitCtrlr**, **TenGigECtrlr**, and **HundredGigECtrlr** keywords were added.
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/RSP0/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/RSP0/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 ASR 9000 Series Routers*.

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

```
RP/0/RSP0/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:
```

The following example shows sample output from the **show controllers hundredGigE phy** command for A9K-2x100GE line card:

```
RP/0/RSP0/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/RSP0/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 mode.

show lldp

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/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/RSP0/CPU0:router# show lldp
Wed Apr 13 06:42:48.221 DST
% LLDP is not enabled
```

Related Commands

Command	Description
lldp, on page 101	Enables LLDP globally for both transmit and receive operation on the system.
lldp timer, on page 106	Specifies the LLDP packet rate.
lldp holdtime, on page 104	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 105	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/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 101	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/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 101	Enables LLDP globally for both transmit and receive operation on the system.
show lldp traffic, on page 135	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/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 7: 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 101	Enables LLDP globally for both transmit and receive operation on the system.
lldp (interface), on page 102	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/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 8: 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/RSP0/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 101	Enables LLDP globally for both transmit and receive operation on the system.
clear lldp, on page 92	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 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 mode

Command History

Release	Modification
Release 4.1.0	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/RSP0/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 9: show lldp traffic Field Descriptions

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

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

Related Commands

Command	Description
lldp, on page 101	Enables LLDP globally for both transmit and receive operation on the system.
clear lldp, on page 92	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 mode.

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** , .
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 mode

Command History

Release	Modification
Release 4.1.1	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/RSP0/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
```

Table 10: 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 94	Clears MAC accounting statistics for an interface.
mac-accounting, on page 109	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/RSP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface FastEthernet 0/0/2/0
RP/0/RSP0/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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# transport-mode tx-only
RP/0/RSP0/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 ASR 9000 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, on page 149
- action critical-event, on page 151
- action discovery-timeout, on page 153
- action dying-gasp, on page 155
- action high-threshold, on page 157
- action remote-loopback, on page 159
- action session-down, on page 161
- action session-up, on page 163
- action uni-directional link-fault, on page 165
- action wiring-conflict, on page 167
- aggregate, on page 169
- ais transmission, on page 172
- ais transmission up, on page 174
- buckets archive, on page 176
- buckets size, on page 177
- clear error-disable, on page 179
- clear ethernet cfm ccm-learning-database location, on page 180
- clear ethernet cfm interface statistics, on page 181
- clear ethernet cfm local meps, on page 182
- clear ethernet cfm offload, on page 184
- clear ethernet cfm peer meps, on page 185
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- ping ethernet cfm, on page 287

- polling-verification-timer, on page 290
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- remote-loopback, on page 296
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- show ethernet lmi interfaces, on page 343
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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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action capabilities-conflict log
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action critical-event log
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 4.0.0	The **efd** keyword was added.
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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
```

```
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action discovery-timeout log
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action dying-gasp log
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action high-threshold disable
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action remote-loopback log
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action session-down log
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action session-up log
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# action uni-directional link-fault log
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
(config-if-eoam)# action wiring-conflict error-disable-interface
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	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 { **none** | **bins** *count* **width** **[usec]** *width* [**minimum-delay** **[usec]** *width*] }

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.
minimum-delay **[usec]width** *width*	(Optional) Specifies the width of the first bin in milliseconds or microseconds. You can set this value only if the bin count is at least two. When the **usec** keyword is specified, the size of bins can be configured in microseconds (range is 1 to 10000000). **Note** The minimum-delay option can be configured only for delay measurements and not for jitter measurements.

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.
Release 25.1.1	The keyword **minimum-delay** 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
```

Examples

This example shows how to configure mimimum delay of width 5 milliseconds.

```
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 10 width 2 minimum-delay 5
```

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service S1 bridge group BG1 bridge-domain BD2
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# ais transmission interval 1m cos 7
```

Related Commands

Command	Description
log ais, on page 265	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
ais transmission up, on page 174	Configures AIS transmission on a CFM interface.
show ethernet cfm interfaces ais, on page 316	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 323	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RSP0/CPU0:router(config-if-cfm)# ais transmission up interval 1m cos 7
```

Related Commands

Command	Description
ais transmission, on page 172	Configures AIS transmission for a CFM domain service.
log ais, on page 265	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
show ethernet cfm interfaces ais, on page 316	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 323	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.

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 177 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RSP0/CPU0:router(config-sla-prof-stat-cfg)# buckets archive 50
```

Related Commands

Command	Description
buckets size, on page 177	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 4.3.0	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 292, send (SLA), on page 303, and schedule (SLA), on page 300 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RSP0/CPU0:router(config-sla-prof-stat-cfg)# buckets size 100 per-probe
```

Related Commands

Command	Description
buckets archive, on page 176	Configures the number of buckets to store in memory.
probe (SLA), on page 292	Enters SLA profile probe configuration mode.
schedule (SLA), on page 300	
send (SLA), on page 303	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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/CPU0:router# clear ethernet cfm ccm-learning-database location all
```

Related Commands

Command	Description
show ethernet cfm ccm-learning-database, on page 312	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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/CPU0:router# clear ethernet cfm interface statistics location all
```

Related Commands

Command	Description
show ethernet cfm interfaces statistics, on page 318	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 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.

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/RSP0/CPU0:router# clear ethernet cfm local meps all
```

Related Commands

Command	Description
show ethernet cfm local meps, on page 323	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 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 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/RSP0/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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/CPU0:router# clear ethernet cfm peer meps all
```

Related Commands

Command	Description
show ethernet cfm peer meps, on page 329	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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/CPU0:router# clear ethernet cfm traceroute-cache all
```

Related Commands

Command	Description
traceroute cache, on page 396	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 337	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 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 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/RSP0/CPU0:router# clear ethernet lmi interfaces GigabitEthernet 0/0/0/0
```

Related Commands

Command	Description
show ethernet lmi interfaces, on page 343	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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/CPU0:router# clear ethernet oam statistics interface gigabitethernet 0/1/5/1
```

Related Commands

Command	Description
show ethernet oam statistics, on page 362	Displays the local and remote Ethernet OAM statistics for interfaces.

Command	Description
show ethernet oam interfaces, on page 360	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 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 mode

Command History

Release	Modification
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 177 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/RSP0/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/RSP0/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/RSP0/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 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 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 177 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/RSP0/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/RSP0/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/RSP0/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 191	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 225	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 247	Executes an on-demand Ethernet SLA operation probe for CFM synthetic loss measurement.
show ethernet sla operations, on page 369	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 372	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 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 mode

Command History

Release	Modification
Release 3.9.0	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 177 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/RSP0/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/RSP0/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/RSP0/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/RSP0/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/RSP0/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 177	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/RSP0/CPU0:routerclear ethernet udld statistics interface GigabitEthernet
 0/1/0/1
```

Related Commands

Command	Description
show ethernet udld statistics, on page 382	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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# connection timeout 20
```

Related Commands

Command	Description
action discovery-timeout, on page 153	Configures what action is taken on an interface when a connection timeout occurs.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
show ethernet oam configuration, on page 353	Displays the current active Ethernet OAM configuration on an interface.

Command	Description
show ethernet oam discovery, on page 356	Displays the current status of Ethernet OAM sessions.
show ethernet oam interfaces, on page 360	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.

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

Related Commands

Command	Description
show ethernet cfm peer meps, on page 329	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RSP0/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.

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

Related Commands

Command	Description
show ethernet cfm traceroute-cache, on page 337	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.

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

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

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

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm mep domain Dm1 service Sv1 mep-id 1
RP/0/RSP0/CPU0:router(config-if-cfm-mep)# cos 7
```

Related Commands

Command	Description
ethernet cfm (interface), on page 217	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 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 mode

Command History

Release	Modification
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/RSP0/CPU0:router# debug ethernet cfm packets hexdump

RP/0/RSP0/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/RSP0/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/RSP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: MAID: MDID String 'dom4',
SMAN String 'ser4'
RP/0/RSP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: Sender ID: Chassis ID Local
 'hpr', Mgmt Addr <none>
RP/0/RSP0/CPU0:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: Port status: Up, interface
status Up
RP/0/RSP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:   Raw Frame:
RP/0/RSP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:     0x40010546 00000001 00100404
646F6D34 02047365 72340000 00000000 00000000
RP/0/RSP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:     0x00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000
RP/0/RSP0/CPU0:May 29 14:15:39.622 : cfmd[150]: PKT-RX:     0x00000000 00000000 00000200
01020400 01010100 05030768 707200
RP/0/RSP0/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/RSP0/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/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: MAID: MDID String 'foo',
SMAN String 'foo'
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Sender ID: Chassis ID Local
 'ios', Mgmt Addr <none>
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Port status: Up, interface
status Up
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   Raw Frame:
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:     0x40018546 00000010 00010403
666F6F02 03666F6F 00000000 00000000 00000000
RP/0/RSP0/CPU0:May 29 14:15:43.625 : cfmd[150]: PKT-TX:     0x00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000
RP/0/RSP0/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 208	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 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 mode

Command History

Release	Modification
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/RSP0/CPU0:router# debug ethernet cfm protocol-state

RP/0/RSP0/CPU0:May 29 14:41:49.966 : cfmd[150]: CFM: Created 1 local MEPs in PM and Engine
RP/0/RSP0/CPU0:May 29 14:41:49.967 : cfmd[150]: CFM: State changes notification for 1 EFPs
RP/0/RSP0/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/RSP0/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/RSP0/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 205	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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)#
```

Related Commands

Command	Description
ethernet cfm (global), on page 216	Enters CFM configuration mode.
ethernet cfm (interface), on page 217	Enters interface CFM configuration mode.
mep domain, on page 277	Creates a MEP on an interface.
service, on page 306	
show ethernet cfm configuration-errors, on page 314	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 320	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 323	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service S1 down-meps
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# efd
```

Related Commands

Command	Description
show efd interface, on page 311	Displays all interfaces that are shut down because of EFD.
show ethernet cfm local meps, on page 323	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 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 mode.

ethernet cfm

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)#
```

Related Commands

Command	Description
domain, on page 210	
ethernet cfm (interface), on page 217	Enters interface CFM configuration mode.
show ethernet cfm configuration-errors, on page 314	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 320	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 323	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RSP0/CPU0:router(config-if-cfm)#
```

Related Commands

Command	Description
cos (CFM), on page 203	Configures the CoS for all CFM packets generated by the MEP on an interface.
ethernet cfm (global), on page 216	Enters CFM configuration mode.
mep domain, on page 277	Creates a MEP on an interface.
show ethernet cfm configuration-errors, on page 314	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 320	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 323	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/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)#
```

Related Commands

Command	Description
interface (Ethernet), on page 99	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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/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 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 mode

Command History

Release	Modification
Release 3.9.0	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/RSP0/CPU0:router# ethernet oam loopback enable tengigabitethernet 0/6/1/0
```

Related Commands

Command	Description
remote-loopback, on page 296	Enables a remote loopback on the far end of an Ethernet OAM interface.
action remote-loopback, on page 159	Configures what action is taken on an interface when a remote-loopback event occurs.
snmp-server traps ethernet oam events, on page 387	
show ethernet oam configuration, on page 353	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 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)

Command History

Release	Modification
Release 3.9.0	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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)#
```

ethernet sla

To enter the Ethernet Service Level Agreement (SLA) configuration mode, use the **ethernet sla** command in Global Configuration mode.

ethernet sla

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Global Configuration 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
ethernet-services	read, write

Examples

The following example shows how to enter the Ethernet SLA configuration mode.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/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 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' >
<kwd >send</kwd>
<sep> </sep>
<groupchoice >
<groupcomp >

<kwd >packet</kwd>
<sep> </sep>
<groupchoice >
<kwd >once</kwd>
<groupcomp >
<kwd >every</kwd>
<sep> </sep>
<kwd >number</kwd>
<sep> </sep>
<groupchoice >
<kwd >milliseconds</kwd>
<kwd >seconds</kwd>
<kwd >minutes</kwd>
<kwd >hours</kwd>
</groupchoice>
</groupcomp>
</groupchoice>
</groupcomp>
<groupcomp >
<kwd >burst</kwd>
<sep> </sep>
<groupchoice >
<kwd >once</kwd>
<groupcomp >
<kwd >every</kwd>
<sep> </sep>
<kwd >number</kwd>
<sep> </sep>
<groupchoice >
<kwd >seconds</kwd>
<kwd >minutes</kwd>
<kwd >hours</kwd>
</groupchoice>
</groupcomp>

```
</groupchoice>
</groupcomp>
</groupchoice>
<sep> </sep>
<kwd >packet</kwd>
<sep> </sep>
<kwd >count</kwd>
<sep> </sep>
<kwd >number</kwd>
<sep> </sep>
<kwd >interval</kwd>
<sep> </sep>
<kwd >number</kwd>
<sep> </sep>
<groupchoice >
<kwd >milliseconds</kwd>
<kwd >seconds</kwd>
</groupchoice>
</groupcomp>
<sep> </sep>
<groupcomp importance='optional' >
<kwd >packet</kwd>
<sep> </sep>
<kwd >size</kwd>
<sep> </sep>
<kwd >bytes</kwd>
<sep> </sep>
<groupcomp importance='optional' >
<kwd >test</kwd>
<sep> </sep>
<kwd >pattern</kwd>
<sep> </sep>
<groupchoice >
<groupcomp >
```

<kwd >hex</kwd>
<sep> </sep>
<kwd >0x</kwd>
<sep> </sep>
<kwd >HHHHHHHH</kwd>
</groupcomp>
<kwd >pseudo-random</kwd>
</groupchoice>
</groupcomp>
</groupcomp>
<sep> </sep>
<kwd >domain</kwd>
<sep> </sep>
<kwd >domain_name</kwd>
<sep> </sep>
<kwd >source</kwd>
<sep> </sep>
<kwd >interface</kwd>
<sep> </sep>
<kwd >type</kwd>
<sep> </sep>
<kwd >interface-path-id</kwd>
<sep> </sep>
<kwd >target</kwd>
<sep> </sep>
<groupchoice >
<groupcomp >
<kwd >mac-address</kwd>
<sep> </sep>
<kwd >H</kwd>
<sep> </sep>
<groupcomp >
<delim>.</delim>
<kwd >H</kwd>

```
</groupcomp>
<sep> </sep>
<groupcomp >
<delim>.</delim>
<kwd >H</kwd>
</groupcomp>
<sep> </sep>
<groupcomp >
<delim>.</delim>
<kwd >H</kwd>
</groupcomp>
</groupcomp>
<groupcomp >
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<sep> </sep>
<kwd >id_number</kwd>
</groupcomp>
</groupchoice>
<sep> </sep>
<groupcomp importance='optional' >
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<sep> </sep>
<kwd >measure</kwd>
<sep> </sep>
<groupchoice >
<kwd >one-way-delay-ds</kwd>
<kwd >one-way-delay-sd</kwd>
<kwd >one-way-jitter-ds</kwd>
<kwd >one-way-jitter-sd</kwd>
<kwd >round-trip-delay</kwd>
<kwd >round-trip-jitter</kwd>
</groupchoice>
<sep> </sep>
<groupcomp importance='optional' >
```

<kwd >aggregate</kwd>
<sep> </sep>
<groupchoice >
<kwd >none</kwd>
<groupcomp >
<kwd >bins</kwd>
<sep> </sep>
<kwd >number</kwd>
<sep> </sep>
<kwd >width</kwd>
<sep> </sep>
<kwd >milliseconds</kwd>
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</groupchoice>
</groupcomp>
</groupcomp>
<sep> </sep>
<groupcomp importance='optional' >
<kwd >buckets</kwd>
<sep> </sep>
<groupchoice >
<groupcomp >
<kwd >archive</kwd>
<sep> </sep>
<kwd >number</kwd>
</groupcomp>
<groupcomp >
<kwd >size</kwd>
<sep> </sep>
<kwd >number</kwd>
<sep> </sep>
<groupchoice >
<kwd >per-probe</kwd>
<kwd >probes</kwd>

```
</groupchoice>
</groupcomp>
</groupchoice>
</groupcomp>
<sep> </sep>
<groupcomp importance='optional' >
<kwd >schedule</kwd>
<sep> </sep>
<groupchoice >
<kwd >now</kwd>
<groupcomp >
<kwd >at</kwd>
<sep> </sep>
<kwd >hh</kwd>
<sep> </sep>
<groupcomp >
<delim>:</delim>
<kwd >mm</kwd>
</groupcomp>
<sep> </sep>
<groupcomp importance='optional' >
<delim>.</delim>
<kwd >ss</kwd>
</groupcomp>
<sep> </sep>
<groupcomp importance='optional' >
<kwd >day</kwd>
<sep> </sep>
<groupcomp importance='optional' >
<kwd >month</kwd>
<sep> </sep>
<kwd importance='optional' >year</kwd>
</groupcomp>
</groupcomp>
```

```
</groupcomp>
<groupcomp >
<kwd >in</kwd>
<sep> </sep>
<kwd >number</kwd>
<sep> </sep>
<groupchoice >
<kwd >seconds</kwd>
<kwd >minutes</kwd>
<kwd >hours</kwd>
</groupchoice>
</groupcomp>
</groupchoice>
<sep> </sep>
<groupcomp importance='optional' >
<kwd >for</kwd>
<sep> </sep>
<kwd >duration</kwd>
<sep> </sep>
<groupchoice >
<kwd >seconds</kwd>
<kwd >minutes</kwd>
<kwd >hours</kwd>
</groupchoice>
</groupcomp>
<sep> </sep>
<groupcomp importance='optional' >
<kwd >repeat</kwd>
<sep> </sep>
<kwd >every</kwd>
<sep> </sep>
<kwd >number</kwd>
<sep> </sep>
<groupchoice >
```

<kwd >seconds</kwd>

<kwd >minutes</kwd>

<kwd >hours</kwd>

</groupchoice>

<sep> </sep>

<kwd >count</kwd>

<sep> </sep>

<kwd >probes</kwd>

</groupcomp>

</groupcomp>

<sep> </sep>

<kwd importance='optional' >asynchronous</kwd>

</groupcomp>

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 mode

Command History

Release	Modification
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/RSP0/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 191	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 192	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 369	Displays information about configured Ethernet SLA operations.

Command	Description
show ethernet sla statistics, on page 372	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 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* | **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 mode

Command History

Release	Modification
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/RSP0/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 191	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 192	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 369	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 372	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 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** | **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 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/RSP0/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 191	Deletes the contents of buckets containing SLA statistics collected by all operations probes.
clear ethernet sla statistics on-demand, on page 192	Deletes the contents of buckets containing SLA statistics collected by on-demand probes.
show ethernet sla operations, on page 369	Displays information about configured Ethernet SLA operations.
show ethernet sla statistics, on page 372	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/RSP0/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/RSP0/CPU0:router(config)# interface gigabitethernet 0/0/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet uni id PE1-CustA-Slot0-Port0
```

Related Commands

Command	Description
interface (Ethernet), on page 99	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/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# extension remote-uni disable
```

Related Commands

Command	Description
interface (Ethernet), on page 99	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 219	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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/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 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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor (config-eoam)#  link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# frame-seconds threshold low 10 high 900
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 264	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 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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# frame-seconds window milliseconds 900000
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 264	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 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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# frame threshold low 100 high 60000
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.

Command	Description
link-monitor, on page 264	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 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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/CPU0:router(config-eoam-lm)# frame window milliseconds 6000
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
link-monitor, on page 264	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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/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.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	read, write

Related Commands

Command	Description
ais transmission, on page 172	Configures AIS transmission for a CFM domain service.
ais transmission up, on page 174	Configures AIS transmission on a CFM interface.
show ethernet cfm interfaces ais, on page 316	Displays the information about interfaces that are currently transmitting AIS.
show ethernet cfm local meps, on page 323	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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check errors
```

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log continuity-check mep changes
```

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log crosscheck errors


RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log crosscheck errors
```

Related Commands

Command	Description
mep crosscheck, on page 274	Enters CFM MEP crosscheck configuration mode.
mep-id, on page 275	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/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# log errors disable
```

The following example shows how to disable logging of E-LMI events:

```
RP/0/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# log events disable
```

Related Commands

Command	Description
interface (Ethernet), on page 99	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 219	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.
show ethernet lmi interfaces, on page 343	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service S1 down-meps
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# log efd
```

Related Commands

Command	Description
efd, on page 212	Enables EFD on all down MEPs in a down MEPs service.
show efd interface, on page 311	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# maximum-meps 4000
```

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# maximum-meps 4000
```

Related Commands

Command	Description
domain, on page 210	
ethernet cfm (global), on page 216	Enters CFM configuration mode.
ethernet cfm (interface), on page 217	Enters interface CFM configuration mode.
service, on page 306	
show ethernet cfm configuration-errors, on page 314	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 320	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 323	Displays information about local MEPs.
show ethernet cfm peer meps, on page 329	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RSP0/CPU0:router(config-cfm-xcheck)#


RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
```

```
RP/0/RSP0/CPU0:router(config-cfm-xcheck)# mep-id 10
```

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mep crosscheck
RP/0/RSP0/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 306 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RSP0/CPU0:router(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
```

Related Commands

Command	Description
ethernet cfm (interface), on page 217	Enters interface CFM configuration mode.
show ethernet cfm configuration-errors, on page 314	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# mib-retrieval
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.

Command	Description
profile (EOAM), on page 293	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 353	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 360	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)# mip auto-create all
```

Related Commands

Command	Description
domain, on page 210	
ethernet cfm (global), on page 216	Enters CFM configuration mode.
service, on page 306	
show ethernet cfm configuration-errors, on page 314	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 320	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 323	Displays information about local MEPs.
show ethernet cfm peer meps, on page 329	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# profile Profile_1
RP/0/RSP0/CPU0:router(config-if-eoam)# mode passive
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.

Command	Description
profile (EOAM), on page 293	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 353	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 360	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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# packet size 9000
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# packet size 9000 test pattern hex 0xabcdabcd
RP/0/RSP0/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.

Usage Guidelines

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

The command displays the following infomation:

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

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

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

Task ID

Task ID	Operations
basic-services	execute
ethernet-services	execute

Examples

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

```
RP/0/RSP0/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/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# polling-verification-timer 30
```

Related Commands

Command	Description
interface (Ethernet), on page 99	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 219	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.
show ethernet lmi interfaces, on page 343	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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# profile Profile_1
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
show ethernet oam configuration, on page 353	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 360	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 4.3.0	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/5/6
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# profile Profile_1
RP/0/RSP0/CPU0:router(config-if-eoam)# remote-loopback
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.

Command	Description
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
ethernet oam loopback, on page 221	Starts or stops a loopback at the remote end of an Ethernet OAM interface.
profile (EOAM), on page 293	Attaches an Ethernet OAM profile to an interface.
show ethernet oam configuration, on page 353	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam interfaces, on page 360	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# require-remote mode active
RP/0/RSP0/CPU0:router(config-eoam)# require-remote mib-retrieval
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/6/5/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# require-remote mode active disabled
RP/0/RSP0/CPU0:router(config-if-eoam)# require-remote mib-retrieval disabled
RP/0/RSP0/CPU0:router(config-if-eoam)# require-remote link-monitoring disabled
```

Related Commands

Command	Description
ethernet oam profile, on page 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	Attaches an Ethernet OAM profile to an interface.
action capabilities-conflict, on page 149	Configures what action is taken on an interface when a capabilities-conflict event occurs.
show ethernet oam configuration, on page 353	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 356	Displays the current status of Ethernet OAM sessions.
show ethernet oam interfaces, on page 360	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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# schedule every 2 hours first at 13:45:01
```

Example 4: Hourly Scheduling for a Specified Duration

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# schedule every 6 hours for 2 hours
```

Related Commands

Command	Description
send (SLA), on page 303	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 4.3.0	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# send burst every 60 seconds packet count 30
interval 1 second
RP/0/RSP0/CPU0:router(config-sla-prof-pb)#
```

Example 2: Sending a Burst of a Number of Packets With a Specified Interval One Time

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/CPU0:router(config-sla-prof-pb)# send burst once packet count 2 interval 1 second

RP/0/RSP0/CPU0:router(config-sla-prof-pb)#
```

Example 3: Sending a Single Packet Every Specified Number of Seconds

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
```

```
RP/0/RSP0/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* {**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 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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Bridge_Service bridge group BD1 bridge-domain
 B1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Serv_1 down-meps
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RSP0/CPU0:router(config-cfm-dmn-svc)#
```

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

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service Cross_Connect_2 xconnect group XG2 mp2mp X2
 ce-id 201 remote-ce-id 202
RP/0/RSP0/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 210	Creates and names a container for all domain configurations and enter the CFM domain configuration mode.
ethernet cfm (global), on page 216	Enters Ethernet CFM configuration mode.
p2p	Enters p2p configuration mode to configure point-to-point cross-connects.
show ethernet cfm configuration-errors, on page 314	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 320	Displays all the maintenance points that have been created.
show ethernet cfm local meps, on page 323	Displays information about local MEPs.
show ethernet cfm peer meps, on page 329	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 ]
```

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 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 mode

Command History

Release	Modification
Release 3.9.1	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/RSP0/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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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 11: 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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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 216	Enters CFM configuration mode.
ethernet cfm (interface), on page 217	Enters interface CFM configuration mode.
traceroute ethernet cfm, on page 397	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 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 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/RSP0/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 12: 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 172	Configures AIS transmission for a CFM domain service.
log ais, on page 265	Configures AIS logging for a CFM domain service to indicate when AIS or LCK packets are received.
ais transmission up, on page 174	Configures AIS transmission on a CFM interface.
show ethernet cfm local meps, on page 323	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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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/RSP0/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 13: 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 181	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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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 14: 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 323	Displays information about local MEPs.
show ethernet cfm peer meps, on page 329	Displays information about maintenance end points (MEPs) for peer MEPs.

Command	Description
traceroute cache, on page 396	Sets the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries.
traceroute ethernet cfm, on page 397	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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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 15: 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/RSP0/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/RSP0/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/RSP0/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 320	Displays a list of local maintenance points.
show ethernet cfm peer meps, on page 329	Displays information about maintenance end points (MEPs) for peer MEPs.
traceroute ethernet cfm, on page 397	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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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 16: 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/RSP0/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 17: 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 320	Displays a list of local maintenance points.
show ethernet cfm local meps, on page 323	Displays information about local MEPs.
traceroute ethernet cfm, on page 397	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 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 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/RSP0/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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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 18: 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/RSP0/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 396	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 186	Removes the contents of the traceroute cache.
traceroute ethernet cfm, on page 397	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 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 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/RSP0/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 19: 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/RSP0/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 20: 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/RSP0/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 21: 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 188	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 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 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/RSP0/CPU0:router#show 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/RSP0/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 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 mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	

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/RSP0/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/RSP0/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 356	Displays the current status of Ethernet OAM sessions.
show ethernet oam statistics, on page 362	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 360	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 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 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
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/RSP0/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/RSP0/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 353	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam statistics, on page 362	Displays the local and remote Ethernet OAM statistics for interfaces.
show ethernet oam interfaces, on page 360	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 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 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/RSP0/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 353	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 356	Displays the current status of Ethernet OAM sessions.
show ethernet oam interfaces, on page 360	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 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 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
ethernet-services	read

Examples

The following example shows how to display the current state for all Ethernet OAM interfaces:

```
RP/0/RSP0/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 22: 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 353	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 356	Displays the current status of Ethernet OAM sessions.
show ethernet oam statistics, on page 362	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 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 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
ethernet-services	read

Examples

The following example shows how to display Ethernet OAM statistics for a specific interface:

```
RP/0/RSP0/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 353	Displays the current active Ethernet OAM configuration on an interface.
show ethernet oam discovery, on page 356	Displays the current status of Ethernet OAM sessions.
show ethernet oam interfaces, on page 360	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 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 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 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 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
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/RSP0/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/RSP0/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 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 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.

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/RSP0/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/RSP0/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/RSP0/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/RSP0/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 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 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 4.3.0	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/RSP0/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/RSP0/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/RSP0/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/RSP0/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/RSP0/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/RSP0/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/RSP0/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 177	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/RSP0/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/RSP0/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 23: 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 382	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/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ethernet cfm
RP/0/RSP0/CPU0:router(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
```

```
RP/0/RSP0/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 329	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 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 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/RSP0/CPU0:router #configure
RP/0/RSP0/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 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 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
snmp	read, write

Examples

The following example shows how to enable SNMP server traps on an Ethernet OAM interface.

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/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	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile Prof1 type cfm-loopback
RP/0/RSP0/CPU0:router(config-sla-prof)# statistics measure round-trip-delay
RP/0/RSP0/CPU0:router(config-sla-prof-stat-cfg)#
```

Related Commands

Command	Description
ethernet sla, on page 224	Enters the Ethernet SLA configuration mode.
profile (SLA), on page 294	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/RSP0/CPU0:router# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet lmi
RP/0/RSP0/CPU0:router(config-if-elmi)# status-counter 6
```

Related Commands

Command	Description
interface (Ethernet), on page 99	Specifies or creates an Ethernet interface and enters interface configuration mode.
ethernet lmi, on page 219	Enables E-LMI operation on an interface and enters interface Ethernet LMI configuration mode.
show ethernet lmi interfaces, on page 343	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, see **symbol-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, see **symbol-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 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.

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/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/CPU0:router(config-eoam)# link-monitor
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet sla
RP/0/RSP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-synthetic-loss-measurement
RP/0/RSP0/CPU0:router(config-sla-prof)# probe
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# domain D1 level 1
RP/0/RSP0/CPU0:router(config-cfm-dmn)# service S2 bridge group BG1 bridge-domain BD2
RP/0/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet cfm
RP/0/RSP0/CPU0:router(config-cfm)# traceroute cache hold-time 1 size 3000
```

Related Commands

Command	Description
ethernet cfm (global), on page 216	Enters CFM configuration mode.
traceroute ethernet cfm, on page 397	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 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 mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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 396	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 186	Removes the contents of the traceroute cache.
show ethernet cfm traceroute-cache, on page 337	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# ethernet oam profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# profile Profile_1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# ethernet oam
RP/0/RSP0/CPU0:router(config-if-eoam)# uni-directional link-fault detection disable
RP/0/RSP0/CPU0:router(config-if-eoam)# commit
```

Related Commands

Command	Description
action uni-directional link-fault, on page 165	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 223	Creates an EOAM profile and enters EOAM configuration mode.
ethernet oam, on page 220	Enables Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode.
profile (EOAM), on page 293	Attaches an Ethernet OAM profile to an interface.



Frame Relay Commands

This module provides CLI commands for configuring Frame Relay services on the Cisco ASR 9000 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.

- clear frame-relay multilink interface, on page 404
- clear frame-relay lmi interface, on page 406
- encap (PVC), on page 407
- encapsulation frame-relay, on page 408
- frame-relay intf-type, on page 410
- frame-relay lmi disable, on page 411
- frame-relay lmi-n391dte, on page 412
- frame-relay lmi-n392dce, on page 413
- frame-relay lmi-n392dte, on page 414
- frame-relay lmi-n393dce, on page 415
- frame-relay lmi-n393dte, on page 416
- frame-relay lmi-t391dte, on page 417
- frame-relay lmi-t392dce, on page 418
- frame-relay lmi-type, on page 419
- frame-relay multilink ack, on page 420
- frame-relay multilink bandwidth-class, on page 422
- frame-relay multilink bid, on page 424
- frame-relay multilink hello, on page 426
- frame-relay multilink lid, on page 428
- frame-relay multilink retry, on page 430
- pvc (frame relay), on page 432
- show frame-relay lmi, on page 433
- show frame-relay lmi-info, on page 435
- show frame-relay multilink, on page 438
- show frame-relay pvc, on page 451
- show frame-relay vcm-info interface, on page 454
- show interfaces (frame relay), on page 456
- snmp-server traps frame-relay pvc, on page 461

clear frame-relay multilink interface

To clear the multilink frame-relay (MFR) statistics for the given interface or location, use the **clear frame-relay multilink interface** command in EXEC mode.

clear frame-relay multilink interface {*type interface-path-id* | **all** [**location** *node 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.
all	Clears MFR statistics for all interfaces
location *node-id*	(Optional) Clears MFR statistics for all interfaces at the location specified by *node-id*. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

EXEC mode

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
fr	execute

Examples

The following example shows how to use the **clear frame-relay multilink interface** command to clear the multilink frame-relay protocol and internal statistics on an interface:

```
RP/0/RSP0/CPU0:router# clear frame-relay multilink interface serial 0/1/0/0
```

Related Commands

Command	Description
show frame-relay lmi-info, on page 435	Displays Frame Relay information for the LMI.

Command	Description
show interfaces multilink, on page 641	Displays information about a multilink interface.

clear frame-relay lmi interface

To clear the LMI statistics for the given interface or location, use the **clear frame-relay lmi** command in EXEC mode.

clear frame-relay lmi interface {*type interface-path-id* | **all** [**location** *node 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.
all	Clears LMI statistics for all interfaces
location *node-id*	(Optional) Clears LMI statistics for all interfaces at the location specified by *node-id*. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

EXEC mode

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
fr	execute

Examples

The following example shows how to use the **clear frame-relay lmi** command to clear the LMI counters on an interface:

```
RP/0/RSP0/CPU0:router# clear frame-relay lmi interface pos 0/1/0/0
```

Related Commands

Command	Description
show frame-relay lmi, on page 433	Displays Frame Relay statistics for the LMI.

encap (PVC)

To change the encapsulation for a Frame Relay permanent virtual circuit (PVC), use the **encap** command in Frame Relay PVC configuration mode. To restore default encapsulation from the Frame Relay main interface, use the **no** form of this command.

encap {**cisco** | **ietf**}

Syntax Description

cisco	(Optional) Uses Cisco encapsulation, which is a 4-byte header, with 2 bytes to identify the data-link connection identifier (DLCI) and 2 bytes to identify the packet type.
ietf	(Optional) Sets the encapsulation method to comply with the Internet Engineering Task Force (IETF) standard (RFC 1490). Use this keyword when connecting to equipment that belongs to a vendor other than Cisco across a Frame Relay network.

Command Default

The default encapsulation keyword is Cisco.

When this command is not configured, encapsulation is inherited from the Frame Relay main interface.

Command Modes

Frame Relay PVC configuration (config-fr-vc)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

This command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to set encapsulation on PVC data-link connection identifier (DLCI) 16 for Packet-over-SONET/SDH (POS) subinterface 0/4/0/1.1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/4/0/1.1 l2transport
RP/0/RSP0/CPU0:router(config-subif)# pvc 16
RP/0/RSP0/CPU0:router(config-fr-vc)# encap ietf
```

Related Commands

Command	Description
encapsulation frame-relay, on page 408	Enables Frame Relay encapsulation.

encapsulation frame-relay

To enable Frame Relay encapsulation, use the **encapsulation frame-relay** command in interface configuration mode. To disable Frame Relay encapsulation, use the **no** form of this command.

encapsulation frame-relay [**ietf**]

Syntax Description

ietf	(Optional) Sets the encapsulation method to comply with the Internet Engineering Task Force (IETF) standard (RFC 1490). Use this keyword when connecting to equipment from another vendor across a Frame Relay network.

Command Default

The default encapsulation method is Cisco.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Use the **encapsulation frame-relay** command to connect an interface to a Frame Relay network. When this command is configured, outgoing packets are encapsulated with a Frame Relay header and Frame Relay headers are removed from incoming packets to the interface.

A Cisco or IETF encapsulation method controls the Network Layer Protocol Identifier (NLPID) that is added to outgoing packets on the interface. The encapsulation method enabled for an outgoing packet can be changed for each data-link connection identifier (DLCI) per subinterface by using the **encap (PVC)** command in Frame Relay PVC configuration mode.

When the **encapsulation frame-relay** command is configured, LMI is enabled by default. To disable LMI use the **frame-relay lmi disable** command.

The following restrictions apply to the **encapsulation frame-relay** command upon configuration or removal of the command on an interface:

- When configuring this command, Layer 3 and Layer 2 configurations are not allowed on the interface.
- Before removing this command, all Frame Relay subinterfaces and LMI configuration should be deleted from the interface.

The **encapsulation frame-relay** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
interface	read, write
fr	read, write

Examples

The following example shows Frame Relay encapsulation configured on Packet-over-SONET/SDH (POS) 0/3/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation frame-relay ietf
```

Related Commands

Command	Description
encap (PVC), on page 407	Changes the encapsulation for a Frame Relay PVC.
frame-relay lmi disable, on page 411	Disables the Frame Relay LMI.

frame-relay intf-type

To configure the interface type of the User-Network Interface (UNI), use the **frame-relay intf-type** command in interface configuration mode. To change the configuration, use the **no** form of this command.

frame-relay intf-type {**dce** | **dte** | **nni**}

Syntax Description

dce	Router functions as a switch connected to a router.
dte	Router is connected to a Frame Relay network.
nni	Router is connected to a NNI signaling interface.

Command Default

DTE

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.
Release 4.2.1	The **nni** keyword was introduced.

Usage Guidelines

The **frame-relay intf-type** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to configure a DCE switch type on the interface:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/4/0/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dce
```

frame-relay lmi disable

To disable the Frame Relay Local Management Interface (LMI), use the **frame-relay lmi disable** command in interface configuration mode. To reenable LMI, use the **no** form of this command.

frame-relay lmi disable

Syntax Description

This command has no keywords or arguments.

Command Default

LMI is enabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **frame-relay lmi disable** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to configure a DCE switch type on the interface:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/4/0/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi disable
```

frame-relay lmi-n391dte

To set the full status polling interval, use the **frame-relay lmi-n391dte** command in interface configuration mode. To restore the default interval value, use the **no** form of this command.

frame-relay lmi-n391dte *polling-cycles*

Syntax Description

polling-cycles	Number of Line Integrity Verification (LIV) exchanges performed before requesting a full status message. Range is from 1 to 255. The default is 6.

Command Default

The full status polling interval is 6.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Use the **frame-relay lmi-n391dte** command to set the full status message polling interval. This command is relevant only when the interface type is data terminal equipment (DTE).

Two message types are supported: status inquiry and status. Status inquiry messages are sent from DTE to DCE. Status messages are sent from DCE to DTE (in response to a status inquiry). The Status (Full) and LIV report types are contained within these messages, and typically there is one status transaction for every five LIV transactions.

This command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows that one out of every four status inquiries generated requests a full status response from the DCE on the interface:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dte
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n391dte 4
```

frame-relay lmi-n392dce

To set the error threshold on a DCE interface, use the **frame-relay lmi-n392dce** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

frame-relay lmi-n392dce *threshold*

Syntax Description

threshold	Error threshold value. Range is from 1 to 10. Default is 3.

Command Default

The DCE error threshold is 3.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

N392 errors must occur within the number defined by the N393 event count for the link to be declared down. Therefore, the threshold value for this command must be less than the count value defined in the **frame-relay lmi-n393dce** command.

The **frame-relay lmi-n392dce** command is relevant only when the interface type is data communication equipment (DCE).

This command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to set the Local Management Interface (LMI) failure threshold to 4. The router acts as a Frame Relay DCE switch:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dce
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n392dce 4
```

Related Commands

Command	Description
frame-relay lmi-n393dce, on page 415	Sets the DCE monitored events count.

frame-relay lmi-n392dte

To set the error threshold on a DTE interface, use the **frame-relay lmi-n392dte** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

frame-relay lmi-n392dte *threshold*

Syntax Description

threshold	Error threshold value. Range is from 1 to 10. The default is 3.

Command Default

The DTE error threshold is 3.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **frame-relay lmi-n392dte** command is relevant only when the interface type is data terminal equipment (DTE).

This command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to set the Local Management Interface (LMI) failure threshold to 4. The router acts as a Frame Relay DTE switch.

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dte
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n392dte 4
```

frame-relay lmi-n393dce

To set the DCE monitored events count, use the **frame-relay lmi-n393dce** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

frame-relay lmi-n393dce *events*

Syntax Description

events	Monitored events count. Range is from 1 to 10. The default is 4.

Command Default

The number of DCE monitored events is 4.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **frame-relay lmi-n393dce** command is used along with the **frame-relay lmi-n392dce** command to define the condition that causes the link to be declared down.

N392 errors must occur within the *events* argument count in order for the link to be declared down. Therefore, the events value defined in this command must be greater than the threshold value defined in the **frame-relay lmi-n392 dce** command.

The **frame-relay lmi-n393dce** command is relevant only when the interface type is data communication equipment (DCE).

This **frame-relay lmi-n393dce** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to set the Local Management Interface (LMI) monitored events count to 5.

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dce
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n393dce 5
```

Related Commands

Command	Description
frame-relay lmi-n392dce, on page 413	Sets the error threshold on a DCE interface.

frame-relay lmi-n393dte

To set the monitored event count on a DTE interface, use the **frame-relay lmi-n393dte** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

frame-relay lmi-n393dte *events*

Syntax Description

events	Monitored events count. Range is from 1 to 10. The default is 4.

Command Default

The number of DTE monitored events is 4.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **frame-relay lmi-n393dte** command is relevant only when the interface type is data terminal equipment (DTE).

This **frame-relay lmi-n393dte** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to set the Local Management Interface (LMI) monitored events count to 5.

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dte
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-n393dte 5
```

frame-relay lmi-t391dte

To set the Local Management Interface (LMI) polling interval, use the **frame-relay lmi-t391dte** command in interface configuration mode. To restore the default interval value, use the **no** form of this command.

frame-relay lmi-t391dte *seconds*

Syntax Description

seconds	Polling interval between each status inquiry from the DTE end, in seconds. Range is from 5 to 30. The default is 10.

Command Default

The LMI polling interval is 10 seconds.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

This **frame-relay lmi-t391dte** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

The *seconds* value defined in this command must be less than the polling verification timer defined in the **frame-relay lmi-t392 dce** command.

The **frame-relay lmi-t391dte** command is relevant only when the interface type is data terminal equipment (DCE).

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to set the LMI polling timer interval to 15 seconds:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dte
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-t391dte 15
```

frame-relay lmi-t392dce

To set the Local Management Interface (LMI) polling verification timer on the DCE, use the **frame-relay lmi-t392dce** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

frame-relay lmi-t392dce *seconds*

Syntax Description

seconds	Polling verification timer, in seconds. The range is from 5 to 30. The default is 15.

Command Default

The LMI polling verification timer is 15 seconds.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **frame-relay lmi-t392dce** command is used along with the **frame-relay lmi-t391dte** command to define the condition that causes the link to be declared down.

The *seconds* value defined in this command must be greater than the polling verification timer defined in the **frame-relay lmi-t391 dte** command.

This **frame-relay lmi-n392dce** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to set the Local Management Interface (LMI) polling timer interval to 30 seconds:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay intf-type dce
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-t392dce 30
```

frame-relay lmi-type

To select the Local Management Interface (LMI) type, use the **frame-relay lmi-type** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

frame-relay lmi-type [**ansi** | **cisco** | **q933a**]

Syntax Description

ansi	(Optional) Uses LMI as defined by ANSI T1.617a-1994 Annex D.
cisco	(Optional) Uses LMI as defined by Cisco (not standard).
q933a	(Optional) Uses LMI as defined by ITU-T Q.933 (02/2003) Annex A.

Command Default

The default is **cisco**.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

If the DTE is not explicitly configured or the **no** form is not used after explicit configuration, then the DTE automatically senses the LMI type of the DCE and use that type of LMI.

This **frame-relay lmi-type** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to set the Local Management Interface (LMI) type to Q.933, Annex A:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# frame-relay lmi-type q933a
```

frame-relay multilink ack

To configure the MFR acknowledge timeout value for a Frame Relay multilink bundle link, use the **frame-relay multilink ack** command in interface configuration mode. To revert to the default settings, use the **no** form of this command.

frame-relay multilink ack *ack-timeout*

Syntax Description

ack-timeout	Ack timeout value, in seconds. The range is from 1 to 10.

Command Default

The default MFR acknowledge timeout value is 4 seconds.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Note The **frame-relay multilink ack** command is supported only on serial interfaces. The **frame-relay multilink ack** command is not supported on Packet-over-SONET/SDH (POS) or multilink frame relay interfaces.

The **frame-relay multilink ack** command can be configured only on bundle link interfaces that have been associated with a bundle using the **encapsulation frame-relay mfr** command.

Note You can enter the **frame-relay multilink ack** command at any time without affecting the current state of the interface; however, the configured timeout value does not go into effect until the interface has gone from the down state to the up state. One way to bring the interface down and back up again is by using the **shutdown** and **no shutdown** commands in interface configuration mode.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to configure the MFR acknowledge timeout value as 2 seconds. for the serial interface 0/3/1/0:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/1/0
```

```
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink ack 2
```

Related Commands

Command	Description
encapsulation frame-relay, on page 408	Enables Frame Relay encapsulation.
frame-relay multilink bid, on page 424	Assigns a BID name to a multilink Frame Relay bundle.
show frame-relay lmi-info, on page 435	Displays frame relay information for the LMI.
shutdown (interface)	Disables an interface.

frame-relay multilink bandwidth-class

To configure the bandwidth class for a Frame Relay multilink bundle interface, use the **frame-relay multilink bid bandwidth-class** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

frame-relay multilink bandwidth-class {**a** | **b** | **c** *threshold*}

Syntax Description

a	Configures bandwidth class A. When one or more member links are up, the bundle interface is up. When all the member links are down, the bundle interface is down.
b	Configures bandwidth class B. When all the member links are up, the bundle interface is up. When any member link is down, the bundle interface is down.
c	Configures bandwidth class C. The bundle link *threshold* must be configured.
threshold	Minimum number of links that must be up for the bundle interface to be up. The range is 1 to 255.

Command Default

The default is a (Bandwidth Class A).

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Bandwidth class is configurable only under Frame Relay Forum 16.1 (FRF 16.1).

Note The **frame-relay multilink bandwidth-class** command is supported only on multilink frame relay interfaces. The **frame-relay multilink bandwidth-class** command is not supported on Packet-over-SONET/SDH (POS) or serial interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to set a multilink frame relay interface to bandwidth Class C with a threshold of 3:

```
RP/0/RSP0/CPU0:router(config)# interface Multilink 0/3/1/0/100
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink bandwidth-class c 3
```

Related Commands

Command	Description
show frame-relay lmi-info, on page 435	Displays Frame Relay information for the LMI.

frame-relay multilink bid

To create a name for a Frame Relay multilink bundle interface, use the **frame-relay multilink bid** command in interface configuration mode. To restore the default setting, use the **no** form of this command.

frame-relay multilink bid bundle-id-name

Syntax Description

bundle-id-name	Name for the Frame Relay multilink bundle. The bundle identifier (**bid**) name identifies the bundle interface at both endpoints. The **bid** name is exchanged in the information elements to ensure consistent link assignments. The **bid** name can be up to 50 characters including the null termination character. The **bid** name is configured at the bundle interface level and is applied to each member link.

Command Default

By default, the interface name, for example, Multilink 0/4/1/0/1, is used as the bundle identifier.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Note The **frame-relay multilink bid** command is supported only on multilink frame relay interfaces. The **frame-relay multilink bid** command is not supported on Packet-over-SONET/SDH (POS) or serial interfaces.

Regardless of whether you create a bundle identifier name using the **frame-relay multilink bid** command or whether the system uses the default name for the interface, each bundle should have a unique name.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to create a Frame Relay multilink interface bundle identifier name:

```
RP/0/RSP0/CPU0:router(config)# interface Multilink 0/3/1/0/100
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink bid MFRBundle
```

Related Commands

Command	Description
show frame-relay lmi-info, on page 435	Displays Frame Relay information for the LMI.

frame-relay multilink hello

To configure the hello interval used by a Frame Relay multilink bundle link, use the **frame-relay multilink hello** command in interface configuration mode. To reset the name to the default, use the **no** form of this command.

frame-relay multilink hello *hello-interval*

Syntax Description

hello-interval	Hello interval for the Frame Relay multilink bundle link, in seconds. The range is from 1 to 180.

Command Default

The default hello interval is 10 seconds.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Note The **frame-relay multilink hello** command is supported only on serial interfaces. The **frame-relay multilink hello** command is not supported on Packet-over-SONET/SDH (POS) or multilink frame relay interfaces.

The **frame-relay multilink hello** command can be configured only on bundle link interfaces that have been associated with a bundle using the **encapsulation frame-relay mfr** command.

Note You can enter the **frame-relay multilink hello** command at any time without affecting the current state of the interface; however, the configured hello interval value does not go into effect until the interface has gone from the down state to the up state. One way to bring the interface down and back up again is by using the **shutdown** and **no shutdown** commands in interface configuration mode.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to configure the hello interval value as 10 seconds. for the serial interface 0/3/1/0:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/1/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink hello 10
```

Related Commands

Command	Description
encapsulation frame-relay, on page 408	Enables Frame Relay encapsulation.
frame-relay multilink bid, on page 424	Assigns a BID name to a multilink Frame Relay bundle.
show frame-relay lmi-info, on page 435	Displays frame relay information for the LMI.
shutdown (interface)	Disables an interface.

frame-relay multilink lid

To create a name for a Frame Relay multilink bundle link, use the **frame-relay multilink lid** command in interface configuration mode. To reset the name to the default, use the **no** form of this command.

frame-relay multilink lid *link-id name*

Syntax Description

link-id name	Specifies the name for the Frame Relay multilink bundle link. The link identifier (lid) name can be up to 49 characters long.

Command Default

The name of the physical interface, for example, Serial 0/3/0/0/1/2:0, is used as the lid.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Note The **frame-relay multilink lid** command is supported only on serial interfaces. The **frame-relay multilink lid** command is not supported on Packet-over-SONET/SDH (POS) or multilink frame relay interfaces.

The **frame-relay multilink lid** command can be configured only on bundle link interfaces that have been associated with a bundle using the **encapsulation frame-relay mfr** command.

Note You can enter the **frame-relay multilink lid** command at any time without affecting the current state of the interface; however, the link identifier name does not go into effect until the interface has gone from the down state to the up state. One way to bring the interface down and back up again is by using the **shutdown** and **no shutdown** commands in interface configuration mode.

Thelid name is used to identify the bundle link to peer devices and to enable the devices to identify which bundle links are associated with which bundles. The lid name can also be assigned when the bundle link is created using the **encapsulation frame-relay mfr** command with the *name* argument. If a lid name is not assigned, the default lid is the name of the physical interface.

The local and peer lid names do not have to be unique. However, regardless of whether you create a lid name using the **frame-relay multilink lid** command or the systems uses the default name for the bundle link, each link within a bundle must have a unique name. If the same name is used by different links in the same bundle, the bundles will flap indefinitely.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to configure the lid name as ‘BL1’ for the serial interface 0/3/1/0:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/1/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink lid BL1
```

Related Commands

Command	Description
encapsulation frame-relay, on page 408	Enables Frame Relay encapsulation.
frame-relay multilink bid, on page 424	Assigns a BID name to a multilink Frame Relay bundle.
show frame-relay lmi-info, on page 435	Displays frame relay information for the LMI.
shutdown (interface)	Disables an interface.

frame-relay multilink retry

To configure the retry count for retransmissions for a Frame Relay multilink bundle link, use the **frame-relay multilink retry** command in interface configuration mode. To reset the name to the default, use the **no** form of this command.

frame-relay multilink retry *retry-count*

Syntax Description

retry-count	Retry count for retransmissions. The range is from 1 to 5.

Command Default

The default retry count for retransmissions is 2.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Note The **frame-relay multilink retry** command is supported only on serial interfaces. The **frame-relay multilink retry** command is not supported on Packet-over-SONET/SDH (POS) or multilink frame relay interfaces.

The **frame-relay multilink retry** command can be configured only on bundle link interfaces that have been associated with a bundle using the **encapsulation frame-relay mfr** command.

Note You can enter the **frame-relay multilink retry** command at any time without affecting the current state of the interface; however, the configured retry count value does not go into effect until the interface has gone from the down state to the up state. One way to bring the interface down and back up again is by using the **shutdown** and **no shutdown** commands in interface configuration mode.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to configure the retry count for retransmissions as 2 on the serial interface 0/3/1/0:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/1/0
RP/0/RSP0/CPU0:router(config-if)# frame-relay multilink retry 2
```

Related Commands

Command	Description
encapsulation frame-relay, on page 408	Enables Frame Relay encapsulation.
frame-relay multilink bid, on page 424	Assigns a BID name to a multilink Frame Relay bundle.
show frame-relay lmi-info, on page 435	Displays frame relay information for the LMI.
shutdown (interface)	Disables an interface.

pvc (frame relay)

To associate a data-link connection identifier (DLCI) number to a permanent virtual circuit (PVC), and to enter Frame Relay PVC configuration mode, use the **pvc** command in subinterface configuration mode. To delete the PVC, use the **no** form of this command.

pvc *dlci-number*

Syntax Description

dlci-number	DLCI number used to identify the PVC. The range is from 16 to 1007.

Command Default

No PVC is defined.

Command Modes

Subinterface configuration (config-subif)

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Commands available in Frame Relay PVC configuration mode are:

```
RP/0/RSP0/CPU0:router(config-fr-vc)# ?

  commit    Commit the configuration changes to running
  describe  Describe a command without taking real actions
  do        Run an exec command
  encap     Set the Encapsulation of this PVC
  exit      Exit from this submode
  no        Negate a command or set its defaults
  show      Show contents of configuration
```

The **pvc** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to create a PVC with DLCI 16:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/4/0/0.1 l2transport
RP/0/RSP0/CPU0:router(config-subif)# pvc 16
RP/0/RSP0/CPU0:router(config-fr-vc)#
```

show frame-relay lmi

To display Frame Relay statistics for the Local Management Interface (LMI), use the **show frame-relay lmi** command in EXEC mode.

show frame-relay lmi [**interface** *type interface-path-id* | **location** *node-id*]

Syntax Description

interface	(Optional) Interface for which information is to be displayed.Use the *interface-path-id* argument to specify the interface.
type	(Optional) 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.
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.

Command Default

Frame Relay LMI statistics are displayed for all interfaces enabled for LMI.

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **show frame-relay lmi** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

This command is used to check the status enquiry and status message between DCE and DTE.

Task ID

Task ID	Operations
fr	read

Examples

The following example shows the output from the **show frame-relay lmi** command:

```
RP/0/RSP0/CPU0:router# show frame-relay lmi

LMI Statistics for interface POS0/1/0/0/ (Frame Relay DCE) LMI TYPE = ANSI
```

```
  Invalid Unnumbered Info 0             Invalid Prot Disc 0
  Invalid Dummy Call Ref 0              Invalid Msg Type 0
  Invalid Status Message 0              Invalid Lock Shift 9
  Invalid Information ID 0              Invalid Report IE Len 0
  Invalid Report Request 0              Invalid Keep IE Len 0
  Num Status Enq. Rcvd 9444             Num Status Msgs Sent 9444
  Num Full Status Sent 1578             Num St Enq. Timeouts 41
  Num Link Timeouts 7

LMI Statistics for interface POS0/1/0/1/ (Frame Relay DCE) LMI TYPE = CISCO
  Invalid Unnumbered Info 0             Invalid Prot Disc 0
  Invalid Dummy Call Ref 0              Invalid Msg Type 0
  Invalid Status Message 0              Invalid Lock Shift 0
  Invalid Information ID 0              Invalid Report IE Len 0
  Invalid Report Request 0              Invalid Keep IE Len 0
  Num Status Enq. Rcvd 9481             Num Status Msgs Sent 9481
  Num Full Status Sent 1588             Num St Enq. Timeouts 16
  Num Link Timeouts 4
```

Table 24: show frame-relay lmi Field Descriptions

Field	Description
LMI Statistics	Signaling or LMI specification: CISCO, ANSI, or CCITT. **Note** CCITT is LMI as defined by ITU-T Q.933 (02/2003) Annex A.
Invalid Unnumbered Info	Number of received LMI messages with invalid unnumbered information field.
Invalid Dummy Call	Number of received LMI messages with invalid dummy calls.
Invalid Status Message	Number of received LMI messages with invalid status message.
Invalid Information ID	Number of received LMI messages with invalid information identifier.
Invalid Report Request	Number of received LMI messages with invalid report request.
Num Status Enq. Rcvd	Number of LMI status enquiry messages received.
Num Link Timeouts	Number of link timeouts.
Invalid Prot Disc	Number of received LMI messages with invalid protocol discriminator.
Invalid Msg Type	Number or received LMI messages with invalid message type.
Invalid Lock Shift	Number of received LMI messages with invalid lock shift type.
Invalid Report IE Len	Number of received LMI messages with invalid report IE Length.
Invalid Keep IE Len	Number of received LMI messages with invalid report request.
Num Status Msgs Sent	Number of LMI status enquiry messages sent.
Num St Enq. Timeouts	Number of times the status enquiry message was not received within the T392 DCE timer value.

show frame-relay lmi-info

To display Frame Relay information for the Local Management Interface (LMI), use the **show frame-relay lmi -info** command in EXEC mode.

show frame-relay lmi-info [**interface** *type interface-path-id* | **location** *node-id*] [**detail**]

Syntax Description

interface	(Optional) Displays information on the the interface specified by the *type interface-path-id* argument.
type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
location *node-id*	(Optional) Displays information about all interfaces on the specified node. The *node-id* argument is entered in the *rack/slot/module* notation.
detail	(Optional) Displays managed dcli list.

Command Default

Displays LMI information for all Frame Relay interfaces enabled for LMI.

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **show frame-relay lmi-info** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

This command is used to check the status enquiry and status message between DCE and DTE.

Task ID

Task ID	Operations
fr	read

Examples

The following example shows sample output for the **show frame-relay lmi-info** command:

```
RP/0/RSP0/CPU0:router# show frame-relay lmi-info
```

```
LMI IDB Info for interface Multilink0/3/0/0/2
  ifhandle:             0x6176840
  Interface type:       DTE
  Interface state:      UP
  Line Protocol:        UP
  LMI type (cnf/oper):  AUTO/CISCO
  LMI type autosense:   OFF
  Interface MTU:        1504
  -------------- DTE -------------
  T391:                 10s
  N391: (cnf/oper):     6/5
  N392: (cnf/oper):     3/0
  N393:                 4
  My seq#:              83
  My seq# seen:         83
  Your seq# seen:       82
  -------------- DCE -------------
  T392:                 15s
  N392: (cnf/oper):     3/0
  N393:                 4
  My seq#:              0
  My seq# seen:         0
  Your seq# seen:       0
LMI IDB Info for interface Multilink0/3/0/0/1
  ifhandle:             0x6186240
  Interface type:       DTE
  Interface state:      UP
  Line Protocol:        UP
  LMI type (cnf/oper):  AUTO/CISCO
  LMI type autosense:   OFF
  Interface MTU:        1504
  -------------- DTE -------------
  T391:                 10s
  N391: (cnf/oper):     6/5
  N392: (cnf/oper):     3/0
  N393:                 4
  My seq#:              83
  My seq# seen:         83
  Your seq# seen:       82
  -------------- DCE -------------
  T392:                 15s
  N392: (cnf/oper):     3/0
  N393:                 4
  My seq#:              0
  My seq# seen:         0
  Your seq# seen:       0
```

Table 25: show frame-relay lmi-info Field Descriptions

Field	Description
DTE	
T391	Local Management Interface polling interval
N391	Full status polling interval
N392	Error threshold value
N393	DTE monitored events count

Field	Description
DCE	
T392	Local Management Interface polling verification timer
N392	Error threshold value
N393	DCE monitored events count

show frame-relay multilink

To display the multilink Frame-Relay (MFR) information about the given interface along with MFR protocol and internal statistics, use the **show frame-relay multilink interface** command in EXEC mode.

show frame-relay multilink [**detail** [**location** *node id*] | **interface** *type interface-path-id* [**detail** | **verbose**] | **location** *node id* | **verbose** [**location** *node id*]]

Syntax Description

detail	(Optional) Displays Interface Descriptor Block (IDB) information and Feasible Successor Metrics (FSM) statistics.
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.
interface	(Optional) Interface for which you want to display information.
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.
verbose	(Optional) Displays IDB information, FSM statistics and internal statistics.

Command Default

No default behavior or values

Command Modes

EXEC mode

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
fr	read

Examples

The following example shows how to display the multilink Frame-Relay information for all interfaces:

```
RP/0/RSP0/CPU0:router# show frame-relay multilink
```

```
Bundle interface: Multilink0/3/0/0/1, ifhandle 0x060322c0
    Member Links: 2 active, 0 inactive
    State = Up,   BW Class = A

    Member Links:
    Serial0/3/0/0/1/2:0,   HW state = Up, link state = Up
    Serial0/3/0/0/1/1:0,   HW state = Up, link state = Up


Bundle interface: Multilink0/3/0/0/2, ifhandle 0x06032280
    Member Links: 2 active, 0 inactive
    State = Up,   BW Class = A

    Member Links:
    Serial0/3/0/0/1/4:0,   HW state = Up, link state = Up
    Serial0/3/0/0/1/3:0,   HW state = Up, link state = Up


Member interface: Serial0/3/0/0/1/1:0, ifhandle 0x060323c0
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/3/0/0/1 with ifhandle 0x060322c0


Member interface: Serial0/3/0/0/1/2:0, ifhandle 0x06032380
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/3/0/0/1 with ifhandle 0x060322c0


Member interface: Serial0/3/0/0/1/3:0, ifhandle 0x06032340
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/3/0/0/2 with ifhandle 0x06032280


Member interface: Serial0/3/0/0/1/4:0, ifhandle 0x06032300
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/3/0/0/2 with ifhandle 0x06032280
```

The following example shows how to display detailed multilink Frame-Relay information for all interfaces, including IDB information and FSM statistics:

```
RP/0/RSP0/CPU0:router# show frame-relay multilink detail

Bundle interface: Multilink0/3/0/0/1, ifhandle 0x060322c0
    Member Links: 2 active, 0 inactive
    State = Up,   BW Class = A
      nodeid:             0x838
      group:              1
      my_bid:             Multilink0/3/0/0/1
      peer_bid:           Multilink0/6/0/0/1
      magic:              0x696d8a95
      flags:              0x0
      im_state:           3  [Up]
      fsm_req_state:      3  [Up]
      is_owned_resource:  Y
      is_zombie:          N
      active_mbr_count:   2
      cfg_bid:
      bw_class:           1
      bw_class_threshold: 0


    =============== Member Links ===============
```

```
Serial0/3/0/0/1/2:0,   HW state = Up, link state = Up
  my_lid:         Serial0/3/0/0/1/2:0
  peer_lid:       Serial0/6/0/0/1/2:0
  flags:          0x0
  fsm_state:      3  [Up]
  im_state:       3  [Up]
  fsm_req_state:  3  [Up]
  cause:          0  [None]
  retry_count:    0
  in_loopback:    No
  bc_init_rcvd:   Yes
  bc_owned_res:   Yes
  cc_owned_res:   Yes
  is_parent_up:   Yes
  Last Packet Tx: 00:00:09 ago
  Round trip:     00:00.000 (0 secs 999997 nsecs)
  Min Round trip: 00:00.000 (0 secs 999997 nsecs)
  Max Round trip: 00:00.003 (0 secs 3999988 nsecs)
  cfg_lid:
  mfr_t_hello:    10
  mfr_t_ack:      4
  mfr_retry_max:  2
  --------------- Member Link Statistics ---------------
  Add Link Tx:                3     Add Link Rx:                2
  Add Link Ack Tx:            2     Add Link Ack Rx:            1
  Add Link Rej Tx:            0     Add Link Rej Rx:            0
  Remove Link Tx:             0     Remove Link Rx:             0
  Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
  Hello Tx:                6235     Hello Rx:                6236
  Hello Ack Tx:            6236     Hello Ack Rx:            6235
  Loopback Detected:          0     Invalid Pkts Rx:            0
  Bundle Mismatch:            0     Expired Ack Rx:             0
  Hello Timer expiry:      6236     Ack Timer expiry:           1

Serial0/3/0/0/1/1:0,   HW state = Up, link state = Up
  my_lid:         Serial0/3/0/0/1/1:0
  peer_lid:       Serial0/6/0/0/1/1:0
  flags:          0x0
  fsm_state:      3  [Up]
  im_state:       3  [Up]
  fsm_req_state:  3  [Up]
  cause:          0  [None]
  retry_count:    0
  in_loopback:    No
  bc_init_rcvd:   Yes
  bc_owned_res:   Yes
  cc_owned_res:   Yes
  is_parent_up:   Yes
  Last Packet Tx: 00:00:01 ago
  Round trip:     00:00.000 (0 secs 999997 nsecs)
  Min Round trip: 00:00.000 (0 secs 999997 nsecs)
  Max Round trip: 00:00.004 (0 secs 4999985 nsecs)
  cfg_lid:
  mfr_t_hello:    10
  mfr_t_ack:      4
  mfr_retry_max:  2
  --------------- Member Link Statistics ---------------
  Add Link Tx:                3     Add Link Rx:                2
  Add Link Ack Tx:            2     Add Link Ack Rx:            1
  Add Link Rej Tx:            0     Add Link Rej Rx:            0
  Remove Link Tx:             0     Remove Link Rx:             0
  Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
  Hello Tx:                6234     Hello Rx:                6237
```

```
  Hello Ack Tx:             6237     Hello Ack Rx:             6234
  Loopback Detected:           0     Invalid Pkts Rx:             0
  Bundle Mismatch:             0     Expired Ack Rx:              0
  Hello Timer expiry:       6235     Ack Timer expiry:            1


Bundle interface: Multilink0/3/0/0/2, ifhandle 0x06032280
    Member Links: 2 active, 0 inactive
    State = Up,   BW Class = A
      nodeid:             0x838
      group:              2
      my_bid:             Multilink0/3/0/0/2
      peer_bid:           Multilink0/6/0/0/2
      magic:              0x303c008f
      flags:              0x0
      im_state:           3  [Up]
      fsm_req_state:      3  [Up]
      is_owned_resource:  Y
      is_zombie:          N
      active_mbr_count:   2
      cfg_bid:
      bw_class:           1
      bw_class_threshold: 0


    =============== Member Links ===============

    Serial0/3/0/0/1/4:0,   HW state = Up, link state = Up
      my_lid:         Serial0/3/0/0/1/4:0
      peer_lid:       Serial0/6/0/0/1/4:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:00 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.004 (0 secs 4999985 nsecs)
      cfg_lid:
      mfr_t_hello:    10
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                 3     Add Link Rx:                 2
      Add Link Ack Tx:             2     Add Link Ack Rx:             1
      Add Link Rej Tx:             0     Add Link Rej Rx:             0
      Remove Link Tx:              0     Remove Link Rx:              0
      Remove Link Ack Tx:          0     Remove Link Ack Rx:          0
      Hello Tx:                 6236     Hello Rx:                 6235
      Hello Ack Tx:             6235     Hello Ack Rx:             6236
      Loopback Detected:           0     Invalid Pkts Rx:             0
      Bundle Mismatch:             0     Expired Ack Rx:              0
      Hello Timer expiry:       6237     Ack Timer expiry:            1

    Serial0/3/0/0/1/3:0,   HW state = Up, link state = Up
      my_lid:         Serial0/3/0/0/1/3:0
```

```
      peer_lid:       Serial0/6/0/0/1/3:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:01 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.003 (0 secs 3999988 nsecs)
      cfg_lid:
      mfr_t_hello:    10
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                3     Add Link Rx:                2
      Add Link Ack Tx:            2     Add Link Ack Rx:            1
      Add Link Rej Tx:            0     Add Link Rej Rx:            0
      Remove Link Tx:             0     Remove Link Rx:             0
      Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
      Hello Tx:                6236     Hello Rx:                6237
      Hello Ack Tx:            6237     Hello Ack Rx:            6236
      Loopback Detected:          0     Invalid Pkts Rx:            0
      Bundle Mismatch:            0     Expired Ack Rx:             0
      Hello Timer expiry:      6237     Ack Timer expiry:           1

  Member interface: Serial0/3/0/0/1/1:0, ifhandle 0x060323c0
    HW state = Up, link state = Up
    Member of bundle interface Multilink0/3/0/0/1 with ifhandle 0x060322c0
    Local bid: Multilink0/3/0/0/1  Peer bid: Multilink0/6/0/0/1
      my_lid:         Serial0/3/0/0/1/1:0
      peer_lid:       Serial0/6/0/0/1/1:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:00 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.004 (0 secs 4999985 nsecs)
      cfg_lid:
      mfr_t_hello:    10
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                3     Add Link Rx:                2
      Add Link Ack Tx:            2     Add Link Ack Rx:            1
      Add Link Rej Tx:            0     Add Link Rej Rx:            0
      Remove Link Tx:             0     Remove Link Rx:             0
      Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
      Hello Tx:                6235     Hello Rx:                6237
```

```
      Hello Ack Tx:             6237     Hello Ack Rx:             6235
      Loopback Detected:           0     Invalid Pkts Rx:             0
      Bundle Mismatch:             0     Expired Ack Rx:              0
      Hello Timer expiry:       6236     Ack Timer expiry:            1

Member interface: Serial0/3/0/0/1/2:0, ifhandle 0x06032380
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/3/0/0/1 with ifhandle 0x060322c0
  Local bid: Multilink0/3/0/0/1  Peer bid: Multilink0/6/0/0/1
      my_lid:         Serial0/3/0/0/1/2:0
      peer_lid:       Serial0/6/0/0/1/2:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:00 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.003 (0 secs 3999988 nsecs)
      cfg_lid:
      mfr_t_hello:    10
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                 3     Add Link Rx:                 2
      Add Link Ack Tx:             2     Add Link Ack Rx:             1
      Add Link Rej Tx:             0     Add Link Rej Rx:             0
      Remove Link Tx:              0     Remove Link Rx:              0
      Remove Link Ack Tx:          0     Remove Link Ack Rx:          0
      Hello Tx:                 6236     Hello Rx:                 6237
      Hello Ack Tx:             6237     Hello Ack Rx:             6236
      Loopback Detected:           0     Invalid Pkts Rx:             0
      Bundle Mismatch:             0     Expired Ack Rx:              0
      Hello Timer expiry:       6237     Ack Timer expiry:            1

Member interface: Serial0/3/0/0/1/3:0, ifhandle 0x06032340
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/3/0/0/2 with ifhandle 0x06032280
  Local bid: Multilink0/3/0/0/2  Peer bid: Multilink0/6/0/0/2
      my_lid:         Serial0/3/0/0/1/3:0
      peer_lid:       Serial0/6/0/0/1/3:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:02 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.003 (0 secs 3999988 nsecs)
      cfg_lid:
```

```
      mfr_t_hello:    10
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                3     Add Link Rx:                2
      Add Link Ack Tx:            2     Add Link Ack Rx:            1
      Add Link Rej Tx:            0     Add Link Rej Rx:            0
      Remove Link Tx:             0     Remove Link Rx:             0
      Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
      Hello Tx:                6236     Hello Rx:                6237
      Hello Ack Tx:            6237     Hello Ack Rx:            6236
      Loopback Detected:          0     Invalid Pkts Rx:            0
      Bundle Mismatch:            0     Expired Ack Rx:             0
      Hello Timer expiry:      6237     Ack Timer expiry:           1

Member interface: Serial0/3/0/0/1/4:0, ifhandle 0x06032300
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/3/0/0/2 with ifhandle 0x06032280
  Local bid: Multilink0/3/0/0/2  Peer bid: Multilink0/6/0/0/2
      my_lid:         Serial0/3/0/0/1/4:0
      peer_lid:       Serial0/6/0/0/1/4:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:01 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.004 (0 secs 4999985 nsecs)
      cfg_lid:
      mfr_t_hello:    10
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                3     Add Link Rx:                2
      Add Link Ack Tx:            2     Add Link Ack Rx:            1
      Add Link Rej Tx:            0     Add Link Rej Rx:            0
      Remove Link Tx:             0     Remove Link Rx:             0
      Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
      Hello Tx:                6236     Hello Rx:                6235
      Hello Ack Tx:            6235     Hello Ack Rx:            6236
      Loopback Detected:          0     Invalid Pkts Rx:            0
      Bundle Mismatch:            0     Expired Ack Rx:             0
      Hello Timer expiry:      6237     Ack Timer expiry:           1
```

The following example shows how to display detailed multilink Frame Relay information for all interfaces, including IDB information and FSM statistics, on a Cisco 2-Port Channelized OC-12c/DS0 SPA:

```
RP/0/RSP0/CPU0:router# show frame-relay multilink detail
Fri Mar 25 14:04:05.425 UTC
Bundle interface: Multilink0/2/1/0/1, ifhandle 0x04002840
    Member Links: 2 active, 0 inactive
    State = Up,   BW Class = A
      nodeid:             0x829
      group:              1
```

```
  my_bid:             Multilink0/2/1/0/1
  peer_bid:           Multilink0/2/1/0/1
  magic:              0x75b06726
  flags:              0x0
  im_state:           3  [Up]
  fsm_req_state:      3  [Up]
  is_owned_resource:  Y
  is_zombie:          N
  active_mbr_count:   2
  cfg_bid:
  bw_class:           1

  bw_class_threshold: 0


=============== Member Links ===============

Serial0/2/1/0/1/2:0,   HW state = Up, link state = Up
  my_lid:         Serial0/2/1/0/1/2:0
  peer_lid:       Serial0/2/1/0/1/2:0
  flags:          0x0
  fsm_state:      3  [Up]
  im_state:       3  [Up]
  fsm_req_state:  3  [Up]
  cause:          0  [None]
  retry_count:    0
  in_loopback:    No
  bc_init_rcvd:   Yes
  bc_owned_res:   Yes
  cc_owned_res:   Yes
  is_parent_up:   Yes
  Last Packet Tx: 00:00:06 ago
  Round trip:     00:00.000 (0 secs 999997 nsecs)
  Min Round trip: 00:00.000 (0 secs 999997 nsecs)
  Max Round trip: 00:00.002 (0 secs 2999991 nsecs)
  cfg_lid:
  mfr_t_hello:    10
  mfr_t_ack:      4
  mfr_retry_max:  2
  --------------- Member Link Statistics ---------------
  Add Link Tx:                2     Add Link Rx:                1
  Add Link Ack Tx:            1     Add Link Ack Rx:            1
  Add Link Rej Tx:            0     Add Link Rej Rx:            0
  Remove Link Tx:             0     Remove Link Rx:             0
  Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
  Hello Tx:                   2     Hello Rx:                   2
  Hello Ack Tx:               2     Hello Ack Rx:               2
  Loopback Detected:          0     Invalid Pkts Rx:            1
  Bundle Mismatch:            0     Expired Ack Rx:             0
  Hello Timer expiry:         2     Ack Timer expiry:           0

Serial0/2/1/0/1/1:0,   HW state = Up, link state = Up
  my_lid:         Serial0/2/1/0/1/1:0
  peer_lid:       Serial0/2/1/0/1/1:0
  flags:          0x0
  fsm_state:      3  [Up]
  im_state:       3  [Up]
  fsm_req_state:  3  [Up]
  cause:          0  [None]
  retry_count:    0
  in_loopback:    No
  bc_init_rcvd:   Yes
  bc_owned_res:   Yes
  cc_owned_res:   Yes
```

```
    is_parent_up:   Yes
    Last Packet Tx: 00:00:06 ago
    Round trip:     00:00.000 (0 secs 999997 nsecs)
    Min Round trip: 00:00.000 (0 secs 999997 nsecs)
    Max Round trip: 00:00.002 (0 secs 2999991 nsecs)
    cfg_lid:
    mfr_t_hello:    10
    mfr_t_ack:      4
    mfr_retry_max:  2
    --------------- Member Link Statistics ---------------
    Add Link Tx:                2     Add Link Rx:                1
    Add Link Ack Tx:            1     Add Link Ack Rx:            1
    Add Link Rej Tx:            0     Add Link Rej Rx:            0
    Remove Link Tx:             0     Remove Link Rx:             0
    Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
    Hello Tx:                   2     Hello Rx:                   2
    Hello Ack Tx:               2     Hello Ack Rx:               2
    Loopback Detected:          0     Invalid Pkts Rx:            1
    Bundle Mismatch:            0     Expired Ack Rx:             0
    Hello Timer expiry:         2     Ack Timer expiry:           0


Bundle interface: Multilink0/2/1/0/2, ifhandle 0x04002880
    Member Links: 2 active, 0 inactive
    State = Up,   BW Class = A
      nodeid:             0x829
      group:              2
      my_bid:             Multilink0/2/1/0/2
      peer_bid:           Multilink0/2/1/0/2
      magic:              0x41f1f15a
      flags:              0x0
      im_state:           3  [Up]
      fsm_req_state:      3  [Up]
      is_owned_resource:  Y
      is_zombie:          N
      active_mbr_count:   2
      cfg_bid:
      bw_class:           1
      bw_class_threshold: 0


    =============== Member Links ===============

    Serial0/2/1/0/1/4:0,   HW state = Up, link state = Up
      my_lid:         Serial0/2/1/0/1/4:0
      peer_lid:       Serial0/2/1/0/1/4:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:06 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.002 (0 secs 2999991 nsecs)
      cfg_lid:
      mfr_t_hello:    10
```

```
    mfr_t_ack:      4
    mfr_retry_max:  2
    --------------- Member Link Statistics ---------------
    Add Link Tx:                2     Add Link Rx:                1
    Add Link Ack Tx:            1     Add Link Ack Rx:            1
    Add Link Rej Tx:            0     Add Link Rej Rx:            0
    Remove Link Tx:             0     Remove Link Rx:             0
    Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
    Hello Tx:                   2     Hello Rx:                   2
    Hello Ack Tx:               2     Hello Ack Rx:               2
    Loopback Detected:          0     Invalid Pkts Rx:            1
    Bundle Mismatch:            0     Expired Ack Rx:             0
    Hello Timer expiry:         2     Ack Timer expiry:           0

  Serial0/2/1/0/1/3:0,   HW state = Up, link state = Up
    my_lid:         Serial0/2/1/0/1/3:0
    peer_lid:       Serial0/2/1/0/1/3:0
    flags:          0x0
    fsm_state:      3  [Up]
    im_state:       3  [Up]
    fsm_req_state:  3  [Up]
    cause:          0  [None]
    retry_count:    0
    in_loopback:    No
    bc_init_rcvd:   Yes
    bc_owned_res:   Yes
    cc_owned_res:   Yes
    is_parent_up:   Yes
    Last Packet Tx: 00:00:06 ago
    Round trip:     00:00.000 (0 secs 999997 nsecs)
    Min Round trip: 00:00.000 (0 secs 999997 nsecs)
    Max Round trip: 00:00.002 (0 secs 2999991 nsecs)
    cfg_lid:
    mfr_t_hello:    10
    mfr_t_ack:      4
    mfr_retry_max:  2
    --------------- Member Link Statistics ---------------
    Add Link Tx:                2     Add Link Rx:                1
    Add Link Ack Tx:            1     Add Link Ack Rx:            1
    Add Link Rej Tx:            0     Add Link Rej Rx:            0
    Remove Link Tx:             0     Remove Link Rx:             0
    Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
    Hello Tx:                   2     Hello Rx:                   2
    Hello Ack Tx:               2     Hello Ack Rx:               2
    Loopback Detected:          0     Invalid Pkts Rx:            1
    Bundle Mismatch:            0     Expired Ack Rx:             0
    Hello Timer expiry:         2     Ack Timer expiry:           0
```

The following example shows how to display detailed multilink Frame Relay information for all interfaces, including IDB information and FSM statistics, on a Cisco 4-Port Channelized T3 SPA:

```
RP/0/RSP0/CPU0:router# show frame-relay multilink detail
Member interface: Serial0/0/0/0/1:0, ifhandle 0x00005180
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/0/0/0/1 with ifhandle 0x00005280
  Local bid: Multilink0/0/0/0/1  Peer bid: Multilink0/0/0/0/1
      my_lid:         Serial0/0/0/0/1:0
      peer_lid:       Serial0/0/0/0/1:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
```

```
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:06 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.001 (0 secs 1999994 nsecs)
      cfg_lid:
      mfr_t_hello:    10
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                3     Add Link Rx:                1
      Add Link Ack Tx:            1     Add Link Ack Rx:            1
      Add Link Rej Tx:            0     Add Link Rej Rx:            0
      Remove Link Tx:             0     Remove Link Rx:             0
      Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
      Hello Tx:               21692     Hello Rx:               21690
      Hello Ack Tx:           21690     Hello Ack Rx:           21692
      Loopback Detected:          0     Invalid Pkts Rx:            0
      Bundle Mismatch:            0     Expired Ack Rx:             0
      Hello Timer expiry:     21693     Ack Timer expiry:           1


Member interface: Serial0/0/0/0/2:0, ifhandle 0x000051c0
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/0/0/0/1 with ifhandle 0x00005280
  Local bid: Multilink0/0/0/0/1  Peer bid: Multilink0/0/0/0/1
      my_lid:         Serial0/0/0/0/2:0
      peer_lid:       Serial0/0/0/0/2:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:03 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.001 (0 secs 1999994 nsecs)
      cfg_lid:
      mfr_t_hello:    10
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                3     Add Link Rx:                1
      Add Link Ack Tx:            1     Add Link Ack Rx:            1
      Add Link Rej Tx:            0     Add Link Rej Rx:            0
      Remove Link Tx:             0     Remove Link Rx:             0
      Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
      Hello Tx:               21688     Hello Rx:               21694
      Hello Ack Tx:           21694     Hello Ack Rx:           21688
      Loopback Detected:          0     Invalid Pkts Rx:            0
      Bundle Mismatch:            0     Expired Ack Rx:             0
      Hello Timer expiry:     21689     Ack Timer expiry:           1
```

```
Member interface: Serial0/0/0/0/3:0, ifhandle 0x00005200
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/0/0/0/2 with ifhandle 0x000052c0
  Local bid: Multilink0/0/0/0/2  Peer bid: Multilink0/0/0/0/2
      my_lid:         Serial0/0/0/0/3:0
      peer_lid:       Serial0/0/0/0/3:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:03 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.001 (0 secs 1999994 nsecs)
      cfg_lid:
      mfr_t_hello:    10
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                3     Add Link Rx:                1
      Add Link Ack Tx:            1     Add Link Ack Rx:            1
      Add Link Rej Tx:            0     Add Link Rej Rx:            0
      Remove Link Tx:             0     Remove Link Rx:             0
      Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
      Hello Tx:               21694     Hello Rx:               21689
      Hello Ack Tx:           21689     Hello Ack Rx:           21694
      Loopback Detected:          0     Invalid Pkts Rx:            0
      Bundle Mismatch:            0     Expired Ack Rx:             0
      Hello Timer expiry:     21695     Ack Timer expiry:           1


Member interface: Serial0/0/0/0/4:0, ifhandle 0x00005240
  HW state = Up, link state = Up
  Member of bundle interface Multilink0/0/0/0/2 with ifhandle 0x000052c0
  Local bid: Multilink0/0/0/0/2  Peer bid: Multilink0/0/0/0/2
      my_lid:         Serial0/0/0/0/4:0
      peer_lid:       Serial0/0/0/0/4:0
      flags:          0x0
      fsm_state:      3  [Up]
      im_state:       3  [Up]
      fsm_req_state:  3  [Up]
      cause:          0  [None]
      retry_count:    0
      in_loopback:    No
      bc_init_rcvd:   Yes
      bc_owned_res:   Yes
      cc_owned_res:   Yes
      is_parent_up:   Yes
      Last Packet Tx: 00:00:00 ago
      Round trip:     00:00.000 (0 secs 999997 nsecs)
      Min Round trip: 00:00.000 (0 secs 999997 nsecs)
      Max Round trip: 00:00.001 (0 secs 1999994 nsecs)
      cfg_lid:
      mfr_t_hello:    10
```

```
      mfr_t_ack:      4
      mfr_retry_max:  2
      --------------- Member Link Statistics ---------------
      Add Link Tx:                3     Add Link Rx:                1
      Add Link Ack Tx:            1     Add Link Ack Rx:            1
      Add Link Rej Tx:            0     Add Link Rej Rx:            0
      Remove Link Tx:             0     Remove Link Rx:             0
      Remove Link Ack Tx:         0     Remove Link Ack Rx:         0
      Hello Tx:               21691     Hello Rx:               21689
      Hello Ack Tx:           21689     Hello Ack Rx:           21691
      Loopback Detected:          0     Invalid Pkts Rx:            0
      Bundle Mismatch:            0     Expired Ack Rx:             0
      Hello Timer expiry:     21692     Ack Timer expiry:           1


Bundle interface: Multilink0/0/0/0/1, ifhandle 0x00005280
    Member Links: 2 active, 0 inactive
    State = Up,   BW Class = A
      nodeid:             0x808
      group:              1
      my_bid:             Multilink0/0/0/0/1
      peer_bid:           Multilink0/0/0/0/1
      magic:              0x48bac00c
      flags:              0x0
      im_state:           3  [Up]
      fsm_req_state:      3  [Up]
      is_owned_resource:  Y
      is_zombie:          N
      active_mbr_count:   2
      cfg_bid:
      bw_class:           1
      bw_class_threshold: 0
```

The following example shows how to display the multilink Frame-Relay information for the interface at location 0/3/0/0/1:

```
RP/0/RSP0/CPU0:router# show frame-relay multilink interface multilink 0/3/0/0/1

Bundle interface: Multilink0/3/0/0/1, ifhandle 0x060322c0
    Member Links: 2 active, 0 inactive
    State = Up,   BW Class = A

    Member Links:
    Serial0/3/0/0/1/2:0,   HW state = Up, link state = Up
    Serial0/3/0/0/1/1:0,   HW state = Up, link state = Up
```

Related Commands

Command	Description
interface multilink, on page 633	Configures a multilink interface and enters multilink interface configuration mode.
frame-relay multilink bid, on page 424	Creates a name for a Frame Relay multilink bundle interface.

show frame-relay pvc

To display statistics about Frame Relay permanent virtual circuits (PVCs), use the **show frame-relay pvc** command in EXEC mode.

show frame-relay pvc [**interface** *type interface-path-id* | **location** *node-id*] [*dlci-number*]

Syntax Description

interface	(Optional) Interface for which information is to be displayed. Use the *type* and *interface-path-id* arguments to specify the interface.
type	(Optional) 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.
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.
dlci-number	(Optional) DLCI number used to identify the PVC. The range is from 16 to 1007.

Command Default

Information for all Frame Relay interfaces and PVCs is displayed.

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **show frame-relay pvc** command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

This command is used to check the status of PVCs on interfaces.

Task ID

Task ID	Operations
fr	read

Examples

The following example shows the output from the **show frame-relay pvc** command:

```
RP/0/RSP0/CPU0:router# show frame-relay pvc
```

```
PVC Statistics for interface POS0/3/2/0 (Frame Relay DCE)

             Active     Inactive      Deleted       Static
  Local          4            0            0            0
  Switched       0            0            0            0
  Dynamic        0            0            0            0

DLCI = 612, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACT
VE, INTERFACE = POS0/3/2/0.1
  input pkts 0          output pkts 0           in bytes 0
  out bytes 0           dropped pkts 0          in FECN packets 0
  in BECN pkts 0        out FECN pkts 0         out BECN pkts 0
  in DE pkts 0          out DE pkts 0
  out bcast pkts 0      out bcast bytes 0
  pvc create time 00:00:00      last time pvc status changed 00:00:00

DLCI = 613, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACT
VE, INTERFACE = POS0/3/2/0.2
  input pkts 0          output pkts 0           in bytes 0
  out bytes 0           dropped pkts 0          in FECN packets 0
  in BECN pkts 0        out FECN pkts 0         out BECN pkts 0
  in DE pkts 0          out DE pkts 0
  out bcast pkts 0      out bcast bytes 0
  pvc create time 00:00:00      last time pvc status changed 00:00:00

DLCI = 614, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACT
VE, INTERFACE = POS0/3/2/0.3
  input pkts 0          output pkts 0           in bytes 0
  out bytes 0           dropped pkts 0          in FECN packets 0
  in BECN pkts 0        out FECN pkts 0         out BECN pkts 0
  in DE pkts 0          out DE pkts 0
  out bcast pkts 0      out bcast bytes 0
  pvc create time 00:00:00      last time pvc status changed 00:00:00

DLCI = 615, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACT
VE, INTERFACE = POS0/3/2/0.4
  input pkts 0          output pkts 0           in bytes 0
  out bytes 0           dropped pkts 0          in FECN packets 0
  in BECN pkts 0        out FECN pkts 0         out BECN pkts 0
  in DE pkts 0          out DE pkts 0
  out bcast pkts 0      out bcast bytes 0
  pvc create time 00:00:00      last time pvc status changed 00:00:00
```

The following example shows the output for a specific frame-relay PVC:

```
RP/0/RSP0/CPU0:router# show frame-relay pvc 613

DLCI = 613, DLCI USAGE = LOCAL, ENCAP = CISCO, INHERIT = TRUE, PVC STATUS = ACTI
VE, INTERFACE = POS0/3/2/0.2
  input pkts 0          output pkts 0           in bytes 0
  out bytes 0           dropped pkts 0          in FECN packets 0
  in BECN pkts 0        out FECN pkts 0         out BECN pkts 0
  in DE pkts 0          out DE pkts 0
  out bcast pkts 0      out bcast bytes 0
  pvc create time 00:00:00      last time pvc status changed 00:00:00
```

Table 26: show frame-relay pvc Field Descriptions

Field	Description
DLCI	One of the DLCI numbers for the PVC.
DLCI USAGE	Lists SWITCHED when the router or access server is used as a switch, or LOCAL when the router or access server is used as a DTE device.
ENCAP	Type of encapsulation.
INHERIT	Encapsulation type for the PVC is inherited from the main interface.
PVC STATUS	Status of the PVC: ACTIVE, INACTIVE, or DELETED.
INTERFACE	Specific subinterface associated with this DLCI.
input pkts	Number of packets received on this PVC.
output pkts	Number of packets sent on this PVC.
in bytes	Number of bytes received on this PVC.
out bytes	Number of bytes sent on this PVC.
dropped pkts	Number of incoming and outgoing packets dropped by the router at the Frame Relay level.
in FECN pkts	Number of packets received with the FECN bit set.
in BECN pkts	Number of packets received with the BECN bit set.
out FECN pkts	Number of packets sent with the FECN bit set.
out BECN pkts	Number of packets sent with the BECN bit set.
in DE pkts	Number of DE packets received.
out DE pkts	Number of DE packets sent.
out bcast pkts	Number of output broadcast packets.
out bcast bytes	Number of output broadcast bytes.
pvc create time	Time at which the PVC was created.
last time pvc status changed	Time at which the PVC changed status.
shaping drops	Number of packets dropped by the traffic-shaping process.
Fragment Counters	Displays whether fragment counters are enabled or disabled on the PVC. Fragment counters are disabled by default. Use the **fragment-counter** command to enable collection of these statistics.

show frame-relay vcm-info interface

To display Virtual Circuit (VC) manager information for a given interface, use the **show frame-relay vcm-info interface** command in EXEC mode.

show frame-relay vcm-info interface *type interface-path-id* [**vc** *dlci*]

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.
vc	(Optional) Specifies a VC on the interface.
dlci	(Optional) Data-link Connection Identifier number. Range is from 0 to 1023.

Command Default

No default behavior or values

Command Modes

EXEC mode

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
fr	read

Examples

The following example shows how to display Virtual Circuit (VC) manager information for the multlink interface 0/1/0/0:

```
RP/0/RSP0/CPU0:router# show frame-relay vcm-info interface multilink 0/3/0/0/1

VCM IDB:Multilink0_3_0_0_1
==================================
IDB type:               IFT_MAIN
<main specific>
  i/f term type:        L3
  i/f handle:           0x06186240
  BW:                   0x00000c00
```

```
  OIR insert:           F
VC chkpt oid:           0x00000000
proto info:             500323c8 [ptr]
proto fn table:         500323d4 [ptr]
i/f type:               0x00000037 [IFT_MULTILINK]
i/f state:              0x00000003 [up]
i/f basecaps num:       0x0000004c [fr]
i/f basecaps state:     0x00000003 [up]
VCM states:             5002c708 [ptr]
in db:                  T
chkpt:                  F
datapath info           0 [0 bytes]
partner info            50016d98 [16 bytes]
  encaps type:          IETF
  intf type:            DTE
non chkptd info         0 [0 bytes]
```

Related Commands

Command	Description
interface multilink, on page 633	Configures a multilink interface and enters multilink interface configuration mode.
frame-relay multilink bid, on page 424	Creates a name for a Frame Relay multilink bundle interface.

show interfaces (frame relay)

To display statistics about Frame Relay interfaces, use the **show interfaces** command in EXEC mode.

show interfaces [**summary** | [*type interface-path-id*] [**brief** | **description** | **detail** | **accounting** [**rates**]]] [**location** *node-id*]

Syntax Description

summary	(Optional) Displays a summary of interface information by interface type.
type	(Optional) 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.
brief	(Optional) Displays brief information about each interface (one line per interface).
description	(Optional) Displays an interface description.
detail	(Optional) Displays detailed information about each interface. This is the default.
accounting	(Optional) Displays the number of packets of each protocol type that have been sent through the interface.
rates	(Optional) Displays interface accounting rates.
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.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced

Usage Guidelines

The **show interfaces** (Frame Relay) command is available on Packet-over-SONET/SDH (POS), serial, and multilink interfaces.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows the output from the **show interfaces** command when the interface is configured with Frame Relay encapsulation:

```
RP/0/RSP0/CPU0:router# show interfaces pos 0/1/0/0

POS0/1/0/0 is up, line protocol is up
  Hardware is Packet over SONET/SDH
  Internet address is Unknown
  MTU 4474 bytes, BW 622080 Kbit
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation FRAME-RELAY, crc 32, controller loopback not set,
  LMI enq sent  0, LMI stat recvd 0, LMI upd recvd 0
  LMI enq recvd 9463, LMI stat sent  9463, LMI upd sent  0, DCE LMI up
  LMI DLCI 0  LMI type is ANSI Annex D  frame relay DCE
  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
     20934 packets input, 1508069 bytes, 1151 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
     1151 input errors, 1058 CRC, 0 frame, 0 overrun, 93 ignored, 0 abort
     19590 packets output, 990924 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
```

Table 27: show interfaces Field Descriptions

Field	Description
Interface name	Displays the name of the current interface. In the example, the interface name is POS0/1/0/0.
Interface state	Displays the state of the interface. In the example, the interface is in the administratively up state.
Line protocol state	Displays the state of the Layer 2 line protocol. This field may be different from the interface state if, for example, a keepalive failure has brought down the Layer 2. **Note** The line protocol state is not the same as the protocol state displayed in the **show ip interfaces** command, because it is the state of Layer 2 (media) rather than Layer 3 (IP protocol).
Hardware	Displays the current hardware type.

Field	Description
Internet 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.
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.
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** Enter the **pos crc** command to configure the CRC.
controller loopback	Indicates that the hardware was configured as controller loopback.
LMI enq sent	Number of LMI enquiry messages sent.
LMI stat recvd	Number of LMI status messages received.
LMI upd recvd	Number of LMI updated messages received.
LMI enq recvd	Number of LMI enquiry messages received.
LMI stat sent	Number of LMI status messages sent.
LMI upd sent	Number of LMI updated messages sent.
DCE LMI	Displays the state of the DCE LMI.
LMI DLCI	Displays the LMI DLCI identifier.

Field	Description
LMI type	Displays the LMI type.
Last clearing	Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing for example, load and reliability) are not cleared when the counters are cleared.
5 minute input rate5 minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes. 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 two percent of the instantaneous rate of a uniform stream of traffic over that period.
packets input	Total number of error-free packets received by the system.
bytes	Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.
Received...broadcasts	Total number of broadcast or multicast packets received by the interface
runts	Number of packets that are discarded because they are smaller than the minimum packet size of the medium.
giants	Number of packets that are discarded because they exceed the maximum packet size of the medium
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and terminated counts. Other input-related errors can also increment the count, so that this sum might not balance with the other counts.
CRC	Cyclic redundancy checksum generated by the originating station or far-end device does not match the checksum calculated from the data received. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a serial line, this is usually the result of noise or other transmission problems.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. Broadcast storms and bursts of noise can cause the ignored count to be increased.
abort	Illegal sequence of one bits on a serial interface. This usually indicates a clocking problem between the serial interface and the data link equipment.

Field	Description
carrier transitions	Number of times the carrier detect signal of a serial interface has changed state. For example, if data carrier detect (DCD) goes down and comes up, the carrier transition counter will increment two times. Indicates modem or line problems if the carrier detect line is changing state often.

snmp-server traps frame-relay pvc

To enable Simple Network Management Protocol (SNMP) trap notifications for a Frame Relay permanent virtual circuit (PVC), use the **snmp-server traps frame-relay pvc** command in Global Configuration mode. To disable SNMP notifications for a FR PVC, use the **no** form of this command.

snmp-server traps frame-relay pvc [**interval** *seconds*]

Syntax Description

interval *seconds*	(Optional) Minimum period between successive traps. The range is from 1 to 3600.

Command Default

seconds: 30

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Use the **snmp-server traps frame-relay pvc** command to enable trap requests for a Frame Relay PVC. This command is used with the **snmp-server host** command. Use the **snmp-server host** command to specify which host or hosts receive SNMP notifications.

See *Implementing SNMP on Cisco IOS XR Software* in *System Management Configuration Guide for Cisco ASR 9000 Series Routers* for detailed information about SNMP configuration tasks and commands.

Task ID

Task ID	Operations
snmp	read, write
fr	read, write

Examples

The following example shows how to configure the router to send SNMP trap notifications for a Frame Relay PVC:

```
RP/0/RSP0/CPU0:router(config)# snmp-server host 12.26.25.61 traps public udp-port 5000
RP/0/RSP0/CPU0:router(config)# snmp-server community public RW
RP/0/RSP0/CPU0:router(config)# snmp-server traps frame-relay pvc interval 50
```

Related Commands

Command	Description
snmp-server community	Configures the community access string to permit access to the SNMP.

Command	Description
snmp-server host	Specifies the recipient of an SNMP notification operation.



Global Interface Commands

This module describes the global command line interface (CLI) commands for configuring interfaces on the Cisco ASR 9000 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), on page 464
- clear interface, on page 465
- dampening, on page 466
- interface (global), on page 468
- lacp system , on page 470
- mlacp reset priority, on page 471
- mlacp switchback, on page 472
- mlacp switchover maximize, on page 473
- mlacp switchover type, on page 474
- mtu, on page 475
- replace, on page 478
- show im dampening, on page 481
- show interfaces, on page 484
- show ethernet cfm interfaces bandwidth-notifications, on page 495
- show mlacp inconsistencies, on page 497
- shutdown (global), on page 498

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 3.7.2	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router# interface TenGigE 0/4/1/0
RP/0/RSP0/CPU0:router# bandwidth 4000000
```

Related Commands

Command	Description
shutdown (global), on page 498	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 mode .

clear interface *type interface-path-id*

Syntax Description

type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Task ID

Task ID	Operations
interface	execute
basic-services	read, write

Examples

This example shows how to use the **clear interface** command to clear the loopback interface 2:

```
RP/0/RSP0/CPU0:router# clear interface loopback 2
```

Related Commands

Command	Description
shutdown (global), on page 498	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 3.7.2	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/RSP0/CPU0:router(config)# interface TenGigE 0/4/0/0
RP/0/RSP0/CPU0:router(config-if))# dampening
```

Related Commands

Command	Description
show im dampening, on page 481	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 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 3.7.2	This command was introduced.

Usage Guidelines

The **interface** command enters interface configuration mode to allow you to configure interfaces. If a virtual interface is configured, then the interface is created if it did not already exist.

The **no** form of this command applies only to virtual interfaces or to subinterfaces (that is, interfaces that have been created in global configuration mode).

Until Release 6.5.1, when you create an interface with some configurations, upon router or interface reload, interface configurations are lost. From Release 6.5.1, onwards, automatic shutdown config behavior is persistent and no shutdown configs are lost on interface or router reload.

Task ID

Task ID	Operations
interface	read, write

Examples

In the following example, the **interface** command is given for the card in location 0/2/0/1, and interface configuration mode is entered for that interface:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/2/0/1
```

Related Commands

Command	Description
clear interface, on page 465	Clears interface statistics or packet counters.
shutdown (global), on page 498	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 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/RSP0/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 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

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/RSP0/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 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

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/RSP0/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/RSP0/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/RSP0/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 3.7.2	This command was introduced.

Usage Guidelines

Use the **mtu** command to set a specific MTU value for an interface, or use the **no mtu** command to return the interface to the default MTU value for that interface type. The MTU value can be increased or decreased using the **mtu** command, subject to minimum and maximum MTU limits for the interface type.

If the MTU value is not configured, then each interface will have a default MTU value that is specific to the interface type. The default MTU value is generally the largest Layer 2 frame size possible for the interface type.

The default/configured MTU value on an atm interface includes the L2 header.

The MTU size consists of L2 header that includes either SNAP(8bytes)/MUX(0)/NLPID(2) header or the AAL5 SDU. The AAL5 SDU includes the L3 datagram and the optional Logical Link Control/Subnetwork Access Protocol (LLC/SNAP) header.

The Ethernet interface is the Layer 3 datagram plus 14 bytes. For ATM main interface, the MTU is L3 datagram + 0 bytes.

For ATM L3 sub interface, mtu is as follows:

- SNAP - L3 datagram + 8 bytes
- NLPID - L3 datagram + 2 bytes
- MUX - L3datagram + 0 bytes
- When no pvc is configured under sub interface - L3datagram + 0 bytes

You can use the **show interfaces** command to determine if the MTU value has been changed. The **show interfaces** command output displays the MTU size for each interface in the MTU (byte) field. Note that the MTU size that is displayed includes the Layer 2 header bytes used for each encapsulation type.

Note You can use the **show interfaces** command to determine if the MTU value has been changed. The **show interfaces** command output displays the MTU size for each interface in the MTU (byte) field. Note that the MTU size that is displayed includes the Layer 2 header bytes used for each encapsulation type.

Note Changing the MTU on an interface triggers a change on the protocols and encapsulations configured on that interface, although some protocol-specific configurations can override the interface MTU. For example, specifically changing the interface MTU configuration does not affect the IP MTU configuration, but may affect the resulting MTU on that node.

Note For the 10x10GigE CPAK (10 ports with only 8 profiles), it is not possible to support 10 different MTUs on 10 different 10GigE ports. One of the profiles needs to be reserved for the default MTU, in case you need to change the configured MTU back to the default MTU. Therefore on the 10x10g CPAK, you can configure different MTU sizes on 7 ports and the other 3 ports have the default MTU size. If you configure the 8th port, the configuration command succeeds but an error appears on the console.

Task ID

Task ID	Operations
interface	read, write

Examples

In this example, the MTU value for all interfaces is verified. The MTU value is shown in the next-to-last column:

```
RP/0/RSP0/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/RSP0/CPU0/0          up           up              ARPA  1514    100000

RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface TenGigE 6/0/0/0
RP/0/RSP0/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/RSP0/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/RSP0/CPU0/0           up           up              ARPA  1514    100000
```

Related Commands

Command	Description
shutdown (global), on page 498	Disables an interface (forces an interface to be administratively down).

replace

To substitute any configuration in the router with new settings, use the **replace** command in Global Configuration mode.

replace **interface** *interface_name_before* **with** *interface_name_after*

replace **pattern** *string_before* **with** *string_after* [**dry-run**]

Syntax Description

interface	Specifies the details of interface configuration replacement follows.
interface_name_before	Specifies the name of an interface in the router that you want to replace. For more information about the syntax for the router, use the question mark (**?**) online help function.
interface_name_after	Specifies the new interface name that replaces the current interface name specified in the *interface_name_before* variable. For more information about the syntax for the router, use the question mark (**?**) online help function.
pattern	Specifies that the details of string replacement follow.
string_before	Specify the configuration string in the router that you need to replace. The *string_before* can be any regular expression that specifies a match pattern in text. **Note** You must specify the *string_before* in a single quote.
string_after	Specify the new string that replaces the configuration matching the *string_before* variable. **Note** You must specify the *string_after* in a single quote.
dry-run	Displays the configuration after the pattern replacement without preparing the config changes for a commit. This option facilitates verifying the pattern replacement changes and provides an extra layer of protection to avoid accidentally committing unwanted configuration changes.

Command Default

No default behavior or values.

Command Modes

Global Configuration

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	Operations
interface	read, write

Examples

The following example shows how to use the **replace** command:

```
Router# config
Router(config)# replace interface gigabitEthernet 0/0/0/0 with loopback 450
Loading.
4 bytes parsed in 1 sec (3)bytes/sec


Router# config
Router(config)# replace pattern '10\.20\.30\.40' with '100.200.250.225'
Loading.
232 bytes parsed in 1 sec (230)bytes/sec
```

Examples

The following example details configuration changes on using the **replace** command:

Original Configuration:

```
Router(config-ospf-ar-if)#show configuration
Building configuration...
!! IOS XR Configuration 0.0.0
interface GigabitEthernet0/0/0/0
 description first
 ipv4 address 10.20.30.40 255.255.0.0
 shutdown
!
router ospf 10
 cost 100
 area 200
  cost 200
  interface GigabitEthernet0/0/0/0
   transmit-delay 5
  !
```

Using **replace** command:

```
Router(config-ospf-ar-if)# replace interface gigabitEthernet 0/0/0/0 with loopback 450

Building configuration...
Loading.
232 bytes parsed in 1 sec (230)bytes/sec
```

Configuration changes on using **replace** command:

```
Router(config-ospf-ar-if)#show configuration
Building configuration...
!! IOS XR Configuration 0.0.0
interface Loopback450
 description first
 ipv4 address 10.20.30.40 255.255.0.0
 shutdown
```

```
!
no interface GigabitEthernet0/0/0/0
router ospf 10
 area 200
  interface Loopback450
   transmit-delay 5
  !
  no interface GigabitEthernet0/0/0/0
```

Examples

The following example shows how to use the **dry-run** option in the **replace** command:

```
Router# config
Router(config)# replace pattern 'vrf thr' with 'vrf three' dry-run
no vrf thr
vrf three
 address-family ipv4 unicast
  import route-target
   65321:3
  !
  export route-target
   65321:3
  !
 !
exit
router static
 no vrf thr
 vrf three
  address-family ipv4 unicast
   192.168.3.0/24 vrf one 192.168.1.1
   192.168.3.0/24 vrf two 192.168.2.2
  !
exit
end
Router(config)# commit
No configuration changes to commit.
```

show im dampening

To display the state of all interfaces on which dampening has been configured, use the **show im dampening** command in EXEC mode .

show im dampening [**interface** *type* | **ifhandle** *handle*]

Syntax Description

interface *type*	(Optional) Interface type. For more information, use the question mark (**?**) online help function.
ifhandle *handle*	(Optional) Identifies the caps node whose Interface Manager (IM) dampening information you want to display.

Command Default

If you do not specify an interface, then the system displays brief details about all dampened interfaces.

Command Modes

EXEC

Command History

Release	Modification
Release 3.7.2	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/RSP0/CPU0:router(config)# interface TenGigE 0/4/0/0
RP/0/RSP0/CPU0:router(config-if)# no shutdown
RP/0/RSP0/CPU0:router(config-if)# dampening
```

```
RP/0/RSP0/CPU0:router# show im dampening

Interface               Proto              Caps               Penalty Suppressed

---------               -----              ----               ----------------
TenGigE0/4/0/0              0                  0                   0       NO

RP/0/RSP0/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/RSP0/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/RSP0/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/RSP0/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 28: 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 466	Turns on event dampening.
shutdown (global), on page 498	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 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

Command History

Release	Modification
Release 25.4.1	Note added to **total input drops** description.
Release 3.7.2	This command was introduced.
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 4.2.0	Support for Bundle-POS and CEM interfaces was included.

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 29: 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).
Hardware	Displays the current hardware type.

Field	Description
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.

Field	Description
total input drops	Total number of packets that were dropped after they were received. This includes packets that were dropped due to configured quality of service (QoS) or access control list (ACL) policies. This does not include drops due to unknown Layer 3 protocol. **Note** Starting with Release 25.4.1, IP null0 drops packet count is excluded for 4th and 5th generation ASR9000 series ethernet linecards.
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.

Field	Description
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.
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.

Field	Description
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 ethernet cfm interfaces bandwidth-notifications

To display detailed information about Ethernet CFM interfaces and bandwidth notifications, use the `show ethernet cfm interfaces bandwidth-notifications detail` command in XR EXEC mode.

show ethernet cfm interfaces bandwidth-notifications detail

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.1.1	This command was introduced.

Task ID

Task ID	Operation
interface	read

This example shows the output from the `show ethernet cfm interfaces bandwidth-notifications detail` command.

```
RP/0/RP0/CPU0:router#show ethernet cfm interfaces bandwidth-notifications detail
BNM Enabled Links at Level 3 (Down MEP) for GigabitEthernet/1
    MAC Address 000a.000a.000a
      State (OK):
        Nominal Bandwidth:                                  3000 Mbps
        Reported Bandwidth:                                 1000 Mbps
        Elapsed time in this state:                   00:00:13.000
        Transitions into degraded state:                      5000
        Hold-off:                                    111s remaining
      Last BNM received 00:00:10 ago
        Nominal Bandwidth:                                  1000 Mbps
        Current Bandwidth:                                  2000 Mbps
        Interval:                                             10s
        Packet-type:                                  Cisco BW-VSM
      Packets received:                                      20000

    Port ID 7 (MAC Address 000c.000c.000c)
      State (DEGRADED):
        Nominal Bandwidth:                                  6000 Mbps
        Reported Bandwidth:                                 2000 Mbps
        Elapsed time in this state:                   00:00:39.000
        Transitions into degraded state:                     10000
        Wait-to-restore:                             111s remaining
      Last BNM received 00:00:33 ago
        Nominal Bandwidth:                                  2000 Mbps
        Current Bandwidth:                                  4000 Mbps
        Interval:                                             1min
        Packet-type:                                  Cisco BW-VSM
      Packets received:                                      40000
```



Note This feature is supported only on 64-bit Linux-based IOS XR ASR 9000 operating system.

show mlacp inconsistencies

To check and highlight inconsistencies and misconfigurations in mlacp setup, use the **show mlacp inconsistencies** command in EXEC mode .

show mlacp inconsistencies

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values.

Command Modes

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/RSP0/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 3.7.2	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/RSP0/CPU0:router(config)# interface TenGigE 0/4/0/2
RP/0/RSP0/CPU0:router(config-if)# shutdown
```



Internal Ethernet Control Network Commands

This module provides command line interface (CLI) commands for configuring internal ethernet control on your 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.

- clear controller backplane ethernet location statistics, on page 500
- show controllers backplane ethernet local brief, on page 501
- show controllers backplane ethernet local clients, on page 502
- show controllers backplane ethernet local detail, on page 504
- show controllers backplane ethernet local multicast groups, on page 506
- show controllers backplane ethernet location brief, on page 508
- show controllers backplane ethernet location clients, on page 510
- show controllers backplane ethernet location detail, on page 512
- show controllers backplane ethernet location multicast groups, on page 515

clear controller backplane ethernet location statistics

To delete the aggregate statistics of traffic sent and received over the control Ethernet, use the **clear controller backplane ethernet location statistics** command in EXEC mode.

clear controller backplane ethernet location *node-id* **statistics**

Syntax Description

node-id	Identifies the node whose controller information you want to delete. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows how to clear all client statistics on the node at 0/1/1:

```
RP/0/RSP0/CPU0:router# clear controller backplane ethernet location 0/1/1 clients all
statistics
```

show controllers backplane ethernet local brief

To display brief information about the Ethernet interface that connects the node to the router control Ethernet, use the **show controllers backplane ethernet local brief** command in EXEC mode.

show controllers backplane ethernet local brief

Syntax Description

This command has no keywords or arguments.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 5.3.0	The **local** keyword was deprecated.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows the output from the **show controllers backplane ethernet local brief** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet local brief

FastEthernet0_RP1_0 (local) is up, MTU 1514 bytes
    561688 packets input, 53760372 bytes
    683424 packets output, 216565877 bytes
RP/0/RSP0/CPU0:router#
```

Table 30: show controllers backplane ethernet local brief Field Descriptions

Field	Description
MTU	Maximum packet size, in bytes, that a particular interface can handle.
packets input	Total number of packets received.
packets output	Total number of packets transmitted.

Related Commands

Command	Description
show controllers backplane ethernet local clients, on page 502	
show controllers backplane ethernet local detail, on page 504	
show controllers backplane ethernet local multicast groups, on page 506	Displays all multicast addresses currently being used by active interfaces on the router.

show controllers backplane ethernet local clients

To display information about local client applications, use the **show controllers backplane ethernet local clients** command in EXEC mode.

show controllers backplane ethernet local clients {*client-id* **statistics** | **all**}

Syntax Description

client-id **statistics**	Displays a list of client statistics for the specified client ID. Range is from 1 to 22.
all	Displays a list of all client applications and their IDs.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 5.3.0	The **local** keyword was deprecated.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows the output from the **show controllers backplane ethernet local clients** command, which displays a list of client statistics for client ID 1:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet local clients 1 statistics

  Client QNET, ES Client Id 1, PID 20498 running on FastEthernet0_33_1
    490915 packets input, 41918238 bytes
    490912 packets delivered,41918120 bytes
    0 packets discarded (0 bytes) in garbage collection
    0 (0 bytes) unicast packets filtered
    0 (0 bytes) multicast packets filtered
    0 (0 bytes) buffer mgmt policy discards
    555660 packets output, 134265364 bytes, 0 could not be transmitted
```

Table 31: show controllers backplane ethernet local clients Field Descriptions

Field	Description
Client	Client application name and ID, followed by backplane client application statistics.
PID	Process ID.

Related Commands

Command	Description
show controllers backplane ethernet local brief, on page 501	Displays brief information about the Ethernet interface that connects the node to the router control Ethernet.

Command	Description
show controllers backplane ethernet local detail, on page 504	
show controllers backplane ethernet local multicast groups, on page 506	Displays all multicast addresses currently being used by active interfaces on the router.

show controllers backplane ethernet local detail

To display detailed information for the Ethernet interface that connects the node to the router control Ethernet, use the **show controllers backplane ethernet local detail** command in EXEC mode.

show controllers backplane ethernet local detail

Syntax Description

This command has no keywords or arguments.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 5.3.0	The **local** keyword was deprecated.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows the output from the **show controllers backplane ethernet local detail** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet local detail

FastEthernet0_33_1 is up
  Hardware is 10/100 Ethernet, H/W address is 5246.4800.0211
  Internet address is 10.0.2.17
  MTU 1514 bytes
  Encapsulation HFRIES (HFR Internal Ethernet Server)
  Mode : Full Duplex,  Rate : 100Mb/s
    787486 packets input, 64535218 bytes, 0 total input drops
    0 packets discarded (0 bytes) in garbage collection
    3 packets discarded (582 bytes) in recv processing
    Received 8 broadcast packets, 285994 multicast packets
    Input errors: 0 CRC, 0 overrun, 0 alignment, 0 length, 0 collision
    682244 packets output, 157245225 bytes, 0 total output drops
    Output 42649 broadcast packets, 42649 multicast packets
    Output errors: 0 underruns, 0 aborts, 0 loss of carrier
```

Table 32: show controllers backplane ethernet local detail Field Descriptions

Field	Description
Hardware	Provides the hardware type, followed by the hardware address.
Internet address	IP address of the interface.
MTU	Maximum packet size, in bytes, that a particular interface can handle.
Encapsulation	Encapsulation method assigned to the interface.

Field	Description
Mode	Indicates the operating mode of the interface, followed by transmission data.

Related Commands

Command	Description
show controllers backplane ethernet local brief, on page 501	Displays brief information about the Ethernet interface that connects the node to the router control Ethernet.
show controllers backplane ethernet local clients, on page 502	
show controllers backplane ethernet local multicast groups, on page 506	Displays all multicast addresses currently being used by active interfaces on the router.

show controllers backplane ethernet local multicast groups

To display all multicast addresses currently being used by active interfaces on the router, use the **show controllers backplane ethernet local multicast groups** command in EXEC mode.

show controllers backplane ethernet local multicast groups

Syntax Description

This command has no keywords or arguments.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 5.3.0	The **local** keyword was deprecated.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows the output from the **show controllers backplane ethernet local multicast groups** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet local multicast groups

    Intf                    Multicast      Client registered for this address
    Name                     address                Id               Name
-------------------------------------------------------------------------------
FastEthernet0_RP1_CPU0    0100.0000.0064           2                GSP
                          0100.0000.0065           2                GSP
                          0100.0000.0066           2                GSP
                          0100.0000.0068           2                GSP
                          0100.0000.006a           2                GSP
                          0100.0000.006c           2                GSP
                          0100.0000.006e           2                GSP
                          0100.0000.0070           2                GSP
                          0100.0000.0072           2                GSP
                          0100.0000.2774           2                GSP
                          0100.0000.2775           2                GSP
                          0100.0000.2776           2                GSP
                          0100.0000.2778           2                GSP
                          0100.0000.277a           2                GSP
                          0100.0000.277c           2                GSP
                          0100.0000.277e           2                GSP
                          0100.0000.2780           2                GSP
                          0100.0000.2782           2                GSP
                          0100.0000.2784           2                GSP
                          0100.0000.2786           2                GSP
 --More--
```

Table 33: show controllers backplane ethernet local multicast groups Field Descriptions

Field	Description
Intf Name	Identifies the interface whose multicast addresses are displayed. **Note** A multicast address is a single address that refers to multiple network devices.
Multicast address	Multicast addresses associated with the specified interface. **Note** A multicast address is a single address that refers to multiple network devices.
ID	Client identifier.
Name	Client application name.

Related Commands

Command	Description
show controllers backplane ethernet local brief, on page 501	Displays brief information about the Ethernet interface that connects the node to the router control Ethernet.
show controllers backplane ethernet local clients, on page 502	
show controllers backplane ethernet local detail, on page 504	

show controllers backplane ethernet location brief

To display brief information about backplane Ethernet interfaces in a particular location, use the **show controllers backplane ethernet location brief** command in EXEC mode.

show controllers backplane ethernet location *node-id* **brief**

Syntax Description

This command has no keywords or arguments.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows the output from the **show controllers backplane ethernet location brief** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet location 0/1/0 brief

FastEthernet0_0_CPU0 (local) is up, MTU 1514 bytes
    57569 packets input, 5999749 bytes
    36963 packets output, 4105673 bytes
RP/0/RSP0/CPU0:router#
```

Table 34: show controllers backplane ethernet location brief Field Descriptions

Field	Description
MTU	Maximum packet size, in bytes, that a particular interface can handle.
packets input	Total number of packets received.
packets output	Total number of packets transmitted.

Field	Description
Input errors	Displays the number of errors received by the interface. Input errors occur when incoming cells are dropped or corrupted. The possible input errors are as follows: • CRC—Number of times that the checksum calculated from the data received did not match the checksum from the transmitted data. • overrun—Number of times that the receiver hardware was incapable of handing received data to a hardware buffer because the input rate exceeded the receiver's capability to handle the data. • alignment—Number of nonoctets received. • length—Number of times the interface prevented the ASIC from overrunning a maximum transmission unit (MTU) size. • collision—Number of messages retransmitted because of an Ethernet collision.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, in the error-free packets transmitted by the system.
total output drops	Total number of packets dropped from the output queue because the queue was full.
Output	Indicates the total number of broadcast and multicast packets transmitted by the interface.
Output errors	Displays the number of errors transmitted on the interface. Output errors occur when outgoing cells are dropped or corrupted. The possible types output errors are as follows: • underruns—Number of times that the far-end transmitter has been running faster than the near-end receiver can handle. • terminations—Number of illegal sequences of one bits on the interface. • loss of carrier—Number of times the interface was reset because the carrier detect line of that interface was up, but the line protocol was down.

Related Commands

Command	Description
show controllers backplane ethernet location clients, on page 510	Displays information about client applications in a particular location.
show controllers backplane ethernet location detail, on page 512	Displays detailed information about the backplane interfaces in a particular location.

show controllers backplane ethernet location clients

To display information about client applications in a particular location, use the **show controllers backplane ethernet location clients** command in EXEC mode.

show controllers backplane ethernet location *node-id* **clients** *client-id* {**statistics** | **all**}

Syntax Description

node-id	Identifies the node whose local client applications information you want to display. The *node-id* argument is entered in the *rack/slot/module* notation. **Note** Enter the **show platform** command to obtain the *node-id*
client-id **statistics**	Displays a list of client statistics for the specified client ID. Range is from 1 through 22.
client-id **all**	Displays a list of all client applications and their IDs.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows the output from the **show controllers backplane ethernet location clients** command, which displays detailed information about the backplane client application statistics:

```
RP/0/RSP1/CPU0:router# show controllers backplane ethernet location 0/0/CPU0 clients all

    Intf           Client ethernet         Client              Description
    Name              server id            Process Id
-------------------------------------------------------------------------------
 FE0_0_CPU0              1                  12307          QNX network manager
                         2                  28726               Group services
                         3                      0          Reserved for Attach
                         4                      0            Plugin controller
                         5                      0                Designated SC
                         6                      0                HFR H/W diags
                         7                      0            IP packet handler
                         8                  16415        Redundancy controller
                         9                      0          HFR Virtual console
                        10                  12312         HFR Virtual terminal
                        11                  12305        Control ethernet echo
                        12                      0       Control eth echo reply
                        13                      0  Card Configuration Protocol
                        14                      0          Reserved for Attach
                        15                      0           Chassis controller
                        16                      0            Forwarding driver
```

```
17                  16414                    MBI hello
18                      0        MBI Boot Server Source
19                      0                 HSR ES client
20                      0             Test application 1
21                      0             Test application 2
22                      0       Test client out-of-band
```

Table 35: show controllers backplane ethernet location clients Field Descriptions

Field	Description
Intf Name	Identifies the Ethernet interface.
Client ethernet server id	Identifies the Ethernet server for the specified interface.
Client process id	Identifies the client process running on the specified interface.
Description	Describes the backplane client application.

Related Commands

Command	Description
show controllers backplane ethernet location brief, on page 508	display brief information about backplane Ethernet interfaces in a particular location
show controllers backplane ethernet location detail, on page 512	Displays detailed information about the backplane interfaces in a particular location.

show controllers backplane ethernet location detail

To display detailed information about the backplane interfaces in a particular location, use the **show controllers backplane ethernet location detail** command in EXEC mode.

show controllers backplane ethernet location *node-id* **detail**

Syntax Description

This command has no keywords or arguments.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows the output from the **show controllers backplane ethernet location detail** command:

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet location 0/1/0 detail

FastEthernet0_1_0 is up
  Hardware is 10/100 Ethernet, H/W address is 5246.4800.0010
  Internet address is 10.0.0.16
  MTU 1514 bytes
  Encapsulation HFRIES (HFR Internal Ethernet Server)
  Mode : Full Duplex,  Rate : 100Mb/s
    426422 packets input, 0 bytes, 1 total input drops
    14170 packets discarded (935122 bytes) in garbage collection
    16 packets discarded (5344 bytes) in recv processing
    Received 0 broadcast packets, 0 multicast packets
    Input errors: 0 CRC, 0 overrun, 0 alignment, 0 length, 0 collision
    440272 packets output, 0 bytes, 0 total output drops
    Output 0 broadcast packets, 0 multicast packets
    Output errors: 0 underruns, 0 aborts, 0 loss of carrier
```

Table 36: show controllers backplane ethernet location detail Field Descriptions

Field	Description
Hardware	Provides the hardware type, followed by the hardware address.
Internet address	IP address of the interface.
MTU	Maximum packet size, in bytes, that a particular interface can handle.
Encapsulation	Encapsulation method assigned to the interface.
Mode	Indicates the operating mode of the interface, followed by transmission data.

Field	Description
packets input	Total number of packets received.
bytes	Total number of bytes, including data and MAC encapsulation, in the error-free packets received by the system.
total input drops	Total number of packets dropped from the input queue because the queue was full.
packets discarded in garbage collection	Number of packets and bytes discarded.
packets discarded in recv processing	Number of packets and bytes discarded.
Received broadcast packets and multicast packets	Indicates the total number of broadcast and multicast packets received by the interface.
Input errors	Displays the number of errors received by the interface. Input errors occur when incoming cells are dropped or corrupted. The possible input errors are as follows: • CRC—Number of times that the checksum calculated from the data received did not match the checksum from the transmitted data. • overrun—Number of times that the receiver hardware was incapable of handing received data to a hardware buffer because the input rate exceeded the receiver's capability to handle the data. • alignment—Number of nonoctets received. • length—Number of times the interface prevented the ASIC from overrunning a maximum transmission unit (MTU) size. • collision—Number of messages retransmitted because of an Ethernet collision.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, in the error-free packets transmitted by the system.
total output drops	Total number of packets dropped from the output queue because the queue was full.
Output	Indicates the total number of broadcast and multicast packets transmitted by the interface.

Field	Description
Output errors	Displays the number of errors transmitted on the interface. Output errors occur when outgoing cells are dropped or corrupted. The possible types output errors are as follows: • underruns—Number of times that the far-end transmitter has been running faster than the near-end receiver can handle. • terminations—Number of illegal sequences of one bits on the interface. • loss of carrier—Number of times the interface was reset because the carrier detect line of that interface was up, but the line protocol was down.

Related Commands

Command	Description
show controllers backplane ethernet location brief, on page 508	display brief information about backplane Ethernet interfaces in a particular location
show controllers backplane ethernet location clients, on page 510	Displays information about client applications in a particular location.

show controllers backplane ethernet location multicast groups

To display information about backplane interfaces that are in multicast groups in a particular location, use the **show controllers backplane ethernet location multicast groups** command in EXEC mode.

show controllers backplane ethernet location multicast groups

Syntax Description

This command has no keywords or arguments.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

The following example shows the output from the **show controllers backplane ethernet location multicast groups** command, which displays detailed information about the backplane interfaces.

```
RP/0/RSP0/CPU0:router# show controllers backplane ethernet location multicast groups

Intf                    Multicast      Client registered for this address
    Name                     address                Id               Name
-------------------------------------------------------------------------------
  FastEthernet0_2_CPU0    0100.0000.0064           2                GSP
                          0100.0000.0065           2                GSP
                          0100.0000.0066           2                GSP
                          0100.0000.0068           2                GSP
                          0100.0000.006a           2                GSP
                          0100.0000.006c           2                GSP
                          0100.0000.006e           2                GSP
                          0100.0000.0071           2                GSP
                          0100.0000.2774           2                GSP
                          0100.0000.2775           2                GSP
                          0100.0000.2776           2                GSP
                          0100.0000.2778           2                GSP
                          0100.0000.277a           2                GSP
                          0100.0000.2782           2                GSP
                          0100.0000.278a           2                GSP
                          0100.0000.2796           2                GSP
                          0100.0000.2798           2                GSP
```

Table 37: show controllers backplane ethernet location multicast groups Field Description

Field	Description
Intf Name	Identifies the interface whose multicast addresses are displayed. **Note** A multicast address is a single address that refers to multiple network devices.

Field	Description
Multicast address	Multicast addresses associated with the specified interface. **Note** A multicast address is a single address that refers to multiple network devices.
ID	Client identifier.
Name	Client application name.

Related Commands

Command	Description
show controllers backplane ethernet location brief, on page 508	display brief information about backplane Ethernet interfaces in a particular location
show controllers backplane ethernet location clients, on page 510	Displays information about client applications in a particular location.
show controllers backplane ethernet location detail, on page 512	Displays detailed information about the backplane interfaces in a particular location.



Integrated Routing and Bridging Commands

This module describes the commands to configure Integrated Routing and Bridging (IRB) on the Cisco ASR 9000 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.

- interface bvi, on page 518
- routed interface bvi, on page 520
- show interfaces bvi, on page 521

interface bvi

To create a bridge-group virtual interface (BVI), use the **interface bvi** command in Global Configuration mode. To delete the BVI, use the **no** form of this command.

interface bvi *identifier*

Syntax Description

identifier	Number for the BVI interface from 1 to 65535.

Command Default

No BVI interface is configured.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 4.0.1	This command was introduced.

Usage Guidelines

The BVI is a virtual interface within the router that acts like a normal routed interface. The BVI does not support bridging itself, but acts as a gateway for the corresponding bridge-domain to a routed interface within the router.

Aside from supporting a configurable MAC address, a BVI supports only Layer 3 attributes, and has the following characteristics:

- Uses a MAC address taken from the local chassis MAC address pool, unless overridden at the BVI interface.
- Is configured as an interface type using the **interface bvi** command and uses an IPv4 or IPv6 address that is in the same subnet as the hosts on the segments of the bridged domain. The BVI also supports secondary addresses.
- The BVI identifier is independent of the bridge-domain identifier. These identifiers do not need to correlate like they do in Cisco IOS software.
- Is associated to a bridge group using the **routed interface bvi** command.
- The following interface commands are supported on a BVI:
  - **arp purge-delay**
  - **arp timeout**
  - **bandwidth** (The default is 10 Gbps and is used as the cost metric for routing protocols for the BVI.)
  - **ipv4**
  - **ipv6** (Supported on Gigabit Ethernet line cards only in Cisco IOS XR Release 4.1)
  - **mac-address**
  - **mtu** (The default is 1514 bytes.)
  - **shutdown**

- The BVI supports IP helper addressing and secondary IP addressing.

To display bridge group, bridge-domain, interface status, line protocol state, and packet counters for the specified BVI, use the **show l2vpn bridge domain interface bvi** form of the **show l2vpn bridge domain (VPLS)** command. To display the reason that a BVI is down, you can use the **detail** keyword option.

Task ID

Task ID	Operation
interface	read, write

The following example shows how to create a BVI interface and configure its IPv4 address:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface bvi 50
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.10.0.4 255.255.255.0
RP/0/RSP0/CPU0:router(config-if)# commit
```

Related Commands

Command	Description
routed interface bvi, on page 520	Associates the specified bridge group virtual interface (BVI) as the routed interface for the interfaces assigned to the bridge domain.
show interfaces bvi, on page 521	Displays interface status, line protocol state, and packet counters for the specified BVI.

routed interface bvi

To associate the specified bridge group virtual interface (BVI) as the routed interface for the interfaces assigned to the bridge domain, use the **routed interface bvi** command in L2VPN bridge group bridge domain configuration mode. To remove the BVI as the routed interface for the interfaces assigned to the bridge domain, use the **no** form of this command.

routed interface bvi *identifier*

Syntax Description

identifier	Number for the BVI interface from 1 to 65535.

Command Default

No routed interface is configured.

Command Modes

L2VPN bridge group bridge domain configuration mode (config-l2vpn-bg-bd)

Command History

Release	Modification
Release 4.0.1	This command was introduced.

Usage Guidelines

- Only one BVI can be configured in any bridge domain.
- The same BVI can not be configured in multiple bridge domains.

Task ID

Task ID	Operation
l2vpn	read, write

The following example shows association of a BVI interface numbered “50” on the bridge domain named “IRB”:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# l2vpn
RP/0/RSP0/CPU0:router(config-l2vpn)# bridge group 10
RP/0/RSP0/CPU0:router(config-l2vpn-bg)# bridge-domain IRB
RP/0/RSP0/CPU0:router(config-l2vpn-bg-bd)# routed interface bvi 50
RP/0/RSP0/CPU0:router(config-l2vpn-bg-bd)# commit
```

Related Commands

Command	Description
interface bvi, on page 518	Creates a BVI interface.
show interfaces bvi, on page 521	Displays interface status, line protocol state, and packet counters for the specified BVI.

show interfaces bvi

To display interface status, line protocol state, and packet counters for the specified BVI, use the **show interfaces bvi** command in EXEC mode.

show interfaces bvi *identifier* [**accounting** | **brief** | **description** | **detail** | **location** *location*]

Syntax Description

identifier	Number for the BVI interface from 1 to 65535.
accounting	(Optional) Displays the number of packets of each protocol type that have been sent through the interface.
brief	(Optional) Displays summary information about the interface.
description	(Optional) Displays summary status information and the description for the interface.
detail	(Optional) Displays detailed information about the interface. This is the default.
location *location*	(Optional) Displays information the interface on the specified node. The *location* argument is entered in the *rack/slot/module* notation.

Command Default

Detailed information about the BVI interface is displayed.

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
interface	read

The following example shows sample output for the **show interfaces bvi** command:

```
RP/0/RSP0/CPU0:router# show interfaces bvi 50
Wed Feb 16 16:05:11.508 PST
BVI50 is up, line protocol is up
  Interface state transitions: 3
  Hardware is Bridge-Group Virtual Interface, address is 0000.0000.0002
  Description: IRB Routed Example
  Internet address is 172.16.0.1/24
  MTU 9014 bytes, BW 10000000 Kbit (Max: 10000000 Kbit)
     reliability 255/255, txload 0/255, rxload 0/255
  Encapsulation ARPA,  loopback not set,
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:00:37, output 00:00:00
  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
```

```
25643 packets input, 1641152 bytes, 0 total input drops
0 drops for unrecognized upper-level protocol
Received 0 broadcast packets, 25445 multicast packets
208 packets output, 9472 bytes, 0 total output drops
Output 8 broadcast packets, 0 multicast packets
```

Table 38: show interfaces bvi Field Descriptions

Field	Description
BVI*x* is	Displays the state of the specified BVI interface, where *x* is the number of the interface. The possible values are: administratively down, down, or up.
line protocol is	Displays the stateof the line protocol for the BVI interface. The possible values are: administratively down, down, or up. **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).
Interface state transitions:	Displays the number of times the interface has changed states.
Hardware is	Displays Bridge-Group Virtual Interface for a BVI.
address is	Layer 2 MAC address of the BVI.
Description:	Displays the description of the interface when configured.
Internet address is *n.n.n.n*/*n*	Layer 3 IP address of the BVI in dotted decimal format.
MTU	Displays the maximum transmission unit (MTU) for the interface. The MTU is the maximum packet size that can be transmitted over the interface. 1514 is the default.
BW *x* Kbit	Displays the current bandwidth of the interface in kilobits per second.
Max:	Displays the maximum bandwidth available on the interface in kilobits per second.
reliability	Displays the proportion of packets that are not dropped and do not have errors. **Note** The reliability is shown as a fraction of 255.

Field	Description
txload	Indicates the traffic flowing out of the interface as a proportion of the bandwidth. **Note** The txload is shown as a fraction of 255.
rxload	Indicates the traffic flowing into the interface as a proportion of the bandwidth. **Note** The rxload is shown as a fraction of 255.
Encapsulation	Layer 2 encapsulation on the interface.
loopback	Always displays “not set” for a BVI because loopbacks are not supported.
ARP type	Address Resolution Protocol (ARP) type used on the interface.
ARP timeout	ARP timeout in the format hours:mins:secs. This value is configurable using the **arp timeout** command.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface and processed locally on the router. Useful for knowing when a dead interface failed.
output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by the interface. Useful for knowing when a dead interface failed.
Last clearing of “show interface” counters	Time since the counters in this command were last cleared using the **clear counters** Exec command in hours:mins:secs.

Field	Description
5 minute input rate	Average number of bits and packets received per second in the last 5 minutes. If the interface is not in promiscuous mode, it senses network traffic that it sends and receives (rather than all network traffic). **Note** The 5-minute period referenced in the command output is a load interval that is configurable under the interface. The default value is 5 minutes. **Note** The 5-minute input should be used only as an approximation of traffic per second during a given 5-minute period. This rate is exponentially weighted average with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
5 minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes. If the interface is not in promiscuous mode, it senses network traffic that it sends and receives (rather than all network traffic). **Note** The 5-minute period referenced in the command output is a load interval that is configurable under the interface. The default value is 5 minutes. **Note** The 5-minute output should be used only as an approximation of traffic per second during a given 5-minute period. This rate is exponentially weighted average with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
packets input	Number of packets received on the interface that were successfully delivered to higher layers.
bytes	Number of bytes received on the interface.
total input drops	Total number of valid 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 *x* broadcast packets	Total number of Layer 2 broadcast packets received on the interface. This is a subset of the total input packet count.
multicast packets	Total number of Layer 2 multicast packets received on the interface. This is a subset of the total input packet count.
packets output	Number of packets sent from the interface.
bytes	Total number of bytes successfully sent from the interface.
total output drops	Number of packets that were dropped before being transmitted.
Output *x* broadcast packets	Number of Layer 2 broadcast packets transmitted on the interface. This is a subset of the total output packet count.
multicast packets	Total number of Layer 2 multicast packets received on the interface. This is a subset of the total output packet count.

Related Commands

Command	Description
interface bvi, on page 518	Creates a BVI interface.



Link Bundling Commands

This module provides command line interface (CLI) commands for configuring Link Bundle interfaces on the Cisco ASR 9000 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, on page 529
- bundle lacp delay, on page 530
- bundle-hash, on page 531
- bundle id, on page 537
- bundle load-balancing hash, on page 539
- bundle load-balancing hash (EFP), on page 541
- bundle maximum-active links, on page 543
- bundle minimum-active bandwidth, on page 545
- bundle minimum-active links, on page 546
- bundle port-priority, on page 547
- bundle wait-while, on page 549
- clear lacp counters, on page 550
- interface (bundle), on page 551
- isolation recovery-delay, on page 552
- lacp cisco enable, on page 553
- lacp churn logging, on page 555
- lacp collector-max-delay , on page 556
- lacp fast-switchover, on page 557
- lacp non-revertive, on page 558
- lacp packet-capture, on page 559
- lacp period short, on page 562
- lacp system priority, on page 565
- member neighbor, on page 567
- mlacp connect, on page 568
- mlacp iccp-group, on page 569
- mlacp node, on page 570
- mlacp port-priority, on page 571
- mlacp system mac, on page 572

- mlacp system priority, on page 573
- redundancy iccp group, on page 574
- redundancy one-way, on page 575
- show bundle, on page 576
- show bundle brief, on page 591
- show bundle load-balancing, on page 594
- show bundle replication bundle-ether, on page 598
- show iccp group, on page 599
- show lacp bundle, on page 601
- show lacp counters, on page 603
- show lacp io, on page 605
- show lacp packet-capture, on page 608
- show lacp port, on page 611
- show lacp system-id, on page 613
- show mlacp, on page 615
- show mlacp counters, on page 617

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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# backbone interface GigabitEthernet
0/2/1/0
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)#
```

Related Commands

Command	Description
redundancy iccp group, on page 574	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/RSP0/CPU0:router(config)# int bundle-ether 1
RP/0/RSP0/CPU0:router(config-if)#bundle lacp-delay ?
<1000-15000>  Lacp-delay timeout in milliseconds
RP/0/RSP0/CPU0:router(config-if)#bundle lacp-delay 6000
RP/0/RSP0/CPU0:router(config-if)#commit
```

Related Commands

Command	Description
bundle maximum-active links, on page 543	
show bundle, on page 576	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 mode.

bundle-hash {**Bundle-Ether** *bundle-id* | **members** {**GigabitEthernet** | **TenGigabitEthernet**} *interface-path-id*}
location *source-interface*

Syntax Description

Bundle-Ether *bundle-id*	Specifies an Ethernet 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.
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 mode

Command History

Release	Modification
Release 3.7.2	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 39: bundle-hash Command Options, on page 532 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 39: bundle-hash Command Options, on page 532.

Table 39: bundle-hash Command Options

Option	Information You Need to Provide
L3/3-tuple	L3 information: • Source IP address • Destination IP address • Destination subnet prefix • Bundle IP address

Option	Information You Need to Provide
L4/7-tuple	L3 information: • Source IP address • Destination IP address • Protocol L4 information: • Source port • Destination port Platform-related information: • Router ID • Ingress interface
Single pair	Information for a single source port and destination port. The utility uses this information to calculate the hash and display the bundle load-balance distribution among the user-provided physical/bundle links. The default is single mode. While in single mode, you may receive the following prompt:
Range	Information for sets of source and destination addresses to generate a packet flow for each set. The utility uses this information to calculate the hash for the generated packet flows and display the user-provided egress member links/bundle interfaces and the number of packet flows on each link.
IPv4	IPv4 addresses
IPv6	IPv6 addresses

```
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 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/RSP0/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/RSP0/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/RSP0/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: [ GigabitEthernet | TenGigE ]R/S/I/P
  - bundle interface format:   [ Bundle-Ether]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: [GigabitEthernet | TenGigE ]R/S/I/P
  - bundle interface format:   [ Bundle-Ether ]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 5001) using entropy label, and ingress interface:

```
RP/0/RSP0/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 576	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 3.7.2	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/RSP0/CPU0:router(config)# interface GigabitEthernet 0/1/5/0
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface GigabitEthernet 0/6/5/7
RP/0/RSP0/CPU0:router(config-if)# bundle id 5 mode active
```

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.
Release 6.1.4	This command was modified. Support for Layer 3 multicast flow was added.

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.

From Release 6.1.4, for IPv4 and IPv6 multicast traffic, the default hash is based on source IP and destination IP address.

In Release earlier than Release 6.1.4, the bundle load-balancing hash command has no effect on Layer 3 Multicast IP traffic.

Note If the **bundle load-balancing hash** command has been configured under bundle sub-interface, then this configuration takes precedence over the bundle parent configuration.

Task ID

Task ID	Operation
bundle	read, write

The following example configures load balancing on bundle members based on source IP address:

```
RP/0/RSP0/CPU0:router(config)#interface Bundle-Ether 100
RP/0/RSP0/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/RSP0/CPU0:router(config)#interface Bundle-Ether 100
RP/0/RSP0/CPU0:router(config-if)# bundle load-balancing hash src-ip
```

Related Commands

Command	Description
interface (bundle), on page 551	Specifies or creates a new bundle and enters interface configuration mode for that bundle.
lacp cisco enable, on page 553	Enables use of Cisco-specific TLVs in addition to standard TLVs for negotiating and exchanging LACP information on link bundles.
show bundle, on page 576	Displays information about configured bundles.
show bundle load-balancing, on page 594	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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface bundle-ether 1.1 l2transport
RP/0/RSP0/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/RSP0/CPU0:router# config
```

```
RP/0/RSP0/CPU0:router(config)# interface bundle-ether 1.1 l2transport
RP/0/RSP0/CPU0:router(config-subif)# bundle load-balancing hash 1
```

Related Commands

Command	Description
bundle-hash, on page 531	Displays the source and destination IP addresses for the member links.
interface (bundle), on page 551	Specifies or creates a new bundle and enters interface configuration mode for that bundle.
show bundle, on page 576	Displays information about configured bundles.
show bundle load-balancing, on page 594	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 3.7.2	This command was introduced.

Usage Guidelines

Misconfiguration or inconsistent configuration with a remote side can be causing traffic loss even though the bundle is up. We recommend that you use LACP protocol to better protect against the misconfiguration.

If the **bundle maximum-active links** command is issued, then only the highest-priority link within the bundle is active . The priority is based on the value from the **bundle port-priority** command, where a lower value is a higher priority. Therefore, we recommend that you configure a higher priority on the link that you want to be the active link.

- Another Cisco IOS XR device using the same option.
- Another device using an IEEE standard-based switchover. (Cisco does not recommend using this option because unexpected behavior, such as the peer sending traffic on the standby link, can occur.)

When you configure the **hot-standby** keyword, if the partner device is not XR, you may have to further modify the timeouts. Use the commands that are used for refining the timeouts on the partner device as well. For best performance, do not configure with **bundle-maximum-active links** command on the partner device.

The **bundle maximum-active links hot-standby** command can be configured at both ends. However, this will impact the switchover times.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to set default values for timeouts, to avoid bundle-level flaps when the highest priority link fails or recovers:

```
RP/0/RSP0/CPU0:router(config)# interface bundle-ether 5
RP/0/RSP0/CPU0:router(config-if)# bundle maximum-active links 1 hot-standby
```

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/RSP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RSP0/CPU0:router(config-if)# bundle maximum-active links 1
```

Related Commands

Command	Description
bundle minimum-active links, on page 546	Sets the number of active links required to bring up a specific bundle.
show bundle, on page 576	Displays information about configured bundles.

bundle minimum-active bandwidth

To set the minimum amount of bandwidth required before a user can bring up a specific bundle, use the **bundle minimum-active bandwidth** command in interface configuration mode.

bundle minimum-active bandwidth *kbps*

Syntax Description

kbps	Minimum bandwidth required before you can bring up a bundle. Range is from 1 through a number that is equivalent to the combined bandwidths of 8 TenGigabitEthernet interfaces .

Command Default

The default setting is *kbps* = 1.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.7.2	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 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/RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RSP0/CPU0:router(config-if)# bundle minimum-active bandwidth 620000
```

Related Commands

Command	Description
show bundle, on page 576	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 3.7.2	This command was introduced.
Release 4.0.0	The command range maximum was changed from 8 to 64.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to set the number of active links required to bring up a specific bundle. In this example, the user configures Ethernet bundle 5 so that 2 links must be active before the bundle can be brought up:

```
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RSP0/CPU0:router(config-if)# bundle minimum-active links 2
```

Related Commands

Command	Description
bundle maximum-active links, on page 543	
show bundle, on page 576	Displays information about configured bundles.

bundle port-priority

To configure Link Aggregation Control Protocol (LACP) priority for a port , enter the **bundle port-priority** command in interface configuration mode. To return to the default LACP priority value, use the **no** form of this command.

bundle port-priority *priority*

Syntax Description

priority	Priority for this port, where a lower value equals a higher priority. Replace the *priority* argument with a number. Range is from 1 through 65535.

Command Default

priority: 32768

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

The LACP priority value forms part of the port ID, which is transmitted within the LACP packets that are exchanged with the peer. The peer uses the LACP packets to determine whether a given port should carry traffic for the bundle.

For Multi-Gigabit Service Control Point (MGSCP), the **bundle port-priority** command applies to working links.

Note A lower LACP value is a higher LACP priority for the port.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to configure LACP priority on a port:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# bundle port-priority 1
```

Related Commands

Command	Description
bundle id, on page 537	Adds a port to an aggregated interface or bundle.

Command	Description
show lacp bundle, on page 601	Displays detailed information about LACP ports and their peers.
show lacp port, on page 611	
show lacp system-id, on page 613	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/RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RSP0/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 mode.

clear lacp counters [**bundle Bundle-Ether** *bundle-id* | **port** {**GigabitEthernet** *interface-path-id* | **TenGigE** *interface-path-id*}]

Syntax Description

bundle	(Optional) Clears LACP counters for all members of a bundle.
Bundle-Ether *node-id*	(Optional) Ethernet bundle. Use the *node-id* argument to specify the node ID number of the LACP counters you want to clear. Range is 1 through 65535.
port	(Optional) Clears all LACP counters on the specified bundle or interface.
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.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	execute
basic-services	read, write

Examples

The following example shows how to clear LACP counters:

```
RP/0/RSP0/CPU0:router# clear lacp counters
```

Related Commands

Command	Description
show lacp counters, on page 603	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 mode. To delete a bundle, use the **no** form of this command.

interface Bundle-Ether *bundle-id*

Syntax Description

Bundle-Ether	Specifies or creates an Ethernet bundle interface.
bundle-id	Number from 1 to 65535 that identifies a particular bundle.

Command Default

No bundle interface is configured.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 3
RP/0/RSP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
show bundle, on page 576	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.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

This example shows how to configure ICCP parameters:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# isolation recovery-delay 35
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)#
```

Task ID

Task ID	Operations
config-services	read, write

Related Commands

Command	Description
redundancy iccp group, on page 574	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/RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RSP0/CPU0:router(config-if)# lacp cisco enable link-order signaled
```

Related Commands

Command	Description
interface (bundle), on page 551	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/RSP0/CPU0:router# configure terminal
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RSP0/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/RSP0/CPU0:router# configure terminal
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface Bundle-Ether 100
RP/0/RSP0/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 3.9.0	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 543 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/RSP0/CPU0:router(config)# interface Bundle-Ether 28
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface Bundle-Ether 28
RP/0/RSP0/CPU0:router(config-if)# no lacp fast-switchover
```

Related Commands

Command	Description
bundle maximum-active links, on page 543	

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface bundle-ether 1
RP/0/RSP0/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 mode.

{**lacp packet-capture gigabitethernet** *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*] [**gigabitethernet** *interface-path-id*] [**tengige** *interface-path-id*] **clear** | **stop**}

Syntax Description

bundle-ether	Ethernet bundle interface specified by *bundle-id*.
GigabitEthernet	Gigabit Ethernet 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 mode

Command History

Release	Modification
Release 3.9.0	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

```
RP/0/RSP0/CPU0:router# lacp packet-capture pos 0/1/0/0 100
```

```
RP/0/RSP0/CPU0:router# lacp packet-capture pos 0/1/0/0 stop
```

```
RP/0/RSP0/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/RSP0/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/RSP0/CPU0:router# lacp packet-capture gigabitethernet 0/2/0/0 stop
```

Related Commands

Command	Description
show lacp io, on page 605	Displays the LACP transmission information that used by the transmitting device for sending packets on an interface.

Command	Description
show lacp packet-capture, on page 608	Displays the contents of LACP packets that are sent and received on an interface.
lacp period short, on page 562	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 3.9.0	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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short
RP/0/RSP0/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/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short
RP/0/RSP0/CPU0:router(config-if)# commit
```

Router B

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short
RP/0/RSP0/CPU0:router(config-if)# commit
```

Router A

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RSP0/CPU0:router(config-if)# commit
```

Router B

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RSP0/CPU0:router(config-if)# commit
```

Router A

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RSP0/CPU0:router(config-if)# commit
```

Router B

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RSP0/CPU0:router(config-if)# commit
```

Related Commands

Command	Description
show lacp io, on page 605	Displays the LACP transmission information that used by the transmitting device for sending packets on an interface.
show lacp packet-capture, on page 608	Displays the contents of LACP packets that are sent and received on an interface.
lacp packet-capture, on page 559	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 mode mode. To return to the default LACP system priority value, use the **no** form of this command.

lacp system priority *priority*

Syntax Description

s	Priority for this system. Replace *priority* with a number. Range is from 1 through 65535. A lower value is higher priority.

Command Default

The default setting is *priority* = 32768.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RSP0/CPU0:router(config-if)# lacp system priority 10
RP/0/RSP0/CPU0:router(config-if)# lacp system mac 00c1.4c00.bd15
```

```
RP/0/RSP0/CPU0:router(config-if)# commit
```

Related Commands

Command	Description
show lacp system-id, on page 613	Displays the local system ID used by the LACP.
show lacp bundle, on page 601	Displays detailed information about LACP ports and their peers.
show lacp port, on page 611	

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# member neighbor 10.1.1.1
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)#
```

Related Commands

Command	Description
redundancy iccp group, on page 574	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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/CPU0:router(config-redundancy-iccp-group)# mlacp connect timeout 100
RP/0/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 30
RP/0/RSP0/CPU0:router(config-if)# mlacp iccp-group 200
RP/0/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface Bundle-Ether 30
RP/0/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/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.

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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# redundancy iccp group 10
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# l2vpn
RP/0/RSP0/CPU0:router(config-l2vpn)# pw-class class_mpls
RP/0/RSP0/CPU0:router(config-l2vpn-pwc)# encapsulation mpls
RP/0/RSP0/CPU0:router(config-l2vpn-pwc-mpls)# redundancy one-way
RP/0/RSP0/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-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 mode

Command History

Release	Modification
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 5.3.2	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* 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/RSP0/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
```

Table 40: show bundle Field Descriptions

Field	Description
Bundle-*typenumber*	Full name of the bundle interface, where *type* is Ether (Ethernet) , followed by the configured *number* of the bundle.
Status:	State of the bundle on the local device, with one of the following possible values: • Admin down—The bundle has been configured to be shut down. • Bundle shut—The bundle is holding all links in Standby state and will not support any traffic. • Down—The bundle is operationally down. It has no Active members on the local device. • mLACP cold standby—The bundle is acting as a multichassis LACP Standby device, but the higher layers are not synchronized. • mLACP hot standby—The bundle is Up on the mLACP peer device, and the local device is ready to take over if that bundle goes down on the peer. • Nak—The local and peer devices cannot resolve a configuration error. • Partner down—The partner system indicates that the bundle is unable to forward traffic at its end. • PE isolated—The bundle is isolated from the core. • Up—The bundle has Active members on this device.
Local links <active/standby/configured>:	The number of links on the device (from 0 to the maximum number of supported links for the bundle) in the format *x* / *y* / *z*, with the following values: • *x*—Number of links in Active state on the bundle. • *y*—Number of links in Standby state on the bundle. • *z*—Total number of links configured on the bundle.

Field	Description
Local bandwidth <effective/available>:	Bandwidth characteristics on the bundle in kilobits per second (kbps) in the format *x / y*, with the following values: • *x*—Current bandwidth of the bundle (this effective bandwidth might be limited by configuration). • *y*—Available bandwidth of the bundle that is the sum of the bandwidths of all of the locally active links.
MAC address (source):	Layer 2 MAC address on the bundle interface in the format xxxx.xxxx.xxxx. The (*source*) of the address is shown in parentheses with the following possible values: • Interface name—The MAC address is from the displayed member interface type and path. • Configured—The MAC address is explicity configured. • Chassis pool—The MAC address is from the available pool of addresses for the chassis. • [unknown MAC source 0]—No MAC address could be assigned to the bundle. (You might see this display if you have not completed your bundle configuration.)
Minimum active links / bandwidth:	Displays the following information in the format *x / y* kbps, with the following values: • *x*—Minimum number of active links (from 1 to the maximum number of links supported on the bundle) that are required for the bundle to be operative. • *y*—Minimum total bandwidth on active links (in kbps) that is required for the bundle to be operative. • (partner)—Shows that the peer system's value is in use.
Maximum active links:	Maximum number of links (from 1 to the maximum supported on a bundle) that can be active on the bundle.

Field	Description
Wait-while timer:	Amount of time (in milliseconds) that the system allows for the Link Aggregation Control Protocol (LACP) to negotiate on a “working”link, before moving a “protect”or backup link to Standby state.
Load balancing:	Type of load balancing in use on the bundle, with the following possible values: • Default—The default load balancing method for the system is used on the bundle, and the load balancing sub-fields are not displayed. • No value—Another load balancing method is in use on the bundle, with information shown in the related sub-fields of the display.
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".
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.

Field	Description
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.
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,

Field	Description
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.
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.

Field	Description
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.
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.

Field	Description
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.
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.

Field	Description
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.
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 41: 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.

Reason	Description
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.
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.

Reason	Description
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.
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.

Reason	Description
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.
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.

Reason	Description
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 551	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 mode

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	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/RSP0/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 42: show bundle brief Field Descriptions, on page 591 describes the fields shown in the display.

Table 42: 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*.
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 576	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/RSP0/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/RSP0/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/RSP0/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/RSP0/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 531	Displays the source and destination IP addresses for the member links.
bundle load-balancing hash (EFP), on page 541	Configures all egress traffic on a particular subinterface of a bundle to flow through the same physical member link.
show bundle, on page 576	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 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 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
bundle	read

Examples

```
RP/0/RSP0/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.

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/RSP0/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/RSP0/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 mode.

show lacp bundle {**Bundle-Ether**} *bundle-id*

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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 43: show lacp bundle Field Descriptions

Field	Description
Flags	Describes the possible flags that may apply to a device or port, under the “Flags” field.

Field	Description
State	Describes the possible flags that may apply the port state, under the “State” field.
Port	Port identifier, in the *rack/slot/module/port* notation.
State	Provides information about the state of the specified port. Possible flags are: • 0—Port is not aggregatable. • 1—Port is out of sync with peer. • 2—Port is in sync with peer. • 3—Port is collecting. • 4—Port is collecting and distributing.
Flags	Provides information about the state of the specified device or port. Possible flags are: • A—Device is in Active mode. • P—Device is in Passive mode. • S—Device requests peer to send PDUs at a slow rate. • F—Device requests peer to send PDUs at a fast rate. • D—Port is using default values for partner information. • E—Information about partner has expired.
Port ID	Port identifier, expressed in the format *N*x*nnnn*. *N* is the port priority, and *nnnn* is the port number assigned by the sending router.
Key	Two-byte number associated with the specified link and aggregator. Each port is assigned an operational key. The ability of one port to aggregate with another is summarized by this key. Ports which have the same key select the same bundled interface. The system ID, port ID and key combine to uniquely define a port within a LACP system.
System-ID	System identifier. The system ID is a LACP property of the system which is transmitted within each LACP packet together with the details of the link.

Related Commands

Command	Description
bundle id, on page 537	Adds a port to an aggregated interface or bundle.
show bundle, on page 576	Displays information about configured bundles.

show lacp counters

To display Link Aggregation Control Protocol (LACP) statistics, enter the **show lacp counters** command in EXEC mode.

show lacp counters {**Bundle-Ether**} *bundle-id*

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/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 44: 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 550	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 mode.

show lacp io {**Bundle-Ether**} *bundle-id* {**GigabitEthernet** | **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.
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*.
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 mode

Command History

Release	Modification
Release 3.9.0	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/RSP0/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/RSP0/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)
```

Related Commands

Command	Description
show lacp packet-capture, on page 608	Displays the contents of LACP packets that are sent and received on an interface.
lacp period short, on page 562	Enables a short period time interval for the transmission and reception of LACP packets.
lacp packet-capture, on page 559	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 mode.

show lacp packet-capture [**decoded**] [**in** | **out**] {**GigabitEthernet** | **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*.
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 mode

Command History

Release	Modification
Release 3.9.0	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/RSP0/CPU0:router# lacp packet-capture gigabitethernet 0/1/0/0 100
RP/0/RSP0/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/RSP0/CPU0:router# lacp packet-capture gigabitethernet 0/1/0/0 100
RP/0/RSP0/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 605	Displays the LACP transmission information that used by the transmitting device for sending packets on an interface.
lacp period short, on page 562	Enables a short period time interval for the transmission and reception of LACP packets.
lacp packet-capture, on page 559	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 mode.

show lacp port [[**GigabitEthernet** | **TenGigE**] *interface_instance*]

Command Default

No default behavior or values.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	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 port information for all link bundles on a router:

```
RP/0/RSP0/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 45: 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.

Field	Description
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.
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 537	Adds a port to an aggregated interface or bundle.
show bundle, on page 576	Displays information about configured bundles.
show lacp bundle, on page 601	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 mode.

show lacp system-id

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	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/RSP0/CPU0:router# show lacp system-id

Priority  MAC Address
--------  -----------------
  0x8000  08-00-45-3a-65-01
```

Table 46: 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 537	Adds a port to an aggregated interface or bundle.
show bundle, on page 576	Displays information about configured bundles.

Command	Description
show lacp bundle, on page 601	Displays detailed information about LACP ports and their peers.
show lacp port, on page 611	

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.

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/RSP0/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.

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/RSP0/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 ASR 9000 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), on page 620
- interface MgmtEth, on page 622
- ipv6 address autoconfig, on page 623
- mac-address (Management Ethernet), on page 625
- speed (Management Ethernet), on page 626

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 3.7.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to configure the Management Ethernet interface to operate in full duplex mode:

```
RP/0/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# duplex half
```

The following example shows how to return a Management Ethernet interface to autonegotiated duplex mode:

```
RP/0/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# no duplex
```

Related Commands

Command	Description
interface MgmtEth, on page 622	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 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 mode

Command History

Release	Modification
Release 3.7.2	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 enter interface configuration mode for a Management Ethernet interface:

```
RP/0/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
duplex (Management Ethernet), on page 620	Configures duplex mode operation on a Management Ethernet interface.
mac-address (Management Ethernet), on page 625	Sets the MAC layer address of a Management Ethernet interface.
speed (Management Ethernet), on page 626	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitEthernet 0/2/0/0
```

```
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface mgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# ipv6 address autoconfig
```

Related Commands

Command	Description
interface MgmtEth, on page 622	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 3.7.2	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 /CPU0/0:

```
RP/0/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# mac-address 0001.2468.ABCD
```

Related Commands

Command	Description
interface MgmtEth, on page 622	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 3.7.2	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 47: Relationship Between duplex and speed Commands, on page 626 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 47: Relationship Between duplex and speed Commands

duplex Command	speed Command	Resulting System Action
no duplex	no speed	Autonegotiates both speed and duplex modes.
no duplex	speed 1000	Forces 1000 Mbps (1 Gbps) and full duplex.
no duplex	speed 100	Autonegotiates for duplex mode and forces 100 Mbps.
no duplex	speed 10	Autonegotiates for duplex mode and forces 10 Mbps.
duplex full	no speed	Forces full duplex and autonegotiates for speed.
duplex full	speed 1000	Forces 1000 Mbps (1 Gbps) and full duplex.

duplex Command	speed Command	Resulting System Action
duplex full	speed 100	Forces 100 Mbps and full duplex.
duplex full	speed 10	Forces 10 Mbps and full duplex.
duplex half	no speed	Forces half duplex and autonegotiates for speed (10 or 100 Mbps.)
duplex half	speed 100	Forces 100 Mbps and half duplex.
duplex half	speed 10	Forces 10 Mbps and half duplex.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure the Management Ethernet interface to transmit at one gigabit:

```
RP/0/RSP0/CPU0:router(config)# interface MgmtEth 0/RSP0/CPU0/0
RP/0/RSP0/CPU0:router(config-if)# speed 1000
```

Related Commands

Command	Description
interface MgmtEth, on page 622	Enters interface configuration mode for the Management Ethernet interface.



Multilink Commands

This module provides command line interface (CLI) commands for configuring multilink interfaces on the Cisco ASR 9000 Series Router.

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

- bundle, on page 630
- controller MgmtMultilink, on page 631
- interface multilink, on page 633
- multilink, on page 635
- multilink fragment, on page 636
- multilink group, on page 637
- show controllers mgmtmultilink, on page 638
- show interfaces multilink, on page 641

bundle

To create a multilink interface bundle, use the **bundle** command in the interface configuration mode. To remove a multilink interface bundle, use the **no** form of this command.

bundle *bundleID*

Syntax Description

bundleID	ID number of the multilink interface bundle. The bundle ID can be a 9-digit number.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

The **bundle** command is used in mgmtmultilink controller mode to dynamically create a multilink interface. This command is similar to the **channel-group** command on the T1 controller, which dynamically creates a serial interface.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to create a multilink interface with a bundle ID of 1:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# controller mgmtmultilink 0/1/0/0
RP/0/RSP0/CPU0:router(config-mgmtmultilink)# bundle 1
RP/0/RSP0/CPU0:router(config-mgmtmultilink)# commit
```

Related Commands

Command	Description
multilink, on page 635	Enters the config-if-multilink submode.
multilink group, on page 637	Attaches a serial interface to a multilink interface bundle.

controller MgmtMultilink

To configure a controller for a generic multilink bundle and enter MgmtMultilink configuration mode, use the **controller MgmtMultilink** command in Global Configuration mode . To return to the default state, use the **no** form of this command.

controller MgmtMultilink *interface-path-id*

Syntax Description

interface-path-id	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 mode

Command History

Release	Modification
Release 3.9.0	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*/*instance*. 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.
  - *instance*: Number of the controller instance. The instance is always 0.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter the MgmtMultilink configuration mode :

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# controller MgmtMultilink 0/1/0/0
RP/0/RSP0/CPU0:router(config-mgmtmultilink)#
```

Related Commands

Command	Description
show controllers mgmtmultilink, on page 638	Displays information about the state and the number of bundles of a multilink controller.

interface multilink

To configure a multilink interface and enter multilink interface configuration mode, use the **interface multilink** command in Global Configuration mode. To delete the interface configuration, use the **no** form of this command. To return to the default state, use the **no** form of this command.

interface multilink *interface-path-id*[**.***subinterface* {**l2transport** | **point-to-point**}]

Syntax Description

interface-path-id [**.** *subinterface*]	Physical interface or virtual interface followed by the optional 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	Configures interface to function as one endpoint on a Layer 2 link.
point-to-point	Configures interface to function as one endpoint on a point-to-point link.

Command Default

No interfaces are configured.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The *subinterface* argument and the keywords **l2transport** and **point-to-point** were introduced.

Usage Guidelines

The *subinterface* argument and keywords **l2transport** and **po in t-to-point** are only applicable if frame relay encapsulation is enabled using the **encapsulation frame-relay** command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enable frame relay encapsulation for a multilink bundle, and enter subinterface configuration mode.

```
RP/0/RSP0/CPU0:routerRP/0/RSP0/CPU0:router#
RP/0/RSP0/CPU0:router# configure terminal
RP/0/RSP0/CPU0:router(config)# interface multilink 0/3/0/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation frame-relay
RP/0/RSP0/CPU0:router(config-if)# exit
RP/0/RSP0/CPU0:router(config)# interface multilink 0/3/0/0/1.1 point-to-point
RP/0/RSP0/CPU0:router(config-subif)# ipv4 address 10.86.10.48/24
```

The following example shows how to enter interface configuration mode for a multilink bundle with ppp encapsulation. ppp encapsulation is the default encapsulation type:

```
RP/0/RSP0/CPU0:router# configure terminal
RP/0/RSP0/CPU0:router(config)# interface multilink 0/3/0/0/1
RP/0/RSP0/CPU0:router(config-if)#ipv4 address 10.86.10.48/24
```

Related Commands

Command	Description
show interfaces multilink, on page 641	Displays information about a multilink interface.

multilink

To enter the config-if-multilink submode, use the **multilink** command in the interface configuration mode.

multilink

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.

Usage Guidelines

For multilink interfaces, the **multilink** command provides access to the config-if-multilink submode to use the **multilink fragment-size** command.

Task ID

Task ID	Operations
hdlc	read, write

Examples

The following example shows how to enter the config-if-multilink submode:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1/1/1:0
RP/0/RSP0/CPU0:router(config-if)# multilink
RP/0/RSP0/CPU0:router(config-if-multilink)# group 1
RP/0/RSP0/CPU0:router(config-if-multilink)# commit
```

Related Commands

Command	Description
multilink group, on page 637	Attaches a serial interface to a multilink interface bundle.

multilink fragment

To set the fragmentation size or the fragmentation delay on a multilink interface, use the **multilink fragment** command in interface configuration mode. To remove the fragment size or fragment delay, use the **no** form of this command.

multilink fragment {**size** *size* | **delay** *delay-ms*}

Syntax Description

size *size*	Specifies the fragment size (in bytes) on a multilink interface. The range is 64 to 9216.
delay *delay-ms*	Specifies the fragment delay (in milliseconds) on a multilink interface. The range is 1 to 1000.

Command Default

No multilink fragment size or fragment delay is set.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Multilink fragmentation is only supported for ppp encapsulation, not for frame-relay enacapsulation.

Task ID

Task ID	Operations
hdlc	read, write

Examples

The following example shows how to set the multilink fragment size:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface multilink 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-if)# multilink fragment size 128
RP/0/RSP0/CPU0:router(config-if)#
```

The following example shows how to set the multilink fragment delay:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface multilink 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-if)# multilink fragment delay 2
RP/0/RSP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
interface multilink, on page 633	Configures a multilink interface and enters multilink interface configuration mode.

multilink group

To attach a serial interface to a multilink interface bundle, use the **multilink group** command in interface configuration mode. To remove a serial interface from a multilink interface bundle, use the **no** form of this command.

multilink group *bundleID*

Syntax Description

bundleID	Bundle ID number of the multilink interface, in the format *rack/slot/bay/controllerID/bundleID*)

Command Default

No default behavior or values

Command Modes

Interface 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
hdlc	read, write

Examples

The following examples show how to attach a serial interface to a multilink interface bundle:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1/1/1:0
RP/0/RSP0/CPU0:router(config-if)# multilink group 1
RP/0/RSP0/CPU0:router(config-if)# commit
```

or

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1/1/1:0
RP/0/RSP0/CPU0:router(config-if)# multilink
RP/0/RSP0/CPU0:router(config-if-multilink)# group 1
(config-if-multilink)# commit
```

Related Commands

Command	Description
multilink, on page 635	Enters the config-if-multilink submode.

show controllers mgmtmultilink

To display information about the state and the number of bundles of a multilink controller, use the **show controller mgmtmultilink** command in EXEC mode.

show controllers mgmtmultilink *interface-path-id* [**all** | **brief** | **internal-state** | **tabular**]

Syntax Description

interface-path-id	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 all multilink management information.
brief	Displays brief multilink management information.
internal-state	Displays internal multilink management state.
tabular	Displays multilink management information in tabular format.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.9.0	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*/*instance*. 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.
  - *instance*: Number of the controller instance. The instance is always 0.
- If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows how to display information for a management multilink controller:

```
RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/3/0/0 all

Controller MgmtMultilink0/3/0/0
  State is up
  Number of bundles: 2
    Bundle 1 - Multilink0/3/0/0/1 (0x06186240)
      Type:  Full Framed T1s
      Bandwidth: 3072 kbps
      Encapsulation: Frame Relay
      Fragment size: 0
      Number of members: 2
      Ancestor name: SONET0/3/0/0
      Member(s):
           Serial0/3/0/0/1/1:0  (0x0619b640)    Active
           Serial0/3/0/0/1/2:0  (0x06176980)    Active

    Bundle 2 - Multilink0/3/0/0/2 (0x06176840)
      Type:  Full Framed T1s
      Bandwidth: 3072 kbps
      Encapsulation: Frame Relay
      Fragment size: 0
      Number of members: 2
      Ancestor name: SONET0/3/0/0
      Member(s):
           Serial0/3/0/0/1/3:0  (0x0619b3c0)    Active
           Serial0/3/0/0/1/4:0  (0x0618b9c0)    Active

RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/3/0/0 brief

  MgmtMultilink0/3/0/0 is up

RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/3/0/0 tabular

  MgmtMultilink0/3/0/0 is up

RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/3/0/0 internal-state

Interface(layer)      admin_up if_state
--------------------- -------- --------
MgmtMultilink0/3/0/0  up       up

RP/0/RSP0/CPU0:router# show controllers mgmtmultilink 0/2/0/0

Controller MgmtMultilink0/2/0/0
   State is up
   Number of bundles: 1
     Bundle 1 - Multilink0/2/0/0/1 (0x0802e400)
       Type:  Full Framed T1s
       Bandwidth: 1536 kbps
       Encapsulation: PPP
       Fragment size: 0
       Number of members: 1
       Ancestor name: SONET0/2/0/0
```

```
Member(s):
     Serial0/2/0/0/1/1:0   (0x08023c00)    Active
```

Related Commands

Command	Description
show interfaces multilink, on page 641	Displays information about a multilink interface.

show interfaces multilink

To display information about a multilink interface, use the **show interfaces multilink** command in EXEC mode mode.

show interfaces multilink *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

EXEC mode

Command History

Release	Modification
Release 3.9.0	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.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows how to display information about a multilink interface:

```
RP/0/RSP0/CPU0:router# show interfaces multilink 0/1/0/0/1
 Multilink0/1/0/0/1 is up, line protocol is up
   Interface state transitions: 1
```

```
   Hardware is Multilink network interface(s)
   Internet address is 10.1.1.1/24
   MTU 1504 bytes, BW 1536 Kbit
      reliability 255/255, txload 3/255, rxload 3/255
   Encapsulation PPP,  loopback not set, keepalive set (10 sec)
   LCP Open
   Open: IPCP
   Last input 00:00:00, output 00:00:00
   Last clearing of "show interface" counters 02:06:24
   5 minute input rate 19000 bits/sec, 5 packets/sec
   5 minute output rate 19000 bits/sec, 5 packets/sec
      48769 packets input, 12425740 bytes, 0 total input drops
      0 drops for unrecognized upper-level protocol
      Received 0 runts, 0 giants, 0 throttles, 0 parity
      0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
      67905 packets output, 17400050 bytes, 0 total output drops
      0 output errors, 0 underruns, 0 applique, 0 resets
      0 output buffer failures, 0 output buffers swapped out
Fragmentation Statistics
   Input Fragmented packets 0            Input Fragmented bytes 0
   Output Fragmented packets 0           Output Fragmented bytes 0
   Input Unfragmented packets 0          Input Unfragmented bytes 0
   Output Unfragmented packets 0         Output Unfragmented bytes 0
   Input Reassembled packets 0           Input Reassembled bytes 0
```



Packet-over-SONET Interface Commands

This module provides command line interface (CLI) commands for configuring Packet-over-SONET/SDH (POS) on the Cisco ASR 9000 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.

This module describes the Cisco IOS XR commands used to configure, monitor, and troubleshoot Packet-over-SONET/SDH (POS).

POS provides a method for efficiently carrying data packets in SONET or Synchronous Digital Hierarchy (SDH) frames. High-bandwidth capacity and efficient link utilization are characteristics that make POS largely preferred for building the core of data networks. POS uses PPP in High-Level Data Link Control (HDLC)-like framing for data encapsulation at Layer 2 (data link) of the Open System Interconnection (OSI) stack. This method provides efficient packet delineation and error control.

In addition to high-bandwidth efficiency, POS offers secure and reliable transmission for data. Reliable data transfer depends on timing integrity.

The real-time POS functionality is performed in hardware, according to the hardware configuration setup. Configured hardware events are detected by the framer application-specific integrated circuits (ASICs) and the control is passed to the software. The generic POS driver is responsible for providing a mechanism to configure the hardware on a per-interface basis, to handle interface state transitions, and to collect POS-related statistics.

- crc (POS), on page 644
- encapsulation (POS), on page 645
- interface pos, on page 646
- keepalive (POS), on page 648
- pos, on page 650
- show interfaces pos, on page 652
- transmit-delay, on page 655

crc (POS)

To set the length of the cyclic redundancy check (CRC) on a Packet-over-SONET/SDH (POS) interface, use the **crc** command in POS configuration mode. To return the CRC setting on a POS interface to the 32-bit default setting, use the **no** form of this command.

crc {**16** | **32**}

Syntax Description

16	Sets 16-bit CRC mode.
32	Sets 32-bit CRC mode. The default is 32 bits.

Command Default

The default CRC mode is 32 bits.

Command Modes

POS configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. The designators 16 and 32 indicate the length (in bits) of the frame check sequence (FCS). A CRC of 32 bits provides more powerful error detection, but adds overhead. Both the sender and receiver must use the same setting.

CRC-16, the most widely used error checking method throughout the United States and Europe, is used extensively with WANs. CRC-32 is specified by IEEE standard 802 and as an option by some point-to-point transmission standards. It is often used on Switched Multimegabit Data Service (SMDS) networks and LANs.

Task ID

Task ID	Operations
pos-dpt	read, write

Examples

In this example, the 32-bit CRC on POS interface 0/1/0/2 is enabled:

```
rack/slot/module(config)# interface POS 0/1/0/2
rack/slot/module(config-if)# POS
rack/slot/module(config-if-pos)# crc 32
```

Related Commands

Command	Description
transmit-delay, on page 655	Specifies a number of flag sequences to be inserted between the packets.

encapsulation (POS)

To set the Layer 2 encapsulation of an interface, use the **encapsulation** command in interface configuration mode. To restore the system to the default encapsulation, use the **no** form of this command.

encapsulation {**hdlc** | **ppp** | **frame-relay** [**ietf**] }

Syntax Description

hdlc	Enables Cisco High-Level Data Link Control (cHDLC) encapsulation on the interface. This is the default encapsulation type.
ppp	Enables Point-to-Point Protocol (PPP) encapsulation on the interface.
frame-relay	Enables Frame Relay encapsuation on the interface.
ietf	(Optional) Enables RFC1490/RFC2427 encapsulation.

Command Default

For Packet-over-SONET/SDH (POS) interfaces, the default encapsulation is HDLC.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The task ID hdlc (r,w) is required for use of the keyword **hdlc**. The task ID ppp(r,w) is required for use of the keyword **ppp**. The task ID fr(r,w) is required for use of the keyword **frame-relay**.

Task ID

Task ID	Operations
hdlc OR ppp OR fr	read, write
interface	read, write

Examples

In this example, PPP encapsulation is set on POS interface 0/3/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
```

Related Commands

Command	Description
show interfaces pos, on page 652	Displays information about a POS interface.

interface pos

To enter interface or subinterface configuration mode for a POS interface or subinterface, use the **interface pos** command in Global Configuration mode. To delete a POS configuration, use the **no** form of this command.

interface pos *interface-path-id*[**.***subinterface* {**l2 transport** | **point-to-point**}]

Syntax Description

interface-path-id [*.subinterface*]	Physical interface or virtual interface followed by the optional 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	(Optional) Configures the interface to function as an attachment circuit (AC) on one endpoint of a Layer 2 link.
point-to-point	(Optional) Configures interface to function as one endpoint of a point-to-point link.

Command Default

No default behavior or values

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Subinterfaces of a POS interface can only be configured using the **l2transport** keyword, if Frame Relay encapsulation is configured on the POS interface, using the **encapsulation frame-relay** command. Interfaces configured to use HDLC or PPP encapsulation cannot be configured using the **l2transport** keyword.

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

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter interface configuration mode for a POS interface:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)#
```

The following example shows how to create a subinterface on a POS interface in slot 1, subslot 1, port 2 and enter subinterface configuration mode:

```
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/1/2.1
RP/0/RSP0/CPU0:router(config-subif)#
```

The following example shows how to configure frame-relay encapsulation on the main POS interface before being able to configure an AC subinterface:

```
RP/0/RSP0/CPU0:router# interface pos 0/1/0/0
RP/0/RSP0/CPU0:router(config-if)# encapsulation frame-relay
RP/0/RSP0/CPU0:router(config-if)# commit
RP/0/RSP0/CPU0:router(config-if)# exit
RP/0/RSP0/CPU0:router(config)# interface pos 0/1/0/0.1 l2transport
RP/0/RSP0/CPU0:router(config-subif)# commit
```

Related Commands

Command	Description
show interfaces pos, on page 652	Displays information about a POS interface.

keepalive (POS)

To set the keepalive timer for a specific interface, use the **keepalive** command in interface configuration mode. To reset the keepalive timer to the default of 10 seconds, use the **no** form of this command.

keepalive {*interval* [*retry*] | **disable**}

Syntax Description

interval	Number of seconds (from 1 to 30) between keepalive messages. The default is 10.
retry	(Optional) Number of keepalive messages (from 1 to 255) that can be sent to a peer without a response before transitioning the link to the down state. The default is 5 for interfaces with PPP encapsulation, and 3 for interfaces with HDLC encapsulation.
disable	Turns off the keepalive timer.

Command Default

The default interval is 10 seconds between keepalive messages. The default number of retry keepalive messages that can be sent without a response is 5 for interfaces with PPP encapsulation, and 3 for interfaces with HDLC encapsulation. However, when more than 5 (or 3) keepalive messages are sent to a peer without a response, the link transitions to the down state.

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

HDLC keepalives require that the **keepalive** command is configured the same way on both routers. The two connected routers have no way of negotiating the keepalive value, because there is no way for the routers to tell each other what their configured values are. The keepalive value configured on each router (local and partner) sets the rate at which the Cisco IOS XR software sends packets. It also sets the rate at which the local end expects to receive incoming packets.

To set the keepalive value to the default value, use the **keepalive** command without specifying a value for the *seconds* argument.

If three keepalives are sent to the peer and no response is received from the peer, then the link makes the transition to the down state.

Task ID

Task ID	Operations
hdlc	read, write
ppp	read,write

Examples

This example shows how to configure keepalives for 3 seconds on POS interface 0/7/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/7/0/1
RP/0/RSP0/CPU0:router(config-if)# keepalive 3
```

pos

To access the POS configuration submode, use the **pos** command in interface configuration mode.

pos

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

When you issue the **pos** command in interface configuration mode for a POS interface, the CLI prompt changes to "config-if-pos" indicating that you have entered POS configuration submode. In the following sample output, the question mark (**?**) online help function displays all the commands available under POS configuration submode:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# POS
RP/0/RSP0/CPU0:router(config-if-pos)# ?

  commit          Commit the configuration changes to running
  crc             Set the CRC on a POS interface
  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
  transmit-delay  Set POS transmit delay on an interface
```

Task ID

Task ID	Operations
pos-dpt	read, write

Examples

The following example shows how to access the POS configuration submode from the POS configuration mode:

```
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# POS
RP/0/RSP0/CPU0:router(config-if-pos)#
```

Related Commands

Command	Description
crc (POS), on page 644	Sets the length of the CRC on a Packet-over-SONET/SDH (POS) interface.
transmit-delay, on page 655	Specifies a number of flag sequences to be inserted between the packets.

show interfaces pos

To display information about a POS interface, use the **show interfaces pos** command in EXEC mode .

show interfaces pos *interface-path-id* [**accounting** [**rates**] | **brief** | **description** | **detail**] [**location** *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.
accounting	(Optional) Displays accounting information for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.
rates	(Optional) Displays interface accounting rates for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.
brief	(Optional) Displays brief output for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.
description	Displays descriptive output for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.
detail	(Optional) Displays detailed output for all POS interfaces on the router, for a specific POS interface instance, or for all POS interfaces on a specific node.
location *node-id*	(Optional) Displays detailed POS information for the designated node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

Enter the **show interfaces pos** command without including any of the optional keywords or arguments to display detailed information about all POS interfaces configured on the router.

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	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.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows how to display summarized information for a POS interface on a specific node:

```
RP/0/RSP0/CPU0:router# show interfaces pos summary location 0/1/CPU0

Interface Type          Total    UP       Down     Admin Down
--------------          -----    --       ----     ----------
ALL TYPES               4        1        1        2
--------------
IFT_POS                 4        1        1        2
```

Table 48: show interfaces pos summary Field Descriptions

Field	Description
Intf Type	Type of interface described in the display.
Total	Total number of configured interfaces of the specified type.
Up	Number of interfaces of the specified type that are in the “Up” state.
Down	Number of interfaces of the specified type that are in the “Down” state.
Admin Down	Number of interfaces of the specified type that are in the “Admin Down” state.

The following example shows how to display brief information for a specific POS interface:

```
RP/0/RSP0/CPU0:router# show interfaces pos 0/2/0/0 brief

              Intf        Intf         LineP              Encap  MTU       BW
              Name        State        State               Type (byte)   (Kbps)
--------------------------------------------------------------------------------
         PO0/2/0/0   admin-down   admin-down              HDLC  4474   2488320
```

Table 49: show interfaces pos Field Descriptions

Field	Description
Intf Name	Interface identifier, in the *type*rack*/*slot*/*module*/*port* notation.
Intf State	Indicates whether the interface is in the admin-up or admin down state.

Field	Description
LineP State	Line protocol state.
Encap Type	Encapsulation type for the specified interface. Can be HDLC or PPP.
MTU (byte)	Maximum transmission unit (MTU) value configured for the specified interface, in bytes.
BW (Kbps)	Bandwidth of the interface, in kbps.

Related Commands

Command	Description
show controllers pos, on page 755	Displays information on the POS controllers.
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

transmit-delay

To specify a number of flag sequences to be inserted between the packets, use the **transmit-delay** command in POS configuration mode. To restore the default, use the **no** form of this command.

transmit-delay *microseconds*

Syntax Description

microseconds	Number of microseconds of minimum delay after sending a packet. Range is from 0 to 1023. Default is 0 (disabled).

Command Default

microseconds = 0 (disabled)

Command Modes

POS configuration

Command History

Releases	Modifications
Release 4.0.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
pos-dpt	read, write

Examples

In the following example, a delay of 2 microseconds is specified on POS interface 0/1/0/2:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# pos
RP/0/RSP0/CPU0:router(config-if-pos)# transmit-delay 2
```

In the following example, the transmit delay on POS interface 0/1/0/2 is disabled:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface POS 0/1/0/2
RP/0/RSP0/CPU0:router(config-if)# pos
RP/0/RSP0/CPU0:router(config-if-pos)# no transmit-delay
```

Related Commands

Command	Description
show interfaces	



Serial Interface Commands

This module provides CLI commands for configuring serial interfaces on the Cisco ASR 9000 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.

- clear iphc ipv4, on page 659
- crc (serial), on page 661
- description (IPHC profile), on page 663
- encapsulation (serial), on page 664
- feedback disable, on page 665
- fragment end-to-end, on page 666
- interface serial, on page 667
- invert, on page 669
- iphc profile, on page 670
- ipv4 iphc profile, on page 671
- keepalive (serial), on page 672
- max-header, on page 674
- non-tcp compression, on page 675
- non-tcp context absolute, on page 676
- refresh max-period, on page 677
- refresh max-time, on page 678
- refresh rtp, on page 679
- rtp, on page 680
- scramble, on page 681
- serial, on page 682
- show iphc idb, on page 683
- show iphc ipv4 rtp, on page 685
- show iphc ipv4 tcp, on page 687
- show iphc platform trace, on page 689
- show iphc profile, on page 691
- show iphc trace all, on page 694
- show tech-support iphc, on page 696
- tcp compression, on page 698
- tcp context absolute, on page 699

- transmit-delay (serial), on page 700

clear iphc ipv4

To clear all Real Time Protocol (RTP) and Transport Control Protocol (TCP) statistics for IP header compression (IPHC) packets sent and received on an interface, use the **clear iphc ipv4** command in EXEC mode.

clear iphc ipv4 {**interface** {**serial** | **multilink**} *interface-path-id* | **location** *node-id*}

Syntax Description

interface	Specifies the interface to be configured, by type and the *interface-path-id* argument.
serial	Specifies a serial network interface.
multilink	Specifies a multilink network 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.
location	Specifies the interface to be configured by its *node-id*.
node-id	Fully qualified path of the node in the *rack/slot/module notation*.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Note The **clear counters** command also clears the IPHC statistics for all the interfaces.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to clear RTP and TCP statistics on an interface:

```
RP/0/RSP0/CPU0:router# clear iphc ipv4 interface Serial 0/1/0/1/26:0

Thu Jan  8 20:30:38.155 UTC
```

The following example shows how to clear RTP and TCP statistics on a node:

```
RP/0/RSP0/CPU0:router# clear iphc ipv4 location 0/3/CPU0

Mon Oct 12 22:47:51.430 DST
```

crc (serial)

To set the length of the cyclic redundancy check (CRC) on a serial interface, use the **crc** command in serial configuration mode. To return the CRC setting on a serial interface to the default setting, use the **no** form of this command.

crc {**16** | **32**}

Syntax Description

16	Sets 16-bit CRC mode.
32	Sets 32-bit CRC mode.

Command Default

The default is 16 bits for serial interfaces.

Command Modes

Serial configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data. The designators 16 and 32 indicate the length (in bits) of the frame check sequence (FCS). A CRC of 32 bits provides more powerful error detection, but adds overhead. Both the sender and receiver must use the same setting.

CRC-16, the most widely used error checking method throughout the United States and Europe, is used extensively with WANs. CRC-32 is specified by IEEE standard 802 and as an option by some point-to-point transmission standards. It is often used on Switched Multimegabit Data Service (SMDS) networks and LANs.

Task ID

Task ID	Operations
hdlc	read, write

Examples

In the following example, the 32-bit CRC on serial interface 0/3/0/0/0:10 is enabled:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0/0:10
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# crc 32
```

Related Commands

Command	Description
show interfaces, on page 484	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.

description (IPHC profile)

To add a description to an IPHC profile, use the **description** command in IPHC profile configuration mode. To remove a description for an IPHC profile, use the **no** form of this command.

description *description*
no description

Syntax Description

description	Description to be added to the IPHC profile.

Command Default

By default, no description is attached to an IPHC profile.

Command Modes

IPHC profile 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
ip-services	read, write

Examples

In the following example, a description is attached to the IPHC profile test:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile test type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# description testprofile
RP/0/RSP0/CPU0:router(config-iphc-profile)# commit
```

encapsulation (serial)

To set the Layer 2 encapsulation of an interface, use the **encapsulation** command in interface configuration mode. To restore the system to the default encapsulation, use the **no** form of this command.

encapsulation {**hdlc** | **ppp** | **frame-relay** | **mfr**}

Syntax Description

hdlc	Enables Cisco High-Level Data Link Control (HDLC) encapsulation on the interface. This is the default encapsulation type.
ppp	Enables PPP encapsulation on the interface.
frame-relay	Enables Frame Relay encapsulation on the interface.
mfr	Enables multilink Frame Relay encapsulation on the interface.

Command Default

For serial interfaces, the default encapsulation is HDLC.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Frame Relay and Multilink Frame Relay encapsulation was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
hdlc	read, write
interface	read, write

Examples

The following example shows how to enable PPP encapsulation on serial interface 0/3/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/1
RP/0/RSP0/CPU0:router(config-if)# encapsulation ppp
```

Related Commands

Command	Description
show interfaces, on page 484	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.

feedback disable

To disable the IP header compression (IPHC) context status feedback messages on an interface, use the **feedback disable** command in IPHC profile configuration mode. To re-enable feedback messages after they are disabled, use the **no** form of this command.

feedback disable

Syntax Description

This command has no keywords or arguments.

Command Default

Feedback messages are enabled by default.

Command Modes

IPHC profile configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Note Feedback disable can be configured only within an IPHC profile.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to disable the IP header compression (IPHC) context status feedback messages within an IPHC profile:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# feedback disable
```

fragment end-to-end

To enable fragmentation of Frame Relay frames on an interface, use the **fragment end-to-end** command in serial Frame Relay PVC configuration mode. To disable Frame Relay fragmentation, use the **no** form of this command.

fragment end-to-end *fragment-size*

Syntax Description

fragment-size	Number of payload bytes from the original Frame Relay frame that go into each fragment. This number excludes the Frame Relay header of the original frame. All the fragments of a Frame Relay frame, except the last, have a payload size equal to fragment-size; the last fragment has a payload less than or equal to fragment-size. Valid values are from 64 to 512 bytes, depending on your hardware.

Command Default

Fragmentation is disabled by default.

Command Modes

Frame Relay virtual circuit configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The Cisco 8-Port Channelized T1/E1 SPA supports fragment sizes of 128, 256, and 512 bytes.

Task ID

Task ID	Operations
fr	read, write

Examples

The following example shows how to enter serial Frame Relay virtual circuit configuration mode, set the fragmentation size of Frame Relay frames on subinterface 0/6/2/4.1 to 512 bytes:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/6/2/4.1 point-to-point
RP/0/RSP0/CPU0:router(config-subif)# pvc 100
RP/0/RSP0/CPU0:router(config-fr-vc)# fragment end-to-end 512
```

Related Commands

Command	Description
interface serial, on page 667	Configures a serial interface and enters interface or subinterface configuration mode.

interface serial

To configure a serial interface and enter interface or subinterface configuration mode, use the **interface serial** command in global configuration mode. To delete a serial configuration, use the **no** form of this command.

interface serial *interface-path-id* [**.** *subinterface*] {**point-to-point** | **l2transport**}

Syntax Description

interface-path-id[.*subinterface*]	Physical interface or virtual interface followed by the optional 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.
point-to-point	Interface functions as one endpoint of a point-to-point link.
l2transport	Interface functions as one endpoint on an Layer 2 link.

Command Default

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The . *subinterface* argument, and the **point-to-point** and **l2transport** keywords were added.

Usage Guidelines

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

Note A slash between values is required as part of the notation.

- The naming notation for T1 interfaces on a channelized SPA is *rack*/*slot*/*module*/*port*/*channel-num*:*channel-group-number*, as shown in the following example:

```
interface serial 0/0/1/2/4:3
```

- If a subinterface is configured under the serial interface, then the router includes the subinterface number at the end of the serial interface address. In this case, the naming notation is *rack*/*slot*/*module*/*port*[/*channel-num*:*channel-group-number*].*subinterface*, as shown in the following example:

```
interface serial 0/0/1/2.1
```

- The naming notation syntax for serial interfaces is as follows:

- *rack*—Chassis number of the rack.
- *slot*—Physical slot number of the modular services card or line card.
- *module*—Module number. Shared port adapters (SPAs) are referenced by their subslot number.
- *port*—Physical port number of the controller.
- *channel-num*:—T1 channel number. T1 channels range from 0 to 23.
- *channel-group-number*:—Time slot number. T1 time slots range from 1 to 24. The *channel-group-number* is preceded by a colon and not a slash.
- *subinterface*—Subinterface number.

- Use the question mark (?) online help function following the **serial** keyword to view a list of all valid interface choices.

Serial interfaces on channelized T3 can be deleted using the **no channel-group** command in T1 configuration mode. If there are nondefault serial parameters defined, you need to use the **no interface serial** command first to revert to the default configuration, and then delete the serial interface using the **no channel-group** command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter interface configuration mode for a serial interface in slot 6, subslot 2, port 4, T1 channel number 10 and channel group 8:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/6/2/4/10:8
RP/0/RSP0/CPU0:router(config-if)#
```

The following example shows how to reference the serial interface on channel group 3 of T1 channel group 4 on port 2 of a SPA in subslot 1 and enter subinterface configuration mode:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/0/1/2/4:3
RP/0/RSP0/CPU0:router(config-if)#
```

Related Commands

Command	Description
channel-group, on page 801	Configures a DS0 channel group and enters channel group configuration mode.
show interfaces, on page 484	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.

invert

To invert the data stream on a serial interface, use the **invert** command in serial configuration mode. To disable data inversion, use the **no** form of this command.

invert

Syntax Description

This command has no keywords or arguments.

Command Default

Data is not inverted.

Command Modes

Serial configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

To verify that data inversion is configured on the interface, use the **show interfaces serial** command.

Task ID

Task ID	Operations
hdlc	read, write

Examples

In the following example, data inversion is enabled on serial interface 0/3/0/0/0:10:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0/0:10
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# invert
```

Related Commands

Command	Description
show interfaces, on page 484	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.

iphc profile

To create an IP header compression (IPHC) profile and enter the IPHC profile configuration mode, use the **iphc profile** command in configuration mode. To remove the profile, use the **no** form of this command.

iphc profile *profile-name* **type** {**ietf** | **iphc**}

Syntax Description

profile-name	Text name for the IPHC profile. The maximum number of characters is 50.
type	Specifies the type of compression format.
ietf	Specifies Internet Engineering Task Force (IETF) standard format. Uses RFC2507 and RFC2508 compression schemes.
iphc	Specifies Internet Protocol Header Compression (IPHC) format.Provides options similar to IETF.

Command Default

No default behavior or values

Command Modes

Configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

After you create a profile and enter the IPHC profile configuration mode, you can configure IPHC features in the profile and attach the profile to multiple interfaces. The maximum number of profiles allowed on a router is 250.

A profile cannot be deleted if it is attached to any interfaces. You must remove the profile from all interfaces first. Then, delete the profile using the **no** form of this command.

On-the-fly modifications to IPHC profiles are not supported.

A profile name cannot exceed 50 characters. If you attempt to create a profile name that exceeds 50 characters, you receive the following error message:

```
iphc profile test1test1test1test1test1test1test1test1test1test11 type iphc
!!% 'iphc_profilemgr' detected the 'warning' condition
'Name is longer than allowed character length of 50'
!
```

Examples

The following example shows how to create the IPHC profile Profile_1

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)#
```

ipv4 iphc profile

To attach an IP header compression (IPHC) profile to an interface, use the **ipv4 iphc profile** command in interface configuration mode. To remove the profile from the interface, use the **no** form of this command.

ipv4 iphc profile *profile-name* [**mode service-policy**]

Syntax Description

profile-name	Text name of the configured IPHC profile to attach to this interface.
mode service-policy	(Optional) Specifies that the IPHC profile applies to a QoS service policy.

Command Default

No default behavior or values

Command Modes

Interface configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

If the profile name is not recognized the system returns the following error message:

```
!!% 'iphc_ma' detected the 'warning' condition 'Profile doesn't exist'
```

If the encapsulation on the interface is not supported, the system returns the following error message:

```
!!% 'iphc_ma' detected the 'warning' condition 'IPHC capability: Encap type not supported'
```

Task ID

Task ID	Operations
ip-services	read, write
ipv4	read, write

Examples

The following example shows how to attach an IP header compression (IPHC) profile to an interface.

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ipv4 iphc profile Profile_1
```

The following example shows how to attach an IPHC profile that applies to a QoS service policy to an interface:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# interface serial 0/1/0/1
RP/0/RSP0/CPU0:router(config-if)# ipv4 iphc profile Profile_1 mode service-policy
```

keepalive (serial)

To set the keepalive timer for a specific serial interface, use the **keepalive** command in interface configuration mode. To reset the keepalive timer to the default of 10 seconds, use the **no** form of this command.

keepalive {*interval* [*retry*] | **disable**}
no keepalive

Syntax Description

interval	Number of seconds (from 1 to 30) between keepalive messages. The default is 10.
disable	Turns off the keepalive timer.
retry	(Optional) Number of keepalive messages (from 1 to 255) that can be sent to a peer without a response before transitioning the link to down state. The default is 5.

Command Default

The default interval is 10 seconds between keepalive messages. The default retry is 5 keepalive messages that can be sent without a response. However, when more than 5 keepalive messages are sent to a peer without a response, the link transitions to the down state.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

HDLC keepalives require that the **keepalive** command is configured the same way on both ends of a single connection. The two connected routers have no way of negotiating the keepalive value because there is no way for one router to tell the other about its configured values. The keepalive value configured on each router (local or partner) sets the rate at which the Cisco IOS XR software sends packets. It also sets the rate at which the local end expects to receive incoming packets.

To set the keepalive value to the default value, use the **keepalive** command without specifying a value for the *interval* argument.

By default, if more than five keepalive messages are sent to a peer and no response is received from the peer, then the link transitions to the down state.

Task ID

Task ID	Operations
hdlc	read, write

Examples

The following example shows how to configure keepalives for 3 seconds on serial interface 0/7/0/1:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/7/0/1
RP/0/RSP0/CPU0:router(config-if)# keepalive 3
```

Related Commands

Command	Description
show interfaces, on page 484	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.

max-header

To define the maximum size header that can be compressed, use the **max-header** command in IPHC profile configuration mode. To return to the default maximum size, use the **no** form of this command.

max-header *number-of-bytes*
no max-header [*number-of-bytes*]

Syntax Description

number-of-bytes	Maximum size, in bytes, of a header that can be compressed.The range is from 20 to 40. The default is 40.

Command Default

Number-of-bytes; 40.

Command Modes

IPHC profile configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Note The maximum header size can be configured only within an IPHC profile.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to define the maximum size header that can be compressed.

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# max-header 20
```

non-tcp compression

To enable non-TCP compression in an IP header compression (IPHC) profile, use the **non-tcp compression** command in IPHC profile configuration mode. To disable non-TCP compression in the profile, use the **no** form of this command.

non-tcp compression

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

IPHC profile configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines



Note NON-TCP compression can be enabled only within an IPHC profile. Non-TCP compression does not work unless it is enabled under a profile.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to enable NON-TCP compression within an IP header compression (IPHC) profile:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# non-tcp compression
```

non-tcp context absolute

To configure the maximum number of non-TCP contexts that are allowed for IPHC under a profile, use the **non-tcp context absolute** command in IPHC profile configuration mode. To remove the non-TCP context from the profile, use the **no** form of this command.

non-tcp context absolute *number-of-contexts*

Syntax Description

number-of-contexts	Numeric value that specifies the maximum number of non-TCP contexts allowed for IPHC under this profile. The range is from 0 to 6000.

Command Default

If the number of contexts is not specified, and only non-TCP compression is enabled, the default number of contexts is 16.

Command Modes

IPHC profile configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The maximum allowed number of non-tcp contexts on a Line Card, across all IPHC profiles and interfaces, is 6000.

Note Non-TCP context can be set only within an IPHC profile.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to enable non-TCP compression within an IP header compression (IPHC) profile:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# non-tcp context absolute 255
```

refresh max-period

To configure the maximum number of compressed IP header packets exchanged on a link before IPHC context is refreshed, use the **refresh max-period** command in IPHC profile configuration mode. To return to the default context refresh settings, use the **no** form of this command.

refresh max-period {*max-number* | **infinite**}

Syntax Description

max-number	Maximum number of compressed IP header packets allowed between full headers or before the context is refreshed. Range is from 0 to 65535.
infinite	Allows an unlimited number of packets to be exchanged before context refresh.

Command Default

max-number: 256

Command Modes

IPHC profile configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To enable the configured context refresh settings for RTP packets, the **refresh rtp** command must be used.

Note The maximum period between context refreshes can be set only within an IPHC profile.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to configure the maximum number of compressed IP header packets that are exchanged on a link before the context is refreshed, in an IPHC profile.

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# refresh max-period 50
```

refresh max-time

To configure the maximum time allowed between context refreshes, use the **refresh max-time** command in IPHC profile configuration mode. To return to the default context refresh settings, use the **no** form of this command.

refresh max-time {*max-time* | **infinite**}

Syntax Description

max-time	Time, in seconds, between context refreshes. Range is from 0 to 255.
infinite	Allows an unlimited time to pass between context refreshes.

Command Default

max-time: 5

Command Modes

IPHC profile configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

To enable the configured context refresh settings for RTP packets, the **refresh rtp** command must be used.

Note The maximum time between context refreshes can be set only within an IPHC profile.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to configure the maximum allowed time between context refreshes as 60 seconds, in the IPHC profile ‘Profile 1’:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# refresh max-time 60
```

refresh rtp

To enable the configured context refresh settings for RTP packets, use the **refresh rtp** command in IPHC profile configuration mode. To disable context refresh settings for RTP packets, use the **no** form of this command.

refresh rtp

Syntax Description

This command has no keywords or arguments.

Command Default

By default, refresh RTP is disabled and only the first packet in the flow is sent as a ‘full-header’ packet.

Command Modes

IPHC profile 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
ip-services	read, write

Examples

The following example shows how to enable the configured refresh settings for RTP packets:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# refresh rtp
```

rtp

To enable Real Time Protocol (RTP) compression and decompression on the interface, use the **rtp** command in IPHC profile configuration mode. To remove RTP from the interface, use the **no** form of this command.

rtp

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

IPHC profile configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines



Note RTP can be enabled only within an IPHC profile.

```
You must enable RTP before attaching a profile to an interface. If you do not enable RTP
first, the router will display the following message: '!!% 'iphc_capability' detected the
'warning' condition 'IPHC Capability: RTP Compression NOT enabled in the profile'!
```

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# rtp
```

scramble

To enable payload scrambling (encryption) on a serial interface, use the **scramble** command in interface configuration mode. To disable scrambling, use the **no** form of this command.

scramble

Syntax Description

This command has no keywords or arguments.

Command Default

Scrambling is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Scrambling is used to assist clock recovery on the receiving end. Scrambling is designed to randomize the pattern of 1s and 0s carried in the physical layer frame. Randomizing the digital bits can prevent continuous, nonvariable bit patterns—in other words, long strings of all 1s or all 0s. Several physical layer protocols rely on transitions between 1s and 0s to maintain clocking.

Scrambling can prevent some bit patterns from being mistakenly interpreted as alarms by switches placed between the Data Service Units (DSUs).

The local interface configuration must match the remote interface configuration. For example, if you enable scrambling on the local port, you must also do the same on the remote port.

To verify that scrambling is configured on the interface, use the **show interfaces serial** command.

Task ID

Examples

In the following example, scrambling is enabled on serial interface 0/3/0/0/0:10:

```
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0/0:10
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# scramble
```

Related Commands

Command	Description
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

serial

To configure the serial parameters and enter serial configuration mode, use the **serial** command in interface configuration mode. To return to the default state of the serial interface, use the **no** form of this command.

serial

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.

Usage Guidelines

Serial interfaces are automatically created for unchannelized ports; for channelized ports, serial interfaces are created when you add T1/E1 channel groups.

Task ID

Task ID	Operations
hdlc	read, write

Examples

The following example shows how to enter serial configuration mode:

```
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)#
```

show iphc idb

To display status information for an IP header compression (IPHC) interface description block (IDB), use the **show iphc idb** command in EXEC mode.

show iphc idb {**detail** | **interface** *type interface-path-id* [**detail**] | **location** *node-id* [**detail**]}

Syntax Description

detail	Includes statistics information and internal data.
interface	Specifies the interface for which IPHC information is to be displayed.
type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
location	Specifies the node location for which IPHC information is to be displayed.
node-id	Specifies the fully qualified path of a node. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

The default (no parameters) displays information for all interfaces configured for IPHC.

Command Modes

EXEC

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
ip-services	read

Examples

The following examples show how to display status information for an IP header compression (IPHC) interface description block (IDB).

```
RP/0/RSP0/CPU0:router# show iphc idb interface Serial 0/1/0/1/26:0

Thu Jan  8 20:25:41.079 UTC
```

```
EA Status Codes:                    Neg Status Code:
  CFG_AS: Cfg Apply Succeed          NEG_I: Negotiation Init
  CFG_AF: Cfg Apply Failed           NEG_P: Negotiation Progress
  NEG_AS: Neg Apply Succeed          NEG_D: Negotiation Done
  NEG_AF: Neg Apply Failed           NEG_F: Negotiation Failed

Interface_Name:   Serial0/1/0/1/26:0   Ifhandle  : 0x02008e00
EA Status     : NEG_AS                 Neg Status: NEG_D
MQC Mode      : F                      Prof_Name : iphcfmt


RP/0/RSP0/CPU0:router# show iphc idb interface Serial 0/1/0/1/26:0  detail

Thu Jan  8 20:25:44.731 UTC
EA Status Codes:                    Neg Status Code:
  CFG_AS: Cfg Apply Succeed          NEG_I: Negotiation Init
  CFG_AF: Cfg Apply Failed           NEG_P: Negotiation Progress
  NEG_AS: Neg Apply Succeed          NEG_D: Negotiation Done
  NEG_AF: Neg Apply Failed           NEG_F: Negotiation Failed

Interface_Name: Serial0/1/0/1/26:0   Ifhandle  : 0x02008e00
EA Status     : NEG_AS               Neg Status: NEG_D
MQC Mode      : F                    Prof_Name : iphcfmt

               Tcp    Non-Tcp       Max         Max        Max   RTP
             Space      Space    Header      Period       Time
-------------------------------------------------------------------------
 Cfg_Option      1         60        40         256          5     T
 Neg_Option      1         50        40         256          5     T
```

show iphc ipv4 rtp

To display IPv4 statistics for Real Time Protocol (RTP) and User Datatgram Protocol (UDP) packets sent and received on an interface, use the **show iphc ipv4 rtp** command in EXEC mode.

show iphc ipv4 rtp interface *type interface-path-id* [**location** *node-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.
location	(Optional) Specifies the location of the interface
node-id	(Optional) Node-id entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Caution These Cisco support commands are normally reserved for use by Cisco Technical Support personnel only. If used incorrectly. there is some risk that they may cause performance or other issues that impact products, and we highly recommend that you contact Cisco Technical Support before using any of these commands.

Task ID

Task ID	Operations
ip-services	read
cisco-support	read

Examples

The following example shows how to display IPv4, Real Time Protocol (RTP), User Datatgram Protocol (UDP), and Non-Transmission Control Protocol (non-TCP) statistics about IP header compression (IPHC) packets sent and received on an interface:

```
RP/0/RSP0/CPU0:router# show iphc ipv4 rtp interface Serial 0/1/0/1/26:0

Thu Jan  8 20:28:47.569 UTC
RTP/UDP/IP header compression statistics:
  Interface Serial0/1/0/1/26:0
    Rcvd:    100 total, 93 compressed, 7 full header
             0 dropped, 0 status msgs
    Sent:    0 total, 0 compressed, 0 fullheader, 0 status msgs
             0 bytes saved, 0 bytes sent
             1.00 efficiency improvement factor
```

show iphc ipv4 tcp

To display IPv4 Transport Control Protocol (TCP) statistics about IP header compression (IPHC) packets sent and received on an interface, use the **show iphc ipv4 tcp** command in EXEC mode.

show iphc ipv4 tcp interface *type interface-path-id* *[* **location** *node-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.
location	(Optional) Specifies the location of the interface
node-id	(Optional) Node-id entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Caution These Cisco support commands are normally reserved for use by Cisco Technical Support personnel only. If used incorrectly. there is some risk that they may cause performance or other issues that impact products, and we highly recommend that you contact Cisco Technical Support before using any of these commands.

Task ID

Task ID	Operations
ip-services	read
cisco-support	read

Examples

The following example shows how to display IPv4, Transport Control Protocol (TCP) statistics about IP header compression (IPHC) packets sent and received on an interface:

```
RP/0/RSP0/CPU0:router# show iphc ipv4 tcp interface Serial 0/1/0/1/26:0

Thu Jan  8 20:28:54.407 UTC
TCP/IP header compression statistics:
  Interface Serial0/1/0/1/26:0
    Rcvd:    100 total, 93 compressed, 7 full header
             0 dropped, 0 status msgs
    Sent:    0 status msgs
```

show iphc platform trace

To display platform trace information, such as errors or statistics for a file or a node, use the **show iphc platform trace** command in EXEC mode.

show iphc platform trace [**all** | **events** | **errors** [**events**] [**all**] | **internal** [**all** | **errors** [**events**] [**all**] | **events** [**all**]]] [**unique** | **wrapping**] [**hexdump**] [**last** *number-of-entries*] [**reverse**] [**stats**] [**tailf**] [**verbose**] [**file** *file-name* **original location** *node-id* | **location** {*node-id* | **all** | **mgmt-nodes**}]

Syntax Description

all	(Optional) Displays all platform trace information.
events	(Optional) Displays event platform trace information.
unique	(Optional) Displays trace information for unique entries with counts.
wrapping	Optional) Displays wrapping entries.
hexdump	(Optional) Displays trace information in hexadecimal format.
last *number_of_entries*	(Optional) Displays trace information for the last specified number of entries. The range is 1 to 4294967295.
reverse	(Optional) Displays trace information in reverse order (latest traces first).
stats	(Optional) Displays statistics information for the trace.
tailf	(Optional) Displays new traces as they are added.
verbose	(Optional) Displays internal debugging information.
file *file_name*	(Optional) Displays trace information for the specified file.
original	(Optional) Specifies the original location of file.
location *node_id*	(Optional) Displays trace information for the specified card location.
all	(Optional) Displays trace information for all nodes.
mgmt-nodes	(Optional) Displays trace information for all management nodes.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The keywords **hexdump**, **last**, **reverse**, **stats**, **tailf**, and **verbose** may be entered in any order.

Use of the keywords **file** and **location** allows any number of desired files or locations to be entered. For more information, use the question mark (**?**) online help function.

Caution These Cisco support commands are normally reserved for use by Cisco Technical Support personnel only. If used incorrectly. there is some risk that they may cause performance or other issues that impact products, and we highly recommend that you contact Cisco Technical Support before using any of these commands.

Task ID

Task ID	Operations
ip-services	read
cisco-support	read

Examples

The following example shows how to display platform trace information for a specified location:

```
RP/0/RSP0/CPU0:router# show iphc platform trace all location 0/2/CPU0
Mon Aug 16 06:05:17.906 PDT
6 wrapping entries (24576 possible, 0 filtered, 6 total)
Aug 16 05:53:59.674 iphc_ea/internal 0/2/CPU0 t1  PAL IPHC: LC Platform preinit
Aug 16 05:54:00.255 iphc_ea/internal 0/2/CPU0 t1  PAL IPHC: LC Platform init
Aug 16 05:54:00.255 iphc_ea/internal 0/2/CPU0 t1  PAL IPHC: max iphc interfaces 2048
Aug 16 05:54:00.255 iphc_ea/internal 0/2/CPU0 t1  PAL IPHC: ea respawn count 1
Aug 16 05:54:00.284 iphc_ea/internal 0/2/CPU0 t1  PAL IPHC: LC Platform replay end
Aug 16 05:54:00.284 iphc_ea/internal 0/2/CPU0 t1  PAL IPHC: replay end 0 stale entries
```

show iphc profile

To display the configuration information of an IP header compression (IPHC) profile, use the **show iphc profile** command in EXEC mode.

show iphc profile {*profile-name* | **all**} [**detail**]

Syntax Description

profile-name	Text name of the IPHC profile for which to display information.
all	Displays information for all profiles on the router.
detail	(Optional) Displays the interfaces to which the profile is attached.

Command Default

No default behavior or values

Command Modes

EXEC mode

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
ip-services	read

Examples

The following examples show how to display information about an IPHC profile:

```
RP/0/RSP0/CPU0:router# show iphc profile ietf-test1
Tue Aug 10 06:53:19.711 PDT
IPHC Profile: ietf-test1
Type: IETF
 Compressing : TCP  NON-TCP (RTP)
 Context     : TCP fixed at 1 NON-TCP fixed at 10
 Refresh     : NON-TCP every 60 seconds or 100 packets
 Feedback    : ON
 Max_Header  : 40
 Refresh RTP : OFF
```

```
RP/0/RSP0/CPU0:router# show iphc profile Profile_1 detail
Thu Jan  8 20:22:24.276 UTC
IPHC Profile: Profile_1
Type: IPHC
 Compressing : TCP  NON-TCP (RTP)
 Context     : TCP fixed at 1 NON-TCP fixed at 60
 Refresh     : NON-TCP every 5 seconds or 256 packets
 Feedback    : ON
```

```
 Max_Header  : 40

*** No of Intf 1 ****
 Serial0_4_3_1_1:0
```

```
RP/0/RSP0/CPU0:router# show iphc profile all
Thu Mar 12 11:05:35.987 UTC
IPHC Profiles : 3
IPHC Profile: p1
Type: IETF
 Compressing : TCP  NON-TCP (RTP)
 Context     : TCP fixed at 1 NON-TCP fixed at 16
 Refresh     : NON-TCP every 5 seconds or 256 packets
 Feedback    : ON
 Max_Header  : 40

IPHC Profile: p2
Type: IETF
 Compressing : TCP  NON-TCP (RTP)
 Context     : TCP fixed at 1 NON-TCP fixed at 16
 Refresh     : NON-TCP every 5 seconds or 256 packets
 Feedback    : ON
 Max_Header  : 40

IPHC Profile: test
Type: IETF
 Compressing : TCP  NON-TCP (RTP)
 Context     : TCP fixed at 1 NON-TCP fixed at 16
 Refresh     : NON-TCP every 5 seconds or 256 packets
 Feedback    : ON
 Max_Header  : 40
```

```
RP/0/RSP0/CPU0:router# show iphc profile all detail
Thu Mar 12 11:06:26.902 UTC
IPHC Profiles : 3
IPHC Profile: p1
Type: IETF
 Compressing : TCP  NON-TCP (RTP)
 Context     : TCP fixed at 1 NON-TCP fixed at 16
 Refresh     : NON-TCP every 5 seconds or 256 packets
 Feedback    : ON
 Max_Header  : 40

 *** No of Intf 1 ****
 Serial0_4_3_1_1:0

IPHC Profile: p2
Type: IETF
 Compressing : TCP  NON-TCP (RTP)
 Context     : TCP fixed at 1 NON-TCP fixed at 16
 Refresh     : NON-TCP every 5 seconds or 256 packets
 Feedback    : ON
 Max_Header  : 40

 *** No of Intf 2 ****
 Serial0_4_3_1_2:0
 Serial0_4_3_1_8:0

IPHC Profile: test
```

```
Type: IETF
 Compressing : TCP  NON-TCP (RTP)
 Context     : TCP fixed at 1 NON-TCP fixed at 16
 Refresh     : NON-TCP every 5 seconds or 256 packets
 Feedback    : ON
 Max_Header  : 40

 *** No of Intf 0 ****
```

show iphc trace all

To display trace results for all IP header compression (IPHC) configurations on the router, use the **show iphc trace all** command in EXEC mode.

show iphc trace all [**unique** | **wrapping**] [**hexdump**] [**last** *number-of-entries*] [**reverse**] [**stats**] [**tailf**] [**verbose**] [**file** *file-name* **original location** *node-id* | **location** {*node-id* | **all** | **mgmt-nodes**}]

Syntax Description

unique	(Optional) Displays trace information for unique entries with counts.
wrapping	Optional) Displays wrapping entries.
hexdump	(Optional) Displays trace information in hexadecimal format.
last *number_of_entries*	(Optional) Displays trace information for the last specified number of entries. The range is from 1 to 4294967295.
reverse	(Optional) Displays trace information in reverse order (latest traces first).
stats	(Optional) Displays statistics information for the trace.
tailf	(Optional) Displays new traces as they are added.
verbose	(Optional) Displays internal debugging information.
file *file_name*	(Optional) Displays trace information for the specified file.
original	(Optional) Specifies the original location of file.
location *node_id*	(Optional) Displays trace information for the specified card location.
all	(Optional) Displays trace information for all nodes.
mgmt-nodes	(Optional) Displays trace information for all management nodes.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The keywords **hexdump**, **last**, **reverse**, **stats**, **tailf**, and **verbose** may be entered in any order. The keywords **unique** or **wrapping** may only be entered as the first keyword in the command. The keywords **file** or **location** may only be entered as the last keyword in the command.

Use of the keywords **file** and **location** allows any number of desired files or locations to be entered. For more information, use the question mark (**?**) online help function.

Caution These Cisco support commands are normally reserved for use by Cisco Technical Support personnel only. If used incorrectly. there is some risk that they may cause performance or other issues that impact products, and we highly recommend that you contact Cisco Technical Support before using any of these commands.

Task ID

Task ID	Operations
ip-services	read
cisco-support	read

Examples

The following example shows how to display IPHC trace information:

```
RP/0/RSP0/CPU0:router# show iphc trace all

Wed Jul 22 21:48:07.339 DST
20 wrapping entries (3072 possible, 0 filtered, 20 total)
Jul 22 03:31:39.770 iphc/profilemgr/int 0/5/CPU0 t1  : Event Mgr Create Successl
Jul 22 03:31:39.799 iphc/profilemgr/int 0/5/CPU0 t1  : Sysmgr Init Successful
Jul 22 03:31:39.894 iphc/profilemgr/int 0/5/CPU0 t1  : Ens Init Successful
Jul 22 03:31:39.910 iphc/profilemgr/int 0/5/CPU0 t1  : Sysdb Init Successful
Jul 22 03:31:39.911 iphc/profilemgr/int 0/5/CPU0 t1  : Stats thread Init Succesl
Jul 22 03:31:39.942 iphc/profilemgr/int 0/5/CPU0 t1  : Cfg thread Init Successfl
Jul 22 03:31:39.951 iphc/profilemgr/int 0/5/CPU0 t1  : Registered verifier call7
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : Scanning Profile: *** Pr*
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : Scanning Option (format))
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : Scanning Option (tcp_com)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : Scanning Option (tcp_con)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : Scanning Option (non_tcp)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : Scanning Option (rtp) in)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : Scanning Option (max-per)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : Scanning Option (non_tcp)
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : +++++ Profile Verificati+
Jul 22 03:31:39.952 iphc/profilemgr/eve 0/5/CPU0 t1  : Verify Profile (Profile_n
Jul 22 03:31:39.959 iphc/profilemgr/eve 0/5/CPU0 t1  : +++++ Profile Verificati+
Jul 22 03:31:39.981 iphc/profilemgr/int 0/5/CPU0 t1  : Registered applier calle7
Jul 22 03:31:39.999 iphc/profilemgr/eve 0/5/CPU0 t1  : Registered Profile (Profy
```

show tech-support iphc

To collect and display IP header compression (IPHC) data for an interface, node, or rack, and store that data in a file, use the **show tech-support iphc** command in EXEC mode.

show tech-support iphc [**file** | **interface** *type interface-path-id* [**location** *node-id* | **rack** *rack_name*] | **location** *node-id* | **rack** *rack_name*] **file location** *file_name* [**background**] [**compressed** | **uncompressed**]

Syntax Description

file	(Optional) Specifies a file name and location for IPHC data to be saved to.
interface	(Optional) Collects IPHC data for the specified interface.
type	(Optional) 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.
location *node-id*	(Optional) Collects IPHC data for the specified card location (*node-id*).
rack *rack_name*	(Optional) Collects IPHC data for the specified rack.
file location *file_name*	Stores the collected data in the specified file (*file_name*) in one of the following valid file locations: • bootflash:—stores the collected data to a bootflash file-system file. • compactflash:—stores the collected data to a compactflash file-system file. • compactflasha:—stores the collected data to a compactflasha file-system file. • disk0:—stores the collected data to a disk0 file-system file. • disk0a:—stores the collected data to a disk0a file-system file. • disk1:—stores the collected data to a disk1 file-system file. • disk1a:—stores the collected data to a disk1a file-system file. • ftp:—stores the collected data to an ftp file-system file. • harddisk:—stores the collected data to a harddisk file-system file. • harddiska:—stores the collected data to a harddiska file-system file. • harddiskb:—stores the collected data to a harddiskb file-system file. • lcdisk0:—stores the collected data to a lcdisk0 file-system file. • lcdisk0a:—stores the collected data to a lcdisk0a file-system file. • nvram:—stores the collected data to an nvram file-system file. • rcp:—stores the collected data to an rcp file-system file. • tftp:—stores the collected data to a tftp file-system file.
background	(Optional) Runs this command in the background.

compressed	(Optional) Compresses the output.
uncompressed	(Optional) Does not compress the output.

Command Default

No default behavior or values

Command Modes

EXEC mode

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
basic-services	read
cisco-support	read
ipv4	read

Examples

The following example shows how to collect and display IP header compression (IPHC) data:

```
RP/0/RSP0/CPU0:router# show tech-support iphc

Mon Oct 12 20:30:58.660 DST
++ Show tech start time: 2009-Oct-12.203059.DST ++
Mon Oct 12 20:31:05 DST 2009 Waiting for gathering to complete
......
Mon Oct 12 20:31:46 DST 2009 Compressing show tech output
Show tech output available at 0/5/CPU0 : disk0:/showtech/showtech-iphc-2009-Octz
++ Show tech end time: 2009-Oct-12.203148.DST ++
```

tcp compression

To enable TCP compression in an IP header compression (IPHC) profile, use the **tcp compression** command in IPHC profile configuration mode. To disable TCP compression in the profile, use the **no** form of this command.

tcp compression

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

IPHC profile configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Where the IPHC profile used by a router is configured using this command, the router will negotiate TCP compression with its peer router and decompress any compressed TCP packets sent by its peer. TCP packets transmitted to the peer are transmitted uncompressed.

Note TCP compression can be enabled only within an IPHC profile. TCP compression does not work unless it is enabled under a profile.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to enable TCP compression within an IP header compression (IPHC) profile:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# tcp compression
RP/0/RSP0/CPU0:router(config-iphc-profile)#
```

tcp context absolute

To configure the maximum number of TCP contexts that are allowed for IPHC under a profile, use the **tcp context absolute** command in IPHC profile configuration mode. To remove the TCP context from the profile, use the **no** form of this command.

tcp context absolute *number-of-contexts*

Syntax Description

number-of-contexts	Numeric value that specifies the maximum number of TCP contexts allowed for IPHC under this profile. The range is from 0 to 255.

Command Default

If *number-of-contexts* is not specified, and only TCP compression is enabled, the default *number-of-contexts* is 1.

Command Modes

IPHC profile configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The maximum allowed number of tcp contexts on a Line Card, across all IPHC profiles and interfaces, is 255.

Note TCP context can be set only within an IPHC profile.

Task ID

Task ID	Operations
ip-services	read, write

Examples

The following example shows how to enable TCP compression within an IP header compression (IPHC) profile:

```
RP/0/RSP0/CPU0:router(config)# config
RP/0/RSP0/CPU0:router(config)# iphc profile Profile_1 type iphc
RP/0/RSP0/CPU0:router(config-iphc-profile)# tcp context absolute 255
```

transmit-delay (serial)

To specify a number of High-Level Data Link Control (HDLC) flag sequences to be inserted between the packets, use the **transmit-delay** command in serial configuration mode. To restore the default, use the **no** form of this command.

transmit-delay *microseconds*

Syntax Description

microseconds	Number of microseconds of minimum delay after sending a packet. Range is from 0 to 128. The default is 0 (disabled).

Command Default

microseconds: 0 (disabled)

Command Modes

Serial configuration

Command History

Releases	Modifications
Release 3.9.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
hdlc	read, write

Examples

In the following example, a delay of 2 microseconds is specified on serial interface 0/3/0/0/0:0:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0/0:0
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# transmit-delay 2
```

In the following example, the transmit delay on serial interface 0/3/0/0/0:0 is disabled:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface serial 0/3/0/0/0:0
RP/0/RSP0/CPU0:router(config-if)# serial
RP/0/RSP0/CPU0:router(config-if-serial)# no transmit-delay
```

Related Commands

Command	Description
show interfaces, on page 484	Displays statistics, state and other information such as mac address etc. for all interfaces configured on the router or for a specific node.



SONET Controller Commands

This module provides command line interface (CLI) commands for configuring SONET operation, using Layer 1 SONET transport technology, on the Cisco ASR 9000 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 configuration of the SONET controller includes SONET Automatic Protection Switch (APS), which is a feature offering recovery from fiber (external) or equipment (interface and internal) failures at the SONET line layer. You must configure a SONET controller before you can configure a Packet-over-SONET/SDH (POS) interface or a serial interface.

All SONET-related configurations of a SONET-based physical port are grouped under the SONET controller configuration submode. The SONET path-related configuration commands are grouped under the SONET path submode.

- ais-shut (SONET), on page 703
- ais-shut (SONET path), on page 704
- aps group, on page 705
- aps group (global), on page 708
- au, on page 710
- authenticate (PGP), on page 712
- b3-ber-prdi, on page 714
- channel local, on page 715
- channel remote, on page 717
- clear counters sonet, on page 719
- clock source (SONET), on page 721
- controller (SONET), on page 722
- delay clear, on page 724
- delay trigger, on page 725
- down-when-looped, on page 726
- framing (SONET), on page 727
- line delay clear, on page 728
- line delay trigger, on page 729
- lockout, on page 730
- loopback (SONET), on page 731
- mode (SONET), on page 732

- overhead (SONET), on page 734
- overhead (SONET path), on page 736
- path delay clear, on page 738
- path delay trigger, on page 739
- path (SONET), on page 740
- report (SONET), on page 742
- report (SONET path), on page 744
- revert, on page 746
- scrambling disable (SONET path), on page 748
- show aps, on page 749
- show aps agents, on page 751
- show aps group, on page 753
- show controllers pos, on page 755
- show controllers sonet, on page 761
- show sonet-local trace frr, on page 768
- shutdown (SONET), on page 769
- signalling, on page 770
- sts, on page 771
- timers (APS), on page 772
- threshold (SONET), on page 774
- threshold (SONET path), on page 776
- tug3, on page 777
- uneq-shut (SONET path), on page 778
- unidirectional, on page 779
- width, on page 781

ais-shut (SONET)

To enable automatic insertion of a line alarm indication signal (LAIS) in the sent SONET signal whenever the SONET port enters the administrative shutdown state, use the **ais-shut** command in SONET/SDH configuration mode. To disable automatic insertion of a LAIS, use the **no** form of this command.

ais-shut

Syntax Description

This command has no keywords or arguments.

Command Default

This command is disabled by default; no AIS is sent.

Command Modes

SONET configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

When the line is placed in administrative shutdown state, use the **ais-shut** command to send a signal to downstream equipment that indicates that there is a problem with the line.

The **ais-shut** command is ignored if automatic protection switching (APS) is running for the corresponding port, because the setting must be enabled for proper APS operation.

For SONET ports that do not have hardware support for LAIS insertion, the **ais-shut** command is disabled.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

In the following example, the alarm indication is forced on the SONET OC-3 controller:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# ais-shut
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

ais-shut (SONET path)

To enable automatic insertion of path alarm indication signal (PAIS) in the sent SONET signal whenever the SONET path enters the administratively down state, use the **ais-shut** command in SONET/SDH path configuration mode. To disable automatic insertion of PAIS in the SONET signal, use the **no** form of this command.

ais-shut

Syntax Description

This command has no keywords or arguments.

Command Default

This command is disabled by default; no AIS is sent.

Command Modes

SONET/SDH path configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **ais-shut** command to enable automatic insertion of PAIS in the appropriate sent SONET path overhead whenever the corresponding SONET path enters the administratively down state.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows the alarm indication being enabled on all paths:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# ais-shut
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

aps group

To manually switch an automatic protection switching (APS) channel, use the **aps group** command in EXEC mode.

aps group *number* {**force** | **manual**} {**0** | **1**} {**disable** | **enable**}

Syntax Description

number	Number of the APS group. Range is from 1 to 255.
force	Sends a forced APS request at the local end of a SONET link with the assigned channel number.
manual	Sends a manual APS request at the local end of a SONET link with the assigned channel number, which is implemented when no other higher-priority user-initiated or automatic requests are in effect.
0	Specifies that the protect channel should be switched.
1	Specifies that the working channel should be switched.
disable	Stops sending the SONET K1/K2 bit pattern that informs the remote end to switch ports.
enable	Starts sending a SONET K1/K2 bit pattern to inform the remote end to switch ports.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

In a multirouter APS topology, a manual or force request is supported only on the protect router.

Specify **0** or **1** to identify on which channel the traffic should be stopped and switched to the other channel. Therefore, **force 0** or **manual 0** moves traffic from the protect to the working channel, and **force 1** or **manual 1** moves traffic from the working to the protect channel.

Use the **force** keyword to manually switch the traffic to a protect channel. For example, if you need to change the fiber connection, you can manually force the working channel to switch to the protect interface.

A forced switch can be used to override an automatic (Signal Failed Signal Degraded) or a manual switch request. A lockout request (using the **lockout** command) overrides a force request.

Note If a request of equal or higher priority is in effect, you cannot use the **force** keyword to initiate a forced APS request at the local end of the SONET link.

Use the **manual** keyword to manually switch the circuit to a protect channel. For example, you can use this feature when you need to perform maintenance on the working channel. If a protection switch is already up, you can also use the **manual** keyword to revert the communication link to the working channel before the

wait to restore (WTR) time period has expired. The WTR time period is set by the **revert** command. Use the **no** form of this command to cancel the switch.

A manual switch request can be used to control which channel carries the traffic when no other higher-priority user-initiated or automatic requests are in effect.

The manual request has the lowest priority among all user-initiated or automatic requests. Any other such requests override a manual request.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following examples show how to use the **aps group** command in EXEC mode to force or manually switch traffic, and enable and disable sending of the K1/K2 bit pattern to signal the switchover to the remote end:

Forced Switchover Request From Working to Protect Channel

```
RP/0/RSP0/CPU0:router# aps group 1 force 1 enable
RP/0/RSP0/CPU0:router# aps group 1 force 1 disable
```

Manual Switchover Request From Working to Protect Channel

```
RP/0/RSP0/CPU0:router# aps group 1 manual 1 enable
RP/0/RSP0/CPU0:router# aps group 1 manual 1 disable
```

Forced Switchover Request from Protect to Working Channel

```
RP/0/RSP0/CPU0:router# aps group 1 force 0 enable
RP/0/RSP0/CPU0:router# aps group 1 force 0 disable
```

Manual Switchover Request From Protect to Working Channel

```
RP/0/RSP0/CPU0:router# aps group 1 manual 0 enable
RP/0/RSP0/CPU0:router# aps group 1 manual 0 disable
```

Related Commands

Command	Description
aps group (global), on page 708	Adds an automatic protection switching (APS) group and enter APS group configuration mode.
lockout, on page 730	Overrides a manual or forced APS request at the local end of the SONET link and block the protect channel from receiving traffic.
revert, on page 746	Enables automatic switchover from the protect interface to the working interface after the working interface becomes available.
signalling, on page 770	Configures the K1K2 overhead byte signaling protocol used for APS.

Command	Description
show aps, on page 749	Displays the operational status for all configured SONET APS groups.

aps group (global)

To add an automatic protection switching (APS) group and enter APS group configuration mode, use the **aps group** command in Global Configuration mode. To remove a group, use the **no** form of this command.

aps group *number*

Syntax Description

number	Number of the group. Range is from 1 to 255.

Command Default

No APS groups are defined.

Command Modes

Global configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

An APS group contains one protect (P) SONET port and one working (W) SONET port. The working and protect ports can reside on the same logical channel (LC), on different LCs in the same router, or on different routers. One APS group must be configured for each protect port and its corresponding working ports.

Use the **aps group (global)** command to enter APS group configuration mode and configure APS connections with other SONET equipment.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to use the **aps group** command in global configuration mode to configure APS group 1 and enter APS group configuration mode:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)#
```

Related Commands

Command	Description
aps group, on page 705	Manually switches an APS channel.
authenticate (PGP), on page 712	Configures the authentication string for the PGP message exchange between the protect and working routers.
channel local, on page 715	Assigns local SONET physical ports as SONET APS channels in the current APS group.
channel remote, on page 717	Assigns a port and interface that is physically located in a remote router as a SONET working or protect APS channel.

Command	Description
lockout, on page 730	Overrides a manual or forced APS request at the local end of the SONET link and block the protect channel from receiving traffic.
revert, on page 746	Enables automatic switchover from the protect interface to the working interface after the working interface becomes available.
signalling, on page 770	Configures the K1K2 overhead byte signaling protocol used for APS.
timers (APS), on page 772	Changes the time between hello packets and the time before the protect interface process declares a working interface router to be down.
unidirectional, on page 779	Configures a protect interface for unidirectional mode.
show aps, on page 749	Displays the operational status for all configured SONET APS groups.

au

To specify the administrative unit (AU) group number and enter the AU controller configuration mode, use the **au** command in SONET controller configuration mode.

au *number*

Syntax Description

number	Administrative unit group number in the range from 1 to 48.

Command Default

The default is 1.

Command Modes

SONET controller configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **au** command enables you to begin configuring the interface in the AU controller configuration mode, where you can configure tributary unit groups (TUGs), virtual containers (VCs), and DS3s, such as shown in the following path example:

STM-1 -> AU-4 -> TUG-3 -> VC-3 -> DS-3

One AU-4 path is equivalent to three AU-3 paths. An administrative unit type 4 (AU-4) consists of three STM-1s or one STM-3. An administrative unit type 3 (AU-3) consists of one STM-1.

Note Use the **au** command to configure one of the AUGs available for your card. The **au** command is not used to configure the *type* of AU path that you are configuring, such as AU-3 or AU-4, but rather is used to identify one AU group number in the supported range for the card and AU type that you are configuring. For example, the 1-Port Channelized OC-48/STM-16 SPA supports 16 AU-4 groups. Therefore, you can specify a number between 1 and 16 for the **au** command to configure SDH AU-4 on that card.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify AU 1.

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# au 1
RP/0/RSP0/CPU0:router(config-auPath)#
```

Related Commands

Command	Description
tug3, on page 777	Specifies the tributary unit group (TUG) number and enters the TUG3 controller configuration mode.

authenticate (PGP)

To configure the authentication string for the Protect Group Protocol (PGP) message exchange between the protect and working routers, use the **authenticate** command in APS group configuration mode. To revert to the default authentication string, use the **no** form of this command.

authenticate *string*

Syntax Description

string	Authentication string that the router uses to authenticate PGP message exchange between protect or working routers. The maximum length of the string is eight alphanumeric characters. Spaces are not accepted.

Command Default

The default authentication string is "cisco."

Command Modes

APS group configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **authenticate** command to configure the authentication string for the PGP message exchange between the protect and working routers. Use the **no** form of this command to revert to the default authentication string.

The **authenticate** command applies only in multirouter automatic protection switching (APS) group configurations.

In multirouter APS topologies, the protect and working routers communicate with each other through the User Datagram Protocol (UDP)-based Pretty Good Privacy protocol. Each Pretty Good Privacy packet contains an authentication string used for packet validation. The authentication string on all routers involved in the same APS group operation must match for proper APS operation.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example enables authentication for APS group 1 in abctown:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# authenticate abctown
```

Related Commands

Command	Description
aps group (global), on page 708	Adds an automatic protection switching (APS) group and enter APS group configuration mode.

Command	Description
channel local, on page 715	Assigns local SONET physical ports as SONET APS channels in the current APS group.
channel remote, on page 717	Assigns a port and interface that is physically located in a remote router as a SONET working or protect APS channel.
show aps, on page 749	Displays the operational status for all configured SONET APS groups.

b3-ber-prdi

To enable sending of a path-level remote defect indication (PRDI) when the bit error rate (BER) bit interleaved parity (BIP) B3 threshold is exceeded, use the **b3-ber-prdi** command in SONET/SDH path configuration mode. To disable sending a PRDI, use the **no** form of this command.

b3-ber-prdi

Syntax Description

This command has no keywords or arguments.

Command Default

This command is disabled by default; a PRDI is not sent.

Command Modes

SONET/SDH path 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
sonet-sdh	read, write

Examples

The following example shows a PRDI enabled on all paths:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# b3-ber-prdi
```

Related Commands

Command	Description
path (SONET), on page 740	Enters SONET/SDH path configuration mode.
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

channel local

To assign local SONET physical ports as SONET automatic protection switching (APS) channels in the current APS group, use the **channel local** command in APS group configuration mode. To return to the default setting, use the **no** form of this command.

channel {**0** | **1**} **local** [**preconfigure**] **sonet** *interface-path-id*
no channel {**0** | **1**} **local** [**preconfigure**] **sonet** *interface-path-id*

Syntax Description

{**0** | **1**}	Assigns a protect or working channel type. **0** is protect, **1** is working.
preconfigure	(Optional) Specifies a SONET preconfiguration. This keyword is used only when a modular services or line card is not physically installed in a slot.
sonet	Specifies a SONET interface type.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers sonet** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

A SONET APS local channel is not assigned.

Command Modes

APS group configuration

Command History

Release	Modification
Release 3.9.0	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.

Use the **channel local** command to designate SONET physical ports as SONET APS channels in the current APS group. Use the **channel remote** command to assign channels that are physically located in a different router.

Preconfigured interfaces are supported.

If the protect channel is local, it must be assigned using a **channel** command *before* any of the working channels are assigned. The reason is that having only a working channel assigned is a valid configuration for a working router in a multirouter APS topology and further attempts to configure a local protect channel are rejected.

The interface type must be a SONET controller.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to configure SONET 0/2/0/2 as a local protect channel:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# channel 0 local SONET 0/2/0/2
```

Related Commands

Command	Description
aps group (global), on page 708	Adds an automatic protection switching (APS) group and enter APS group configuration mode.
channel remote, on page 717	Assigns a port and interface that is physically located in a remote router as a SONET working or protect APS channel.
show aps, on page 749	Displays the operational status for all configured SONET APS groups.

channel remote

To assign a port and interface that is physically located in a remote router as a SONET working or protect automatic protection switching (APS) channel, use the **channel remote** command in APS group configuration mode. To return to the default setting, use the **no** form of this command.

channel {**0** | **1**} **remote** *ip-address*

Syntax Description

{**0** | **1**}	Assigns a protect or working channel type. **0** is protect, **1** is working.
ip-address	Remote router IP address in A.B.C.D format.

Command Default

A SONET APS remote channel is not assigned.

Command Modes

APS group configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **channel remote** command to assign working or protect channels that are physically located in a different router.

Use the **channel local** command to assign channels in the local router.

The *IP address* of the remote router is required only if a working channel configured as the protect router contacts all working routers.

Specifying a remote protect channel is optional. If you do not specify a remote protect channel, the default value of 0.0.0.0 is used. The protect router is always the one that contacts the working router. The working router replies to the protect router using the source address extracted from the incoming messages as the destination address. If an address other than 0.0.0.0 (the default value) is specified, the working router always uses that address when sending messages to the protect router.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

In the following examples, a remote channel with IP address 192.168.1.1 is assigned as the working channel:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# channel 1 remote 192.168.1.1
```

Related Commands

Command	Description
aps group (global), on page 708	Adds an automatic protection switching (APS) group and enter APS group configuration mode.
channel local, on page 715	Assigns local SONET physical ports as SONET APS channels in the current APS group.
show aps, on page 749	Displays the operational status for all configured SONET APS groups.

clear counters sonet

To clear SONET counters for a specific SONET controller, use the **clear counters sonet** command in EXEC mode.

clear counters sonet *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers sonet** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

Use the **clear counters sonet** command to clear SONET counters for a specific SONET controller.

Task ID

Task ID	Operations
sonet-sdh	read, write
basic-services	read, write

Examples

The following example shows the SONET counters being cleared on the SONET interface:

```
RP/0/RSP0/CPU0:router# clear counters sonet 0/1/0/0
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

clock source (SONET)

To set the clock source of the sent signal on SONET ports, use the **clock source** command in SONET/SDH configuration mode. To cancel a clock source setting, use the **no** form of this command.

clock source {**internal** | **line**}

Syntax Description

internal	Specifies that the controller will clock its sent data from its internal clock.
line	Specifies that the controller will clock its sent data from a clock recovered from the receive data stream of the line. This is the default value.

Command Default

The clock source for the controller is **line**.

Command Modes

SONET/SDH configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **clock source** command to configure which reference clock is used by the sender.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

In the following example, the SONET controller is configured to clock its sent data from its internal clock:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# clock source internal
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

controller (SONET)

To enter SONET/SDH configuration mode so that you can configure a specific SONET controller, use the **controller (SONET)** command in Global Configuration mode. To return to the default state, use the **no** form of this command.

controller [**preconfigure**] **sonet** *interface-path-id*

Syntax Description

preconfigure	(Optional) Specifies a SONET preconfiguration. Use the **preconfigure** keyword only when a modular services card in not physically installed in a slot.
sonet	Enters the SONET configuration mode or configures the SONET port controller 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

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
Release 3.9.0	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.

Use the **path (SONET)** command to enter SONET/SDH path configuration mode to specify other SONET options for a SONET path.

Task ID

Examples

The following example shows how to enter SONET/SDH configuration mode for the SONET controller in slot number 2:

```
RP/0/RSP0/CPU0:router(config)# controller SONET 0/2/0/1
RP/0/RSP0/CPU0:router(config-sonet)#
```

The following example shows how to configure the SONET controller path (0/2/0/1) to send a path-level remote defect indication (PRDI) when the bit error rate (BER) bit interleaved parity (BIP) B3 threshold is exceeded. :

```
RP/0/RSP0/CPU0:router(config)# controller SONET 0/2/0/1 path b3-ber-prdi
RP/0/RSP0/CPU0:router(config-sonet)#
```

Related Commands

Command	Description
path (SONET), on page 740	Enters SONET/SDH path configuration mode.
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

delay clear

To configure the amount of time before a Synchronous Transport Signal (STS) path delay trigger alarm is cleared, use the **delay clear** command in STS path configuration mode. To return the command to its default setting, use the **no** form of this command.

delay clear *value*

Syntax Description

value	Value, in milliseconds, before an STS path delay trigger alarm is cleared. The range is from 0 to 180000. The default is 10 seconds.

Command Default

The default is 10 seconds.

Command Modes

STS path 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
sonet-sdh	read, write

Examples

The following example shows how to specify that STS path delay trigger alarms should be cleared after 7000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/3
RP/0/RSP0/CPU0:router(config-sonet)# sts 1
RP/0/RSP0/CPU0:router(config-stsPath)# delay clear 7000
```

Related Commands

Command	Description
delay trigger, on page 725	Configures a time value for the STS path delay trigger.

delay trigger

To configure a time value for the Synchronous Transport Signal (STS) path delay trigger, use the **delay trigger** command in STS path configuration mode. To return the command to its default setting, use the **no** form of this command.

delay trigger *value*

Syntax Description

value	Value, in milliseconds, for the STS path delay trigger. The range is from 0 through 60000. The default is 0 seconds, which means that there is no delay.

Command Default

The default is 0 seconds, which means that there is no delay.

Command Modes

STS path configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

If the timer for the STS path delay trigger expires, an alarm is declared.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the STS path delay trigger to 6000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/3
RP/0/RSP0/CPU0:router(config-sonet)# sts 1
RP/0/RSP0/CPU0:router(config-stsPath)# delay trigger 6000
```

Related Commands

Command	Description
delay clear, on page 724	Configures the amount of time before a STS path delay trigger alarm is cleared.

down-when-looped

To configure a SONET controller to inform the system that it is down when loopback is detected, use the **down-when-looped** command in SONET/SDH configuration mode.

down-when-looped

Syntax Description

This command has no keywords or arguments.

Command Default

The default is disabled.

Command Modes

SONET/SDH configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

This command does not have a **no** form.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to configure a SONET controller to inform the system that the associated line is down if a loopback is detected:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# down-when-looped

down-when-looped is a traffic-affecting operation
```

Related Commands

Command	Description
loopback (SONET), on page 731	Configures the SONET controller for loopback mode.

framing (SONET)

To specify the framing used on the SONET controller, use the **framing** command in SONET/SDH configuration mode. To disable framing on the SONET controller, use the **no** form of this command.

framing {**sdh** | **sonet**}

Syntax Description

sdh	Selects Synchronous Digital Hierarchy (SDH) framing. This framing mode is typically used in Europe.
sonet	Selects SONET framing. This is the default.

Command Default

The default framing on SONET controllers is **sonet**.

Command Modes

SONET/SDH configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The **sdh** keyword was supported.

Usage Guidelines

Use the **framing** command to select either SONET or SDH framing on the selected physical port, if supported. For physical ports that do not support either of these two options, the **framing** command is disabled.

Use the **no** form of this command to disable SONET or SDH framing on the SONET controller.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

In the following example, the SONET controller is configured for SDH framing:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# framing sdh
```

In the following example, the SONET controller is configured for SONET framing:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# framing sonet
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

line delay clear

To configure the amount of time before a SONET/SDH line delay trigger alarm is cleared, use the **line delay clear** command in SONET controller configuration mode. To return the command to its default setting, use the **no** form of this command.

line delay clear *value*

Syntax Description

value	Value, in milliseconds, before a SONET/SDH line delay trigger alarm is cleared. The range is 1000 to 180000. The default is 10.

Command Default

The default is 10.

Command Modes

SONET controller configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

If the timer for the SONET/SDH line delay clear expires, an alarm is cleared.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify that SONET/SDH line delay trigger alarms should be cleared after 4000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller SONET 0/0/0/2
RP/0/RSP0/CPU0:router(config-sonet)# line delay clear 4000
```

Related Commands

Command	Description
line delay trigger, on page 729	Configures a time value for the SONET/SDH line delay trigger.

line delay trigger

To configure a time value for the SONET/SDH line delay trigger, use the **line delay trigger** command in SONET controller configuration mode. To return the command to its default setting, use the **no** form of this command.

line delay trigger *value*

Syntax Description

value	Value, in milliseconds, for the SONET/SDH line delay trigger. The range is 0 to 60000.

Command Default

The default is 0, which means that there is no delay.

Command Modes

SONET controller configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

If the timer for the SONET/SDH line delay trigger expires, an alarm is raised.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the SONET/SDH line delay trigger to 3000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller SONET 0/0/0/2
RP/0/RSP0/CPU0:router(config-sonet)# line delay trigger 3000
```

Related Commands

Command	Description
line delay clear, on page 728	Configures the amount of time before a SONET/SDH line delay trigger alarm is cleared.

lockout

To override a manual or forced APS request at the local end of the SONET link and block the protect channel from receiving traffic, use the **lockout** command in APS group configuration mode. To remove the lockout, use the **no** form of this command.

lockout [**0**]

Syntax Description

[**0**]	(Optional) Specifies blocking of the protect channel from a manual or forced APS request. This is the default.

Command Default

The default is 0.

Command Modes

APS group configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

A lockout switch request can be used to override a force, an automatic (Signal Failed or Signal Degraded), or a manual switch request. No other request can override a lockout request; it has the highest possible priority.

In a multirouter APS topology, a **lockout** request is allowed only on the protect router.

This command remains in effect until it is unconfigured by using the **no** form of the command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to lock out or prevent the channel from switching to a protect router in the event that the working channel becomes unavailable:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# lockout 0
```

Related Commands

Command	Description
aps group (global), on page 708	Adds an automatic protection switching (APS) group and enter APS group configuration mode.
aps group, on page 705	Manually switches an APS channel.

loopback (SONET)

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

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

Syntax Description

internal	Specifies that all the packets be looped back from the source.
line	Specifies that the incoming network packets be looped back to the SONET network.

Command Default

This command is disabled by default.

Command Modes

SONET/SDH configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

The SONET and Synchronous Digital Hierarchy (SDH) transport layers support two loopback operation modes 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.

Examples

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

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# loopback internal
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

mode (SONET)

To set the mode of an STS path, AU path, T3 controller, or TUG3 controller, use the **mode** command in the applicable controller configuration mode. To disable the mode, use the **no** form of this command.

STS Controller Configuration Mode
mode {**t3** | **vt15-t1** | **pos**}

AU Controller Configuration Mode
mode {**e3** | **t3** | **tug 3**}

T3 Controller Configuration Mode
mode {**e1** | **serial** | **t1**}

TUG3 Controller Configuration Mode
mode {**c12** | **c12-e1** | **e3** | **serial** | **t3**}

Syntax Description

t3	Specifies the mode of the port to be channelized as an AU3 or a TUG3 path carrying T3.
vt15-t1	Specifies the mode of the port to be channelized VT15-T1.
pos	Specifies the mode of the port to be channelized POS.
tug3	Specifies the mode of the port to be channelized TUG3.
e1	Specifies the mode of the port to be channelized E1.
serial	Specifies the mode of the port to be clear channel serial.
t1	Specifies the mode of the port to be channelized T1.
c12	Specifies the mode of the port to be channelized as a TUG3 path carrying TU-12.
c12-e1	Specifies the mode of the port to be channelized be TUG3 path carrying c12 to E1.
e3	Specifies the mode of the port to be channelized as an AU3 or a TUG3 path carrying E3.

Command Default

No default behavior or values

Command Modes

STS controller configuration

AU controller configuration

T3 controller configuration

TUG3 controller configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The **pos**, **tug3**, **e1**, **c12**, **c12-e1**, and **e3** keywords were supported.

Usage Guidelines

For channelized SPAs, you must use the **mode** command before you can configure any channelized controllers.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the mode of a T3 controller to channelized T1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-t3)# mode t1
```

Related Commands

Command	Description
width, on page 781	Sets the number of paths in a stream.

overhead (SONET)

To set the SONET overhead bytes in the frame header to a specific standards requirement, or to ensure interoperability with equipment from another vendor, use the **overhead** command in SONET/SDH configuration mode. To remove the setting of the SONET overhead bytes from the configuration file and restore the default condition, use the **no** form of this command.

overhead {**j0** | **s1s0**} *byte-value*

Syntax Description

j0	Sets the J0/C1 byte value in the SONET section overhead. For interoperability with Synchronous Digital Hierarchy (SDH) equipment in Japan, use the value 0x1. Default is 0xcc.
s1s0	Sets the SS bits value of the H1 byte in the SONET line overhead. Use the following values to tell the SONET transmission equipment the S1and S0 bit: • For SONET mode, use **0** (this is the default). • For SDH mode, use **2**. Range is from 0 to 3. Default is 0. Values 1 and 3 are undefined.
byte-value	Byte value to which the **j1** or **s1s0** keyword should be set. Range is from 0 to 255.

Command Default

byte-value: 0x01 (j0)

byte-value: 0 (sls0)

Command Modes

SONET/SDH configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **overhead** command to set the SONET overhead bytes in the frame header to a specific standards requirement.

Use the **no** form of this command to remove the setting of the SONET overhead bytes from the configuration file and restore the default condition.

For the **j0** keyword, the value that you use for the trace byte depends on the type of equipment being used. For the **s1s0** keyword, the value that you use depends on whether you are using the SONET or SDH mode. For SONET mode, use the value 0 (the default). For SDH mode, use the value 2.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the SS bits value of the H1 byte in the SONET line overhead to 2 for SDH:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RSP0/CPU0:router(config-sonet)# overhead sls0 2
```

The following example shows how to set the SS bits value of the H1 byte in the SONET line overhead to 0 for SONET:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RSP0/CPU0:router(config-sonet)# overhead sls0 0
```

overhead (SONET path)

To set the SONET path overhead bytes in the frame header to a specific standards requirement or to ensure interoperability with equipment from another vendor, use the **overhead** command in SONET/SDH path configuration mode. To remove the setting of the SONET path overhead bytes from the configuration file and restore the system to its default condition, use the **no** form of this command.

overhead {**c2** *byte-value* | **expected-trace** *LINEascii-text* | **j1** *ascii-value*}

Syntax Description

c2 *byte-value*	Specifies Synchronous Transport Signal (STS) synchronous payload envelope (SPE) content (C2) byte. The transmitted **c2** value is automatically set to 0xCF for unscrambled payload and 0x16 for scrambled payload. If c2 is configured to a user-specified value, the user-specified value is always applied regardless of scrambling. Replace the *byte-value* argument with the byte value to which the **c2** keyword should be set. Range is from 0 to 255. Default value is 0.
j1 *ascii-value*	Configures the SONET path trace (j1) buffer. Replace the *ascii-value* argument with a text string that describes the SONET path trace buffer. Default is a 64-byte path trace ASCII message, which includes default information such as router name, (Layer 2 —POS) interface name, and IP address, if applicable.
expected-trace *LINE ascii-text*	Configures the SONET/SDH path trace. The trace monitoring feature allows a node to perform trace monitoring by using the SONET/SDH capabilities. Replace the *LINE* with the expected trace message Replace the *ascii-text* argument with a text string that describes the SONET path trace buffer. Default is a 64-byte path trace ASCII message, which includes default information such as router name, (Layer 2 —POS) interface name, and IP address, if applicable. the LINE is the expected trace message which should match else ptim mismatch would be reported

Command Default

byte-value: 0xCF

byte-value: 0

Command Modes

SONET/SDH path configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

The SONET standards permit or require user access for configuration of some bytes or bits in the SONET path overhead. Use the **overhead** command to set the SONET path overhead bytes in the frame header to a specific standards requirement. Use the **no** form of this command to remove the setting of the SONET path overhead bytes from the configuration file and restore the system to its default condition.

Use the **c2** keyword to configure the desired C2 byte value in the SONET path overhead.

Use the **j1** keyword to configure a user-defined path trace message in the j1 bytes of the SONET path overhead. For the **j1** keyword, use the default message or insert your own message that has a maximum of 62 characters. If no user-defined message is configured, a default message is automatically generated, containing the router name, the controller name, its IP address, and the values of the sent and received K1 and K2 bytes in the SONET line overhead.

Examples

The following example shows how to set the STS SPE C2 byte in the SONET path frame header:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# overhead c2 0x13
```

Related Commands

Command	Description
scrambling disable (SONET path), on page 748	Disables payload scrambling on a SONET path.

path delay clear

To configure the amount of time before a SONET/SDH path delay trigger alarm is cleared, use the **path delay clear** command in SONET controller configuration mode. To return the command to its default setting, use the **no** form of this command.

path delay clear *value*

Syntax Description

value	Value, in milliseconds, before a SONET/SDH path delay trigger alarm is cleared. The range is 1000 to 180000. The default is 10 seconds.

Command Default

The default is 10 seconds.

Command Modes

SONET controller 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
sonet-sdh	read, write

Examples

The following example shows how to specify that SONET/SDH path delay trigger alarms should be cleared after 7000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller SONET 0/0/0/1
RP/0/RSP0/CPU0:router(config-sonet)# path delay clear 7000
```

Related Commands

Command	Description
path delay trigger, on page 739	Configures a time value for the SONET/SDH path delay trigger.

path delay trigger

To configure a time value for the SONET/SDH path delay trigger, use the **path delay trigger** command in SONET controller configuration mode. To return the command to its default setting, use the **no** form of this command.

path delay trigger *value*

Syntax Description

value	Value, in milliseconds, for the SONET/SDH path delay trigger. The range is 0 to 60000.

Command Default

The default is 0, which means that there is no delay.

Command Modes

SONET controller configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

If the timer for the SONET/SDH path delay trigger expires, an alarm is declared.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the SONET/SDH path delay trigger to 6000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller SONET 0/0/0/1
RP/0/RSP0/CPU0:router(config-sonet)# path delay trigger 6000
```

Related Commands

Command	Description
path delay clear, on page 738	Configures the amount of time before a SONET/SDH path delay trigger alarm is cleared.

path (SONET)

To enter SONET/SDH path configuration mode, use the **path** command in SONET controller configuration mode.

path

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

SONET controller 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
sonet-sdh	read, write

Examples

The following example shows how to access SONET path submode from SONET controller configuration mode:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# path
```

Related Commands

Command	Description
ais-shut (SONET path), on page 704	Enables automatic insertion of PAIS in the sent SONET signal whenever the SONET path enters the administratively down state.
b3-ber-prdi, on page 714	Enables sending of a PRDI when the BER bit interleaved parity (BIP) B3 threshold is exceeded.
delay clear, on page 724	Configures the amount of time before a STS path delay trigger alarm is cleared.
delay trigger, on page 725	Configures a time value for the STS path delay trigger.
overhead (SONET path), on page 736	Sets the SONET path overhead bytes in the frame header to a specific standards requirement or to ensure interoperability with equipment from another vendor.
report (SONET path), on page 744	Configures whether or not selected SONET alarms are logged to the console for a SONET path controller.

Command	Description
scrambling disable (SONET path), on page 748	Disables payload scrambling on a SONET path.
threshold (SONET path), on page 776	Sets the bit error rate (BER) threshold values of the specified alarms for a SONET path.
uneq-shut (SONET path), on page 778	Enables automatic insertion of P-UNEQ code (0x00) in the sent SONET path overhead C2 byte.

report (SONET)

To permit selected SONET alarms to be logged to the console for a SONET controller, use the **report** command in SONET/SDH configuration mode. To disable logging of select SONET alarms, use the **no** form of this command.

report [**b1-tca** | **b2-tca** | **lais** | **lrdi** | **sd-ber** | **sf-ber** | **slof** | **slos**]

Syntax Description

b1-tca	(Optional) Reports bit 1 (B1) bit error rate (BER) threshold crossing alert (TCA) errors.
b2-tca	(Optional) Reports bit 2 (B2) BER TCA errors.
lais	(Optional) Reports line alarm indication signal (LAIS) errors.
lrdi	(Optional) Reports line remote defect indication errors.
sd-ber	(Optional) Reports signal degradation BER errors.
sf-ber	(Optional) Reports signal failure BER errors.
slof	(Optional) Reports section loss of frame (SLOF) errors.
slos	(Optional) Reports section loss of signal (SLOS) errors.

Command Default

Alarms from the following keywords are reported by default:

- b1-tca
- b2-tca
- sf-ber
- slof
- slos

Command Modes

SONET/SDH configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Reporting an alarm means that the alarm can be logged to the console, but it is no guarantee that it is logged. SONET alarm hierarchy rules dictate that only the most severe alarm of an alarm group is reported. Whether an alarm is reported or not, you can check the current state of masked alarm, a problem indication that is a candidate for an alarm, by displaying the “Masked Alarms” line in the **show controllers sonet** command output.

For B1, the bit interleaved parity (BIP) error report is calculated by comparing the BIP-8 code with the BIP-8 code that is extracted from the B1 byte of the following frame. Differences indicate that section-level bit errors have occurred.

For B2, the BIP error report is calculated by comparing the BIP-8/24 code with the BIP-8 code that is extracted from the B2 byte of the following frame. Differences indicate that line-level bit errors have occurred.

Path AIS is sent by line terminating equipment to alert the downstream path terminating equipment (PTE) that it has detected a defect on its incoming line signal.

Path loss of pointer (LOP) is reported as a result of an invalid pointer (H1, H2) or an excess number of new data flag enabled indications.

SLOF is detected when an error-framing defect on the incoming SONET signal persists for 3 microseconds.

SLOS is detected when an all-zeros pattern on the incoming SONET signal is observed. This defect might also be reported if the received signal level drops below the specified threshold.

To determine the alarms that are reported on the controller, use the **show controllers sonet** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable the reporting of line AIS alarms on the path controller:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RSP0/CPU0:router(config-sonet)# report lais
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

report (SONET path)

To configure whether or not selected SONET alarms are logged to the console for a SONET path controller, use the **report** command in SONET/SDH path configuration mode. To disable or re-enable the logging of select SONET alarms, use the **no** form of this command.

report [**b3-tca** | **pais** | **plop** | **pplm** | **prdi** | **ptim**]

Syntax Description

b3-tca	(Optional) Reports bit 3 (B3) bit error rate (BER) threshold crossing alert (TCA) errors.
pais	(Optional) Reports path alarm indication signal (PAIS) errors.
plop	(Optional) Reports path loss of pointer (PLOP) errors.
pplm	(Optional) Reports path payload mismatch (PPLM) defect errors.
prdi	(Optional) Reports path remote defect indication (PRDI) errors.
ptim	(Optional) Reports path trace identity mismatch (PTIM) defect errors.

Command Default

Alarms from the following keywords are reported:

- b3-tca
- plop

Command Modes

SONET/SDH path configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Reporting an alarm means that the alarm can be logged to the console, but it is no guarantee that it is logged. SONET alarm hierarchy rules dictate that only the most severe alarm of an alarm group is reported. Whether an alarm is reported or not, you can view the current state of a masked alarm, a problem indication that is a candidate for an alarm, by inspecting the "Masked Alarms" line displayed in the **show controllers sonet** command output.

For B3, the bit interleaved parity (BIP) error report is calculated by comparing the BIP-8 code with the BIP-8 code that is extracted from the B3 byte of the following frame. Differences indicate that path-level bit errors have occurred.

Path AIS is sent by line-terminating equipment to alert the downstream path-terminating equipment (PTE) that it has detected a defect on its incoming line signal.

Path LOP is reported as a result of an invalid pointer (H1, H2) or an excess number of new data flag enabled indications.

To determine the alarms that are reported on the controller, use the **show controllers sonet** command.

All report commands accept the default option. The default reporting values are determined based upon the SONET standards specifications and are clearly identified in the corresponding command's help string.

Note The reporting of B3 BER TCA errors and path LOP errors is enabled by default.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

In the following example, reporting of path PAIS alarms is enabled:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# report pais
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

revert

To enable automatic switchover from the protect interface to the working interface after the working interface becomes available, use the **revert** command in APS configuration mode. To disable automatic switchover, use the **no** form of this command.

revert *minutes*

Syntax Description

minutes	Number of minutes until the circuit is switched back to the working interface after the working interface is available.

Command Default

minutes: 0

Automatic switchover is disabled.

Command Modes

APS group configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **revert** command to enable and disable revertive APS operation mode, if needed. The revertive APS operation mode of the routers should be matched with the APS operation mode of the connected SONET equipment. Use the **no** form of this command to disable automatic switchover.

The revertive APS operation mode is the recommended operation mode because it offers better traffic protection during various possible software failures and upgrade or downgrade scenarios.

The *minutes* argument indicates how many minutes will elapse until automatic protection switching (APS) decides to switch traffic back from protect to working after the condition that caused an automatic (Signal Failed or Signal Degrade) switch to protect disappears. A value of 0 (default) disables APS revertive mode.

In a multirouter APS topology, the **revert** command is allowed only on the protect router.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable APS to revert to the protect or working channel after 5 minutes have elapsed:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# revert 5
```

Related Commands

Command	Description
aps group (global), on page 708	Adds an automatic protection switching (APS) group and enter APS group configuration mode.
show aps, on page 749	Displays the operational status for all configured SONET APS groups.

scrambling disable (SONET path)

To disable payload scrambling on a SONET path, use the **scrambling disable** command in SONET/SDH path configuration mode. To enable payload scrambling after it has been disabled, use the **no** form of this command.

scrambling disable

Syntax Description

This command has no keywords or arguments.

Command Default

The default is enable (SONET payload scrambling is on).

Command Modes

SONET/SDH path configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

SONET payload scrambling applies a self-synchronous scrambler (x43+1) to the synchronous payload envelope (SPE) of the controller to ensure sufficient bit transition density. Both ends of the connection must be configured using SONET path scrambling.

If the hardware payload scrambling support is not user-configurable, or is not supported, the **scrambling disable** command may be rejected.

Examples

In the following example, scrambling is disabled for the path:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# scrambling disable
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

show aps

To display the operational status for all configured SONET automatic protection switching (APS) groups, use the **show aps** command in EXEC mode.

show aps

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **show aps** command to display operational status for all configured SONET APS groups.

Displaying the SONET APS operational data is considered of lower priority than the APS operation itself. Because the information is collected from several sources scattered across the various nodes involved, there is a small probability that some states will change while the command is being run.

The command should be reissued for confirmation before decisions are made based on the results displayed.

Examples

The following is sample output from the **show aps** command:

```
RP/0/RSP0/CPU0:router# show aps

APS Group 1:
Protect ch 0 (SONET3_0):Enabled
    SONET framing, SONET signalling, bidirectional, revertive (300 sec)
    Rx K1:0x21 (Reverse Request - Working)
       K2:0x15 (bridging Working, 1+1, bidirectional)
    Tx K1:0x81 (Manual Switch - Working)
       K2:0x15 (bridging Working, 1+1, bidirectional)
  Working ch 1 (SONET2_0):Disabled
    Rx K1:0x00 (No Request - Null)
       K2:0x00 (bridging Null, 1+1, non-aps)
    Tx K1:0x00 (No Request - Null)
       K2:0x00 (bridging Null, 1+1, non-aps)
APS Group 3:
PGP:protocol version: native 2 adopted 2
  PGP:Authentication "cisco", hello timeout 1 sec, hold timeout 3 sec
Protect ch 0 (SONET3_1):Disabled
    SONET framing, SONET signalling, bidirectional, non-revertive
    Rx K1:0x00 (No Request - Null)
       K2:0x05 (bridging Null, 1+1, bidirectional)
    Tx K1:0x00 (No Request - Null)
       K2:0x05 (bridging Null, 1+1, bidirectional)
  Working ch 1 (192.168.1.1):Enabled
APS Group 49:
  Protect ch 0 (SONET0_2_0_0):Disabled
    SONET framing, SONET signalling, unidirectional, non-revertive
```

```
    Rx K1:0x00 (No Request - Null)
       K2:0x00 (bridging Null, 1+1, non-aps)
    Tx K1:0x00 (No Request - Null)
       K2:0x04 (bridging Null, 1+1, unidirectional)
  Working ch 1 (SONET0_2_0_1):Enabled
    SONET framing, unidirectional
    Rx K1:0x00 (No Request - Null)
       K2:0x00 (bridging Null, 1+1, non-aps)
    Tx K1:0x00 (No Request - Null)
       K2:0x00 (bridging Null, 1+1, non-aps)
APS Group 6:
PGP:protocol version: native 2 adopted 2
PGP:Authentication "cisco", hello timeout 1 sec, hold timeout 3 sec
  Protect ch 0 (192.168.3.2 - auto):Disabled
  Working ch 1 (SONET6_0):Enabled
    Rx K1:0x00 (No Request - Null)
       K2:0x00 (bridging Null, 1+1, non-aps)
    Tx K1:0x00 (No Request - Null)
       K2:0x00 (bridging Null, 1+1, non-aps)
```

Table 50: show aps Field Descriptions

Field	Description
APS Group	Assigned number of the APS group. Range is from 1 through 255.
Protect ch	Number and address of the protect channel interface.
Working ch	Number and address of the working channel interface.

Related Commands

Command	Description
show aps agents, on page 751	Displays the status of the APS WP distributed communication subsystem.
show aps group, on page 753	Displays information about the APS groups.

show aps agents

To display the status of the automatic protection switching (APS) working to protect (WP) distributed communication subsystem, use the **show aps agents** command in EXEC mode.

show aps agents

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **show aps agents** command to display the status of the APS WP distributed communication subsystem.

The WP communication is critical for the APS functionality. The **show aps agents** command is typically used as a debugging aid for unexpected or unusual APS operation.

Displaying the APS operational data is considered of lower priority than the APS operation itself. Because the information is collected from several sources scattered across the various nodes involved, there is a small probability that some states will change while the command is being run.

The command should be reissued for confirmation before decisions are made based on the results displayed.

Task ID

Task ID	Operations
sonet-sdh	read

Examples

The following is sample output from the **show aps agents** command:

```
RP/0/RSP0/CPU0:router# show aps agents

SONET APS Manager working-Protect (WP) connections:
Remote peer (192.168.3.2 - auto) is up:
  Group 6   [P.Ch0] 192.168.3.2 === Manager --- SONET6_0 (node6) --- [W.Ch1]
Remote peer (10.1.1.1) is up:
  Group 3   [W.Ch1] 192.168.1.1 === Manager --- SONET3_1 (node3) --- [P.Ch0]
Local agent (node2) is up:
  Group 1   [W.Ch1] --- SONET2_0 --- SONET3_0 (node3) --- [P.Ch0]
Local agent (node3) is up:
  Group 1   [P.Ch0] --- SONET3_0 --- SONET2_0 (node2) --- [W.Ch1]
  Group 3   [P.Ch0] --- SONET3_1 --- Manager === 192.168.1.1 [W.Ch1]
  Group 5   [P.Ch0] --- SONET3_2 --- SONET3_3 (node3) --- [W.Ch1]
  Group 5   [W.Ch1] --- SONET3_3 --- SONET3_2 (node3) --- [P.Ch0]
Local agent (node6) is up:
  Group 6   [W.Ch1] --- SONET6_0 --- Manager === 192.168.3.2 [P.Ch0]
```

Table 51: show aps agents Field Descriptions

Field	Description
Remote peer	IP address of the remote Protect Group Protocol (PGP) peer for the working router in an APS group. An IP address of 0.0.0.0 indicates a dynamically discovered PGP peer not yet contacted, shown on working routers only. (The protect router contacts the working router.)
Local agent	Node name of the local agent, such as (node2).
Group	The interface location or IP address of the SONET APS group. Internal WP communication channel segments are represented as "---" if the segment is operational or "-/-" if the connection is broken. PGP segments are represented as "===" if operational or "==" if broken.

Related Commands

Command	Description
show aps, on page 749	Displays the operational status for all configured SONET APS groups.

show aps group

To display information about the automatic protection switching (APS) groups, use the **show aps group** command in EXEC mode.

show aps group [*number*]

Syntax Description

number	(Optional) The assigned group number.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

The **show aps group** command displays information about APS groups, and is useful if multiple APS groups are configured.

Displaying the APS operational data is considered of lower priority than the APS operation itself. Because the information is collected from several sources scattered across the various nodes involved, there is a small probability that some states will change while the command is being run.

The command should be reissued for confirmation before decisions are made based on the results displayed.

Task ID

Task ID	Operations
sonet-sdh	read

Examples

The following is sample output from the **show aps group** command:

```
RP/0/RSP0/CPU0:router# show aps group 3

APS Group 3:
  PGP:Authentication "cisco", hello timeout 1 sec, hold timeout 3 sec
  Protect ch 0 (SONET3_1):Admin Down, Disabled
    SONET framing, SONET signalling, bidirectional, non-revertive
    Rx K1:0x00 (No Request - Null)
       K2:0x05 (bridging Null, 1+1, bidirectional)
    Tx K1:0x00 (No Request - Null)
       K2:0x05 (bridging Null, 1+1, bidirectional)
  Working ch 1 (192.168.1.1):Admin Down, Enabled
```

Table 52: show aps group Field Descriptions

Field	Description
APS Group	Group number assigned to the displayed APS group. For each channel in the group, the following information is displayed: • Authentication string • Hello timer value • Hold timer value • Role of the channel (working or protect) • Channel number • Name of the assigned physical port • Channel status (Enabled, Disabled, Admin Down, Signal Fail, Signal Degraded, or Not Contacted) • Group-related information (for protect channels only) that includes: • Framing of the SONET port • Kilobytes signaling protocol • Unidirectional or bidirectional APS mode • APS revert time, in seconds (in revertive operation mode only)
Rx	Received error signaling bytes and their APS decoded information.
Tx	Sent error signaling bytes and their APS decoded information.
Working ch	IP address of the corresponding Protect Group Protocol (PGP) peer.

The information displayed for the channels local to the routers is identical to the channel information displayed for single-router APS groups.

Related Commands

Command	Description
show aps, on page 749	Displays the operational status for all configured SONET APS groups.
show aps agents, on page 751	Displays the status of the APS WP distributed communication subsystem.

show controllers pos

To display information on the Packet-over-SONET/SDH (POS) controllers, use the **show controllers pos** command in EXEC mode.

show controllers pos *interface-path-id* [**all** | **framer** {**internal** | **register** | **statistics**} | **internal**] [**begin line** | **exclude line** | **file filename** | **include line**]

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.
all	(Optional) Displays information for all POS interface controllers.
framer	(Optional) Displays all POS framer information.
internal	(Optional) Displays all POS internal information.
register	(Optional) Displays the POS framer registers.
statistics	(Optional) Displays the POS framer cumulative counters.
begin line	(Optional) Displays information beginning with the line that includes the regular expression given by the *line* argument.
exclude line	(Optional) Displays information excluding all lines that contain regular expressions that match the *line* argument.
file *filename*	(Optional) Saves the configuration to the designated file. For more information on which standard filenames are recognized, use the question mark (?) online help function.
include *line*	(Optional) Displays only those lines that contain the regular expression given by the *line* argument.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 4.0.0	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 information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

Task ID

Task ID	Operations
interface	read

Examples

The following is sample output from the **show controllers pos** command:

```
RP/0/RSP0/CPU0:router# show controllers POS 0/3/0/2

Port Number         : 2
Interface           : POS0/3/0/2
Ifhandle            : 0x1380120
CRC                 : 32
MTU                 : 4474
Port Bandwidth Kbps : 2488320
Admin state         : Up
Driver Link state   : Up


Bundle member       : No
Bundle MTU          : 4474
Bundle Adminstate   : Up
```

The following is sample output from the **show controllers pos all** command:

```
RP/0/RSP0/CPU0:router# show controllers POS 0/3/0/2 all

Port Number         : 2
Interface           : POS0/3/0/2
Ifhandle            : 0x1380120
CRC                 : 32
MTU                 : 4474
Port Bandwidth Kbps : 2488320
Admin state         : Up
Driver Link state   : Up


Bundle member       : No
Bundle MTU          : 4474
Bundle Adminstate   : Up
```

```
POS Driver Internal Cooked Stats Values for port 2
==================================================
Rx Statistics                    Tx Statistics
-------------                    -------------
Total Bytes:    1200             Total Bytes:    0
Good Bytes:     1200             Good Bytes:     0
Good Packets:   25               Good Packets:   0
Aborts:         0                Aborts:         0
FCS Errors:     0                Min-len errors: 0
Runts:          0                Max-len errors: 0
FIFO Overflows: 0                FIFO Underruns: 0
Giants:         0
Drops:          0


Sky4402 asic #2 registers:


0x000 general_cntrl                0x00
0x002 sys_intf_cntrl_1             0x06
0x003 sys_intf_cntrl_2             0x00
0x004 JTAG3                        0x10
0x005 JTAG2                        0x10
0x006 JTAG1                        0x10
0x007 JTAG0                        0x2f
0x010 active_led                   0x01
0x011 gpio_port_mode               0x01
0x012 gpio_port_fault              0x00
0x013 gpio_port_data               0x58
0x015 gpio_port_cntrl              0x3f
0x017 gpio_port_transition         0x00
0x019 gpio_port_intr_mask          0xff
0x01b gpio_port_intr               0x3f
0x01c master_intr_status           0x00
0x01d master_mask                  0x00
0x020 interrupt_4                  0x04
0x021 interrupt_3                  0x00
0x022 interrupt_2                  0x00
0x023 interrupt_1                  0x00
0x024 status_4                     0x04
0x025 status_3                     0x00
0x026 status_2                     0x0c
0x027 status_1                     0x80
0x028 mask_4                       0x07
0x029 mask_3                       0x03
0x02a mask_2                       0x1c
0x02b mask_1                       0x8f
0x02d link_state_cntrl             0x80
0x041 diag                         0x00
0x042 stcks                        0x03
0x043 short_frame_cntrl            0x00
0x0c0 ror_ram_c2                   0x16
0x0c1 ror_ram_g1                   0x00
0x0c2 ror_ram_f2                   0x00
0x0c3 ror_ram_h4                   0x00
0x0c4 ror_ram_z3                   0x00
0x0c5 ror_ram_z4                   0x00
0x0c6 ror_ram_z5                   0x00
0x0c7 ror_ram_db_c2                0x16
0x0c8 ror_ram_db_g1                0x00
0x142 tor_ram_c2                   0x16
0x143 tor_ram_g1                   0x00
0x144 tor_ram_f2                   0x00
```

```
0x145 tor_ram_h4                  0x00
0x146 tor_ram_z3                  0x00
0x147 tor_ram_z4                  0x00
0x148 tor_ram_z5                  0x00
0x170 tor_ram_s1                  0x00
0x171 tor_ram_e2                  0x00
0x172 tor_ram_e1                  0x00
0x173 tor_ram_f1                  0x00
0x174 tor_ram_k1                  0x00
0x175 tor_ram_k2                  0x00
0x177 tor_ram_z2                  0x00
0x180 rsp_cntrl_1                 0x00
0x181 rsp_cntrl_2                 0x02
0x184 rtop_f1_ovrhd               0x00
0x185 rtop_k1_ovrhd               0x00
0x186 rtop_k2_ovrhd               0x00
0x187 rtop_s1_ovrhd               0x00
0x188 rtop_e1_ovrhd               0x00
0x189 rtop_e2_ovrhd               0x00
0x18a rtop_deb_s1_ovrhd           0x00
0x18c rtop_b1_mismatch_cnt_u      0x00
0x18d rtop_b1_mismatch_cnt_l      0x00
0x190 rtop_b2_mismatch_cnt_u      0x00
0x191 rtop_b2_mismatch_cnt_l      0x00
0x194 rtop_rei_l_cnt_u            0x00
0x195 rtop_rei_l_cnt_l            0x00
0x198 rtop_ber_thresh_u           0x00
0x199 rtop_ber_thresh_l           0x00
0x19a rtop_ber_leak_u             0x00
0x19b rtop_ber_leak_l             0x00
0x19c rtop_ber_delay_u            0x00
0x19d rtop_ber_delay_l            0x00
0x1c0 rpop_signal_lbl_c2          0x16
0x1c2 rpop_valid_ptr_u            0x02
0x1c3 rpop_valid_ptr_l            0x0a
0x1c4 rpop_b3_mismatch_cnt_u      0x00
0x1c5 rpop_b3_mismatch_cnt_l      0x00
0x1c8 rpop_rei_p_cnt_u            0x00
0x1c9 rpop_rei_p_cnt_l            0x00
0x1cc rpop_ber_thresh_u           0x00
0x1cd rpop_ber_thresh_l           0x00
0x1ce rpop_ber_leak_u             0x00
0x1cf rpop_ber_leak_l             0x00
0x1d0 rpop_ber_delay_u            0x00
0x1d1 rpop_ber_delay_l            0x00
0x200 rpp_cntrl_1                 0x11
0x201 rpp_cntrl_2                 0x03
0x202 rpp_cntrl_3                 0x3e
0x203 rpp_cntrl_4                 0x00
0x204 rpp_cntrl_5                 0x00
0x208 rpp_max_pkt_len_u           0x08
0x209 rpp_max_pkt_len_l           0xbd
0x20a rpp_min_pkt_len             0x04
0x244 tpp_inter_pkt_u             0x00
0x245 tpp_inter_pkt_l             0x00
0x246 tpp_idle_cell_hdr           0x00
0x247 tpp_idle_cell_filldata      0x00
0x248 tpp_cntrl                   0x04
0x280 tpog_cntrl                  0x20
0x2c0 ttog_cntrl                  0x00
0x2c2 ttog_ovrhd_src_1            0x00
0x2c3 ttog_ovrhd_src_2            0x00
0x2c9 ttog_ovrhd_fill             0x00
```

Table 53: show controllers pos Field Descriptions

Field	Description
Cisco POS ASIC Register Dump (Receive)	Header for display of the contents of the receive ASIC1 register log.
asic mode	Address in hex of the ASIC mode flag.
error source	Address in hex of the error source flag.
error mask	Address in hex of the error mask flag.
error detail 1	Address in hex of the error detail 1 flag.
error detail 2	Address in hex of the error detail 2 flag.
rx offset	Address in hex of the receive offset.
Channel Modes	Location in hex of the channel mode flag.
Port 0:	Port 0 (the first port) statistics display.
Port 1:	Port 1 (the second port) statistics display.
Port 2:	Port 2 (the third port) statistics display.
Port 3:	Port 3 (the fourth port) statistics display.
Runt Threshold	Limit in packets set for runts on the specified port.
Tx Delay	Transmit delay that has been set for the specified port.
Cisco POS ASIC Register Dump (Transmit)	Header for display of the contents of the transmit ASIC register log.
POS Driver Internal Cooked Stats Values for port 0	Statistics relating to the specified POS port (POS port 0).
Rx Statistics	Receive statistics for the indicated POS port.
Total Bytes	Total number of bytes, including data and MAC encapsulation, received by the system.
Good Bytes	Number of bytes received without errors.
Good Packets	Number of packets received without errors.
Aborts	Number of receive bytes that have been terminated
FCS Errors	Number of FCS2 errors that have been received.
Runts	Number of received packets that are discarded because they are smaller than the minimum packet size of the medium.
FIFO Overflows	Number of received packets that exceeded the FIFO stack limit.

Field	Description
Giants	Number of received packets that are discarded because they exceed the maximum packet size of the medium.
Drops	Number of received packets that have been dropped from the system.
Tx Statistics	Transmit statistics for the indicated POS port.
Total Bytes	Total number of bytes, including data and MAC encapsulation, sent by the system.
Good Bytes	Number of bytes sent without errors.
Good Packets	Number of packets sent without errors.
Aborts	Number of sent bytes that have been terminated.
Min-len errors	Minimum queue length violations.
Max-len errors	Maximum queue length violations.
FIFO Underruns	First-in, first-out, a buffering scheme where the first byte of data entering the buffer is the first byte retrieved by the CPU. FIFO underruns reports the number of times that the transmitter has been running faster than the router can handle.

[1] [2]

[1] 1. application-specific integrated circuit
[2] 2. frame check sequence

show controllers sonet

To display information about the operational status of SONET layers, use the **show controllers sonet** command in EXEC mode.

show controllers sonet *interface-path-id* {**all** | **framers** | **internal-state**}

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.
all	Displays all information.
framers	Displays framer information.
internal-state	Displays internal SONET state.

Command Default

No default behavior or values

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.9.0	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.

Use the **show controllers sonet** command to display information about the operational status of SONET layers on a particular SONET port.

If the manageability PIE is not installed, you can use the **show controllers sonet** command to display the counters for the current 15 minutes only without history data. However, the SONET MIB is still available but is limited to the current bucket of data. History data is still available only when the manageability PIE is

loaded. The **show controllers sonet** command is available at any time to display current data, and history data is stored in the line card rather in the history bucket.

Task ID

Task ID	Operations
interface	read

Examples

The following is sample output from the **show controllers sonet** command:

```
RP/0/RSP0/CPU0:router# show controllers sonet 0/1/2/1

Port SONET0/1/2/1:

Status: Up

Loopback: None

SECTION
  LOF = 0          LOS    = 0                            BIP(B1) = 0
LINE
  AIS = 0          RDI    = 1          FEBE = 0          BIP(B2) = 0
PATH
  AIS = 0          RDI    = 0          FEBE = 0          BIP(B3) = 0
  LOP = 0          NEWPTR = 0          PSE  = 0          NSE     = 0
  PLM = 0          TIM    = 0

Line delays trigger:      0 ms clear:  10000 ms
Path delays trigger:      0 ms clear:  10000 ms
Last clearing of "show controllers SONET" counters never

Detected Alarms: None
Asserted Alarms: None
Mask for Detected->Asserted: None
Detected Alerts: None
Reported Alerts: None
Mask for Detected->Reported: None
Alarm reporting enabled for: SLOS SLOF SF_BER PLOP
Alert reporting enabled for: B1-TCA B2-TCA B3-TCA

Framing: SONET
SPE Scrambling: Enabled
C2 State: Stable   C2_rx = 0x16 (22)   C2_tx = 0x16 (22) / Scrambling Derived
S1S0(tx): 0x0  S1S0(rx): 0x0 / Framing Derived

PATH TRACE BUFFER : STABLE
  Remote hostname : P1_CRS-8
  Remote interface: POS0/1/4/0
  Remote IP addr  : 0.0.0.0

APS
No APS Group Configured
  Protect  Channel 0   DISABLED
  Rx(K1/K2) : 0x00/0x00
  Tx(K1/K2) : 0x00/0x00
  Remote Rx(K1/K2): 01/0   Remote Tx(K1/K2): 01/0


BER thresholds:  SF = 10e-3  SD = 10e-6
TCA thresholds:  B1 = 10e-6  B2 = 10e-6  B3 = 10e-6
```

```
  Optics type: OC48 SR/STM16 I-16
  Clock source: internal (actual) internal (configured)
  Rx S1: 0xf  Tx S1: 0x50

Optical Power Monitoring (accuracy: +/- 1dB)
  Rx power = 0.3162 mW, -5.0 dBm
  Tx power = 0.2883 mW, -5.4 dBm
  Tx laser current bias = 17.2 mA
```

Table 54: show controllers sonet Field Descriptions

Field	Description
Port	Slot number of the POS interface.
Status	Displays whether the link associated with the specified port is up or down.
Loopback	Loopback identifier, if applicable.
LOF	Section loss of frame is detected when a severely error-framing (SEF) defect on the incoming SONET signal persists for 3 milliseconds.
LOS	Section loss of signal is detected when an all-zeros pattern on the incoming SONET signal lasts 19(+-3) microseconds or longer. This defect might also be reported if the received signal level drops below the specified threshold.
BIP	Bit interleaved parity error reported. • For B1, the bit interleaved parity error report is calculated by comparing the BIP-8 code with the BIP-8 code extracted from the B1 byte of the following frame. Differences indicate that section-level bit errors have occurred. • For B2, the bit interleaved parity error report is calculated by comparing the BIP-8/24 code with the BIP-8 code extracted from the B2 byte of the following frame. Differences indicate that line-level bit errors have occurred. • For B3, the bit interleaved parity error report is calculated by comparing the BIP-8 code with the BIP-8 code extracted from the B3 byte of the following frame. Differences indicate that path-level bit errors have occurred.
AIS	Alarm indication signal. • Line alarm indication signal is sent by the STE1 to alert the downstream LTE2 that a LOS or LOF defect has been detected on the incoming SONET section. • Path alarm indication signal is sent by the LTE to alert the downstream PTE3 that it has detected a defect on its incoming line signal.

Field	Description
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	Far-end block errors. • Line far-end block error (accumulated from the M0 or M1 byte) is reported when the downstream LTE detects BIP7 (B2) errors. • Path far-end block error (accumulated from the G1 byte) is reported when the downstream PTE detects BIP (B3) errors.
LOP	Path loss of pointer is reported as a result of an invalid pointer (H1, H2) or an excess number of NDF8 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 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).
PLM	Payload label mismatch. A different payload-specific functionality than the provisioned functionality is reported. For example, 02 to E0, or FD to FE.
TIM	Trace identifier mismatch. Reported TIM defects that occur primarily as a result of provisioning errors; for example, incorrect cross-connections in the network.
Line delays trigger	Line triggers delayed and cleared, in milliseconds.
Path delays trigger	Path triggers delayed and cleared, in milliseconds.
Last clearing of “show controllers SONET” counters	When the counters associated with the **show controllers sonet** command were last cleared.
Detected/Asserted Alarms	Any alarms detected by the controller are displayed here. Alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.

Field	Description
Mask for Detected -> Asserted	Masked alarms for the asserted alarm. For example, when SLOS is asserted, all low-level alarms are masked and are listed in this section of the output.
Detected Alerts	List of alerts that are detected.
Reported Alerts	List of reported alerts, such as B1-TCA B2-TCA B3-TCA, sent to the application layer.
Mask for Detected -> Reported	List of masked alerts for asserted alarms that are reported.
Alarm reporting enabled for	Types of alarms that generate an alarm message.
Alert reporting enabled for	Types of alarms that generate an alert message.
Framing	Type of framing enabled on the controller.
SPE Scrambling	Status of synchronous payload envelope (SPE) scrambling: Enabled, Disabled.
C2 State	Value extracted from the SONET path signal label byte (C2).
S1S0(tx)	Two S bits received in the last H1 byte.
PATH TRACE BUFFER	SONET path trace buffer is used to communicate information regarding the remote hostname, interface name/number, and IP address. This use of the J1 (path trace) byte is proprietary to Cisco.
Remote hostname	Name of the remote host.
Remote interface	Interface of the remote host.
Remote IP addr	IP address of the remote host.
APS	Configuration status of the APS feature
APS Group	Indicates whether or not an APS group is configured.
Protect Channel 0	Indicates whether or not channel 0 is protected.
Rx(K1/K2)/Tx(K1/K2)	Contents of the received and transmitted K1 and K2 bytes at the local end in an APS configuration.
Remote Rx(K1/K2)/Tx(K1/K2)	Contents of the received and transmitted K1 and K2 bytes at the remote end in an APS configuration.
BER thresholds	List of the bit error rate (BER) thresholds you configured with the **threshold** (SONET) command.
TCA thresholds	List of threshold crossing alarms (TCA) you configured with the **threshold** (SONET) command.
Optics type	Type of small form-factor pluggable (SFP) used in the associated port.

Field	Description
Tx laser current bias	Measured laser bias current, in milliamps (mA). The valid range is 0 through 131 mA.
Clock source	Actual and configured clock source.
Optical Power Monitoring	Power status of the SONET controller.
Tx laser current bias	Current information, in milliamps (mA), in the transmit direction.

[3] [4] [5] [6] [7] [8] [9] [10] [11]

The following is sample output from the **show controllers sonet** command with the **framers** option:

```
RP/0/RSP0/CPU0:router# show controllers sonet 0/1/2/1 framers

Common Regs
 reg[0]                Master Reset and Identity 0x01
 reg[1]                             Master Cfg 0000
 reg[3]                   Master Clock Monitors 0x37
 reg[100]                    Master Intr Status 1 0000
 reg[101]               Master Intr Status Ch 0-7 0000
 reg[102]              Master Intr Status Ch 8-15 0000
 reg[1000]                 Master Clock Source Cfg 0000
 reg[1001]               Master DCC Interface Cfg 1 0x0f
 reg[1002]               Master DCC Interface Cfg 2 0000
 reg[1004]                        APS Cfg and Status 0000
 reg[1005]                   APS FIFO Cfg and Status 0x0f
 reg[1006]                         APS Intr Status 1 0000
 reg[1007]                         APS Intr Status 2 0000
 reg[1008]                            APS Reset Ctrl 0000
 reg[1010]                       TUL3 Interface Cfg 0x80
 reg[1011]                 TUL3 Intr Status/Enable 1 0000
 reg[1012]                 TUL3 Intr Status/Enable 2 0000
 reg[1013]                 TUL3 ATM Level 3 FIFO Cfg 0x03
 reg[1014]            TUL3 ATM Level 3 Signal Label 0x01
 reg[1015]     TUL3 POS Level 3 FIFO Low Water Mark 0x15
 reg[1016]    TUL3 POS Level 3 FIFO High Water Mark 0x17
 reg[1017]            TUL3 POS Level 3 Signal Label 0000
 reg[1018]                                TUL3 burst 0x0f
--More--
```

The following is sample output from the **show controllers sonet** command with the **internal-state** keyword:

```
RP/0/RSP0/CPU0:router# show controllers sonet 0/1/2/1 internal-state

Interface(layer)      admin_up if_state
```

[3] 1. section terminating equipment
[4] 2. line terminating equipment
[5] 3. path terminating equipment
[6] 4. loss of frame
[7] 5. loss of synchronization
[8] 6. alarm indication signal
[9] 7. bit interleaved parity
[10] 8. new data flag
[11]

```
---------------------- -------- --------

SONET0/1/2/1           up       up
(SONET Section)        up       up
(SONET Line)           up       up
(SONET Path)           up       up
 SonetPath0/1/2/1      up       up
  POS0/1/2/1           up       up
```

Table 55: show controllers sonet Field Descriptions

Field	Description
Interface (layer)	Slot number of the POS interface.
admin_up	Whether the interface and its associated layers are in the admin-up state.
if_state	Whether the interface and its associated layers are in the up or down state.

show sonet-local trace frr

To display the alarms associated with Fast Re-Route (FRR) for all nodes or for a specific node, use the **show sonet-local trace frr** command in EXEC mode.

show sonet-local trace frr location *node-id*

Syntax Description

location *node-id*	Full path location of the node. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

Displays the FRR alarms for all nodes on the router.

Command Modes

EXEC 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
cisco-support	read

Examples

The following example shows how to display the FRR alarms for a specific node:

```
RP/0/RSP0/CPU0:router# show sonet-local trace frr location 0/1/0/0
```

The following example shows how to display the FRR alarms for all nodes on the router:

```
RP/0/RSP0/CPU0:router# show sonet-local trace frr
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

shutdown (SONET)

To disable SONET controller processing, use the **shutdown** command in SONET/SDH configuration mode. To bring back up a SONET controller and enable SONET controller processing, use the **no form of this** command.

shutdown

Syntax Description

This command has no keywords or arguments.

Command Default

The SONET controller is up, and SONET controller processing is enabled.

Command Modes

SONET/SDH configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **shutdown** command to shut down a SONET controller and disable SONET controller processing. Use the **no shutdown** command to bring back up a SONET controller and enable SONET controller processing.

The SONET controller must be brought up for the proper operation of the Layer 2 interface. The Layer 2 interface has a separate **shutdown** command available, which does not operate on the SONET controller's administrative state.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to bring down the SONET controller and disable SONET controller processing:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/2
RP/0/RSP0/CPU0:router(config-sonet)# shutdown
```

Related Commands

Command	Description
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

signalling

To configure the K1K2 overhead byte signaling protocol used for automatic protection switching (APS), use the **signalling** command in APS group configuration mode. To reset APS signaling to the default, use the **no** form of this command.

signalling {**sonet** | **sdh**}

Syntax Description

sonet	Sets signaling to SONET.
sdh	Sets signaling to Synchronous Digital Hierarchy (SDH).

Command Default

SONET signaling is set by default.

Command Modes

APS group configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	The **sdh** keyword was supported.

Usage Guidelines

By default, APS uses the signaling mode matching the framing mode. The **signalling** command may be required, depending upon the transport equipment capabilities, only on "transition" links interconnecting SONET and SDH networks.

In a multirouter APS topology, the **signalling** command is allowed only on the protect router.

Examples

The following example shows how to reset the signaling protocol from the default SONET value to SDH:

```
RP/0/RSP0/CPU0:router(config)# aps group 1


RP/0/RSP0/CPU0:router(config-aps)# signalling sdh
```

The following example sets the signaling to SONET:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# signalling sonet
```

Related Commands

Command	Description
aps group (global), on page 708	Adds an automatic protection switching (APS) group and enter APS group configuration mode.
show aps group, on page 753	Displays information about the APS groups.

sts

To specify the Synchronous Transport Signal (STS) path and enter the STS controller configuration mode, use the **sts** command in SONET controller configuration mode.

sts *number*

Syntax Description

number	STS path number. The range varies by the type of line card.

Command Default

No default behavior or values

Command Modes

SONET controller 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
sonet-sdh	read, write

Examples

The following example shows how to specify STS 1:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# sts 1
RP/0/RSP0/CPU0:router(config-stsPath)#
```

Related Commands

Command	Description
au, on page 710	Specifies the administrative unit (AU) group number and enters the AU controller configuration mode.

timers (APS)

To change the time between hello packets and the time before the protect interface process declares a working interface router to be down, use the **timers** command in APS group configuration mode. To return to the default timers, use the **no** form of this command.

timers *hello-seconds hold-seconds*

Syntax Description

hello-seconds	Number of seconds to wait before sending a hello packet (hello timer). Range is from 1 through 255 seconds. Default is 1 second.
hold-seconds	Number of seconds to wait to receive a response from a hello packet before the interface is declared down (hold timer). Range is from 1 through 255 seconds. Default is 3 seconds.

Command Default

hello-seconds: 1

hold-seconds: 3

Command Modes

APS group configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **timers** command to change the time between hello packets and the time before the protect interface process declares a working interface router to be down.

The hello time, in seconds, represents the interval between the periodic message exchange between the Protect Group Protocol (PGP) peers. The hold time, in seconds, represents the maximum interval starting with the first failed periodic message after which, if no successful exchange takes place, the PGP link is declared dead. If the Hello timer is X seconds and Hold Timer is configured as Y seconds (where, X < Y), then the PGP link down announcement happens in a minimum of Y-X seconds and maximum of Y seconds.

If many multirouter APS groups are configured and the CPU load or the User Datagram Protocol (UDP) traffic associated with the PGP communication is considered too high, then the hello interval should be increased.

Increasing the hold time is suggested if the PGP link is flapping. The possible causes include high route processor (RP) CPU load, high traffic, or high error rates on the links between the working and the protect routers.

We recommend that you have a hold time at least three times longer than the hello time (allowing three or more consecutive failed periodic message exchange failures).

The **timers** command is typically used only on the protect router. After the PGP connection is established, the working router learns about the timer settings from the protect router and automatically adjusts accordingly, regardless of its own timer configuration.

The **timers** command is meaningful only in multirouter automatic protection switching (APS) topologies and is ignored otherwise.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to configure APS group 3 with the hello timer at *2* seconds and the hold timer at 6 seconds:

```
RP/0/RSP0/CPU0:router(config)# aps group 3
RP/0/RSP0/CPU0:router(config-aps)# timers 2 6
```

Related Commands

Command	Description
aps group (global), on page 708	Adds an automatic protection switching (APS) group and enter APS group configuration mode.
show aps group, on page 753	Displays information about the APS groups.

threshold (SONET)

To set the bit error rate (BER) threshold values of the specified alarms for a SONET controller, use the **threshold** command in SONET/SDH configuration mode. To remove the setting of the threshold from the configuration file and restore the default condition, use the **no** form of this command.

threshold {**b1-tca** | **b2-tca** | **sd-ber** | **sf-ber**} *bit-error-rate*

Syntax Description

b1-tca	Sets the B1 BER threshold crossing alarm (TCA). Range is from 3 through 9. Default is 10e-6.
b2-tca	Sets the B2 BER threshold crossing alarm (TCA). Range is from 3 through 9. Default is 10e-6.
sd-ber	Sets the signal degrade BER threshold. Range is from 3 through 9. Default is 10e-6.
sf-ber	Sets the signal failure BER threshold. Range is from 3 through 9. Default is 10e-3.
bit-error-rate	BER from 3 to 9 (10 to the minus *x*).

Command Default

b1-tca: 10e-6

b2-tca: 10e-6

sd-ber: 10e-6

sf-ber: 10e-3

Command Modes

SONET/SDH configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

For B1, the bit interleaved parity (BIP) error report is calculated by comparing the BIP-8 code with the BIP-8 code that is extracted from the B1 byte of the following frame. Differences indicate that section-level bit errors have occurred.

For B2, the BIP error report is calculated by comparing the BIP-8/24 code with the BIP-8 code that is extracted from the B2 byte of the following frame. Differences indicate that line-level bit errors have occurred.

Signal failure BER and signal degrade BER are sourced from B2 BIP-8 error counts (as is B2-TCA). The **b1-tca** and **b2-tca** keywords print only a log message to the console (if reports for them are enabled).

To determine the BER thresholds configured on the controller, use the **show controllers sonet** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to configure thresholds on the SONET controller:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# threshold sd-ber 8
RP/0/RSP0/CPU0:router(config-sonet)# threshold sf-ber 4
RP/0/RSP0/CPU0:router(config-sonet)# threshold b1-tca 4
```

Related Commands

Command	Description
report (SONET), on page 742	Permits selected SONET alarms to be logged to the console for a SONET controller.
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

threshold (SONET path)

To set the bit error rate (BER) threshold values of the specified alarms for a SONET path, use the **threshold** command in SONET/SDH path configuration mode. To remove the setting of the SONET path threshold from the configuration file and restore the default condition, use the **no** form of this command.

threshold b3-tca *bit-error-rate*

Syntax Description

b3-tca	Sets the B3 BER threshold crossing alarm (TCA). Default is 6.
bit-error-rate	BER from 3 to 9 (10 to the minus *x*).

Command Default

b3-tca: 6

Command Modes

SONET/SDH path configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

For B3, the bit interleaved parity (BIP) error report is calculated by comparing the BIP-8 code with the BIP-8 code that is extracted from the B3 byte of the following frame. Differences indicate that path-level bit errors have occurred.

In addition to BIP errors detected at the local end in the receive direction, B3 error counts detected in the G1 byte (P-REI or P-FEBE) by the far-end SONET equipment are returned.

The **b3-tca** keyword prints only a log message to the console (if reports for them are enabled).

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

In the following example, the BER is set to 4:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/1
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# threshold b3-tca 4
```

Related Commands

Command	Description
report (SONET), on page 742	Permits selected SONET alarms to be logged to the console for a SONET controller.
show controllers sonet, on page 761	Displays information about the operational status of SONET layers.

tug3

To specify the tributary unit group (TUG) number and enter the TUG3 controller configuration mode, use the **tug3** command in SONET controller configuration mode.

tug3 *number*

Syntax Description

number	The tributary unit group (TUG) number. The ranges are: • AU4—The only value is 1. • AU3—The range is 1 to 3.

Command Default

The default is 1.

Command Modes

SONET controller configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

The **tug3** command enables you to begin configuring the interface in the TUG3 controller configuration mode, where you can configure virtual containers (VCs) and DS3s:

STM1 -> AU4 -> TUG3 -> VC-3 -> DS3

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify tug3 1.

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/RSP0/CPU0:router(config-sonet)# au 1
RP/0/RSP0/CPU0:router(config-auPath)# tug3 1
RP/0/RSP0/CPU0:router(config-tug3Path)#
```

Related Commands

Command	Description
au, on page 710	Specifies the administrative unit (AU) group number and enters the AU controller configuration mode.

uneq-shut (SONET path)

To enable automatic insertion of P-UNEQ code (0x00) in the sent SONET path overhead C2 byte, use the **uneq-shut** command in SONET/SDH path configuration mode. To disable this feature, use the **no** form of this command.

uneq-shut

Syntax Description

This command has no keywords or arguments.

Command Default

Automatic insertion is enabled.

Command Modes

SONET/SDH path configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **uneq-shut** command to disable automatic insertion of P-UNEQ code in the sent SONET path overhead C2 byte whenever the SONET path enters the administratively down state.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

In the following example, automatic insertion of P-UNEQ code is disabled in the sent SONET path overhead C2 byte:

```
RP/0/RSP0/CPU0:router(config)# controller sonet 0/2/0/2
RP/0/RSP0/CPU0:router(config-sonet)# path
RP/0/RSP0/CPU0:router(config-sonet-path)# uneq-shut
```

unidirectional

To configure a protect interface for unidirectional mode, use the **unidirectional** command in APS group configuration mode. To restore the default setting, bidirectional mode, use the **no** form of this command.

unidirectional

Syntax Description

This command has no keywords or arguments.

Command Default

Bidirectional mode is the default mode for the protect interface.

Command Modes

APS group configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **unidirectional** command to configure a protect interface for unidirectional mode. Use the **no** form of this command to restore the default setting.

The unidirectional or bidirectional automatic protection switching (APS) operation mode of the routers should be matched with the APS operation mode of the connected SONET equipment.

Note We recommend using bidirectional APS mode when it is supported by the interconnecting SONET equipment. When the protect interface is configured as unidirectional, the working and protect interfaces must cooperate to switch the transmit and receive SONET channel in a bidirectional fashion. Cooperation occurs automatically when the SONET network equipment is in bidirectional mode.

In a multirouter APS topology, the **unidirectional** command is allowed only on the protect router.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to configure an APS group for unidirectional mode:

```
RP/0/RSP0/CPU0:router(config)# aps group 1
RP/0/RSP0/CPU0:router(config-aps)# unidirectional
```

Related Commands

Command	Description
aps group (global), on page 708	Adds an automatic protection switching (APS) group and enter APS group configuration mode.

Command	Description
show aps, on page 749	Displays the operational status for all configured SONET APS groups.

width

To set the number of paths in a stream, use the **width** command in the STS or AU controller configuration mode.

width *number*

Syntax Description

number Number of STS streams that are concatenated. The possible values are:

- 1—Indicating one STS stream
- 3—Indicating three STS streams (STS-3c)
- 12—Indicating concatenation of 12 STS streams (STS-12c)
- 48—Indicating concatenation of 48 STS streams (STS-48c)

Widths 3, 12, and 48 are configured on STS paths at natural boundaries, which coincide with the following path numbers:

- 1, 4, 7, 10, and so on, for STS-3c
- 1, 13, 25, and 37 for STS-12c
- 1 for STS-48c

Command Default

The default is 1.

Command Modes

SONET controller 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
sonet-sdh	read, write

Examples

The following example shows how to specify a width of 3:

```
RP/0/0/CPU0:router(config)# controller sonet 0/1/0/0
RP/0/0/CPU0:router(config-sonet)# sts 1
RP/0/0/CPU0:router(config-stsPath)# width 3
```

Related Commands

Command	Description
mode (SONET), on page 732	Sets the mode of an STS path, AU path, T3 controller, or TUG3 controller.



T3, E3, T1, E1 Controller Commands on the Cisco ASR 9000 Series Router

This module provides command line interface (CLI) commands for configuring T3/E3 and T1/E1 controllers on the Cisco ASR 9000 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.

- bert e1, on page 785
- bert e3, on page 787
- bert error, on page 789
- bert interval, on page 791
- bert pattern, on page 793
- bert t1, on page 796
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- yellow, on page 892

bert e1

To start or stop a configured bit error rate test (BERT) on an E1 controller or channel group, use the **bert e1** command in EXEC mode . To return to the default state, use the **no** form of this command.

bert e1 *interface-path-id* [**channel-group** *channel-group-number*] [**error**] {**start** | **stop**}

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.
channel-group *channel-group-number*	(Optional) Channel group number. When an E1 data line is configured, channel group numbers can be values from 0 to 30. **Note** For any of the DS0 time slots within the time slot range provided for the channel group, use time slot -1 as the channel number.
error	(Optional) Injects errors into the running BERT stream.
start	Starts the BERT on the E1 controller or channel.
stop	Stops the BERT on the E1 controller or channel.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	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.

Note Before you can start a BERT on an E1 controller or channel group, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in E1 configuration mode and channel group configuration mode.

To view the BERT results, use the **show controllers e1** command in EXEC mode . The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to start and stop a BERT on an E1 controller:

```
RP/0/RSP0/CPU0:router# bert e1 0/3/0/0 start
RP/0/RSP0/CPU0:router# bert e1 0/3/0/0 stop
```

The following example shows how to inject errors into the BERT stream on an E1 controller:

```
RP/0/RSP0/CPU0:router# bert e1 0/3/0/0 error
```

Related Commands

Command	Description
bert interval, on page 791	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 793	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.

bert e3

To start or stop a configured bit error rate test (BERT) on an E3 controller or channel group, use the **bert e3** command in EXEC mode . To return to the default state, use the **no** form of this command.

bert e3 *interface-path-id* [**error**] {**start** | **stop**}

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.
error	(Optional) Injects errors into the running BERT stream.
start	Starts the BERT on the E3 controller or channel.
stop	Stops the BERT on the E3 controller or channel.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	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.

Note Before you can start a BERT on an E3 controller, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in E3 configuration mode.

To view the BERT results, use the **show controllers e3** command in EXEC mode . The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to start and stop a BERT on an E3 controller:

```
RP/0/RSP0/CPU0:router# bert e3 0/3/0/0/0 start
RP/0/RSP0/CPU0:router# bert e3 0/3/0/0/0 stop
```

The following example shows how to inject errors into the BERT stream on an E3 controller:

```
RP/0/RSP0/CPU0:router# bert e3 0/3/0/0 error
```

Related Commands

Command	Description
bert interval, on page 791	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 793	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.

bert error

To insert errors into a BERT stream on a T3/E3 or T1/E1 line, use the **bert error** command in T3 or T1 configuration mode. To disable a BERT pattern, use the **no** form of this command.

bert error [*number*]

Syntax Description

number	Specifies the number of BERT errors to introduce into the bit stream. The range is from 1 to 255. The default is 1.

Command Default

The default is 1.

Command Modes

T3 configuration

E3 configuration

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 and E1 configuration modes was added.

Usage Guidelines

Use the **bert error** command with the **bert pattern** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to insert 10 errors into the BERT bit stream on the T3 controller in slot 0, subslot 3:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RSP0/CPU0:router(config-t3e3)# bert error 10
```

Related Commands

Command	Description
bert interval, on page 791	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 793	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.

Command	Description
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

bert interval

To specify the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line, use the **bert interval** command in the appropriate configuration mode. To revert to the default interval, use the **no** form of this command.

bert interval *time*

Syntax Description

time	Duration (in minutes) of the BERT. The interval can be a value from 1 to 14400. The default is 1 minute.

Command Default

A BERT runs for 1 minute.

Command Modes

T3 configuration

E3 configuration

T1 configuration

E1 configuration

Channel group configuration for T1 and E1

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 and E1 configuration mode was added.

Usage Guidelines

Use the **bert interval** command with the **bert pattern** command. If the **bert interval** command is not used, then the BERT runs for a default of 1 minute.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to limit the BERT to 10 minutes on the T3 controller in slot 0, subslot 3:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RSP0/CPU0:router(config-t3e3)# bert interval 10
```

Related Commands

Command	Description
bert error, on page 789	Insert errors into a BERT stream on a T3/E3 or T1/E1 line.
bert pattern, on page 793	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.

Command	Description
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

bert pattern

To enable a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line or an individual channel group, use the **bert pattern** command in T3, E3, T1, E1, or channel group configuration mode. To disable a BERT pattern, use the **no** form of this command.

bert pattern {**0s** | **1in8** | **1s** | **2^11** | **2^15** | **2^20** | **2^20-QRSS** | **2^23** | **2^9** | **3in24** | **55Daly** | **55Octet** | **alt-0-1** | **ds0-1** | **ds0-2** | **ds0-3** | **ds0-4**}

Syntax Description

0s	Invokes a repeating pattern of zeros (...000...).
1in8	(T1 and E1 only) Invokes a repeating pattern of one (1) bit in eight (8).
1s	Invokes a repeating pattern of ones (...111...).
2^11	(Channel group only) Invokes a pseudorandom O.151 test pattern that is 32,768 bits in length.
2^15	Invokes a pseudorandom O.151 test pattern that is 32,768 bits in length.
2^20	Invokes a pseudorandom O.153 test pattern that is 1,048,575 bits in length.
2^20-QRSS	Invokes a pseudorandom quasi-random signal sequence (QRSS) 0.151 test pattern that is 1,048,575 bits in length.
2^23	Invokes a pseudorandom O.151 test pattern that is 8,388,607 bits in length.
2^9	(Channel group only) Invokes a pseudorandom 0.153 test pattern of 511 bits in length.
3in24	(T1 and E1 only) Invokes a repeating pattern in which three (3) bits in twenty-four (24) are set to one (1) and the others are set to zero (0).
55Daly	(T1 and E1 only) Invokes a repeating pattern of fifty-five (55) 8-bit octets of data. This pattern introduces rapid transitions from long sequences of low-density octets to high-density octets, high-density octets to low-density octets, and rapid 1010 bit transitions.
55Octet	(T1 and E1 only) Invokes a repeating pattern of fifty-five (55) 8-bit octets of data. This pattern has fifteen (15) consecutive zeros.
alt-0-1	Invokes a repeating pattern of alternating zeros and ones (...01010...).
ds0-1	(Channel group only) Invokes a repeating sequence of 100x FFh, followed by 100x 00h. This combination of minimum and maximum densities causes stressing of the signal recovery circuitry.
ds0-2	(Channel group only) Invokes a repeating sequence of 100x 7Eh, followed by 100x 00h. This combination provides minimum ones density stressing as well as Layer 2 flag bytes.
ds0-3	(Channel group only) Invokes a repeating sequence of 200x 4Ch. This combination represents the typical SDD traffic patterns.
ds0-4	(Channel group only) Invokes a repeating sequence of 200x 40h. This combination represents the typical DEC VT traffic.

Command Default

BERT pattern test is disabled

Command Modes

T3 configuration

E3 configuration

T1 configuration

E1 configuration

Channel group configuration for T1 and E1

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	• Support for E3 and E1 configuration mode was added. • Support for the **ds0-1**, **ds0-2**, **ds0-3**, and **ds0-4** keywords was added.

Usage Guidelines

BERT is supported on each of the T3/E3 or T1/E1 links. It is done only over an unframed T3/E3 or T1/E1 signal and is run on only one port at a time. It is also supported on an individual channel group.

To begin a BERT, commit the configuration and use the **bert t1**, **bert e1**, **bert t3**, or **bert e3** command in EXEC mode.

To view the BERT results, use the **show controllers t1** or **show controllers t3** command in EXEC mode. The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable the running of a BERT pattern of all zeros on the T3 controller in slot 0, subslot 3:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/0/3/1/10
RP/0/RSP0/CPU0:router(config-t3e3)# bert pattern 0s
```

Related Commands

Command	Description
bert error, on page 789	Insert errors into a BERT stream on a T3/E3 or T1/E1 line.
bert interval, on page 791	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

bert t1

To start or stop a configured bit error rate test (BERT) on a T1 controller or channel group, use the **bert t1** command in EXEC mode .

bert t1 *interface-path-id* [**channel-group** *channel-group-number*] [**error**] {**start** | **stop**}

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.
channel-group *channel-group-number*	**Note** (Optional) Channel group number. When a T1 data line is configured, channel group numbers can be values from 0 to 23.
error	(Optional) Injects errors into the running BERT stream.
start	Starts the BERT on the T1 controller or channel.
stop	Stops the BERT on the T1 controller or channel.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

Note Before you can start a BERT on a T1 controller or channel group, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in T1 configuration mode and channel group configuration mode.

To view the BERT results, use the **show controllers t1** command in EXEC mode mode. The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to start and stop a BERT on a T1 controller:

```
RP/0/RSP0/CPU0:router# bert t1 0/3/0/0/0 start
RP/0/RSP0/CPU0:router# bert t1 0/3/0/0/0 stop
```

The following example shows how to inject errors into the BERT stream on an T1 controller:

```
RP/0/RSP0/CPU0:router# bert t1 0/3/0/0 error
```

Related Commands

Command	Description
bert interval, on page 791	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 793	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

bert t3

To start or stop a configured bit error rate test (BERT) on a T3 controller or channel group, use the **bert t3** command in EXEC mode .

bert t3 *interface-path-id* [**error**] {**start** | **stop**}

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.
error	(Optional) Injects errors into the running BERT stream.
start	Starts the BERT on the T3 controller or channel.
stop	Stops the BERT on the T3 controller or channel.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

Note Before you can start a BERT on a T3 controller, you must configure a BERT pattern using the **bert pattern** command. If desired, you can also adjust the default setting (1 minute) of the BERT interval using the **bert interval** command. Both of these commands are available in T3 configuration mode.

To view the BERT results, use the **show controllers t3** command in EXEC mode . The BERT results include the following information:

- Type of test pattern selected
- Status of the test
- Interval selected
- Time remaining on the BERT
- Total bit errors
- Total bits received

BERT is data intrusive. Regular data cannot flow on a line while the test is in progress. The line is put in an alarm state when a BERT is in progress and restored to a normal state after a BERT has been terminated.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to start and stop a BERT on a T3 controller:

```
RP/0/RSP0/CPU0:router# bert t3 0/3/0/0 start
RP/0/RSP0/CPU0:router# bert t3 0/3/0/0 stop
```

The following example shows how to inject errors into the BERT stream on a T3 controller:

```
RP/0/RSP0/CPU0:router# bert t3 0/3/0/0 error
```

Related Commands

Command	Description
bert interval, on page 791	Specifies the duration of a bit error rate test (BERT) pattern on a T3/E3 or T1/E1 line.
bert pattern, on page 793	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

cablelength

To specify the distance of the cable from the routers to the network equipment, use the **cablelength** command in T3 or E3 configuration mode. To restore the default cable length, use the **no** form of this command.

cablelength *feet*

Syntax Description

feet	Number of feet in the range from 0 to 450. The default is 224 feet.

Command Default

The default is 224 feet.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

You can specify a cable length from 0 to 450 feet; however, the hardware recognizes only two ranges: 0 to 49 and 50 to 450. For example, entering 35 feet uses the 0 to 49 range. If you later change the cable length to 40 feet, there is no change because 40 is still within the 0 to 49 range. However, if you change the cable length to 50, the 50 to 450 range is used. The actual number you enter is stored in the configuration file.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the cable length for the router to 300 feet:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RSP0/CPU0:router(config-t3)# cablelength 300
```

channel-group

To configure a DS0 channel group and enter channel group configuration mode, use the **channel-group** command in T1 or E1 configuration mode. To unassign a channel group, use the **no** form of this command.

channel-group *channel-group-number*

Syntax Description

channel-group-number	**Note** Channel group number. When a T1 controller is configured, channel group numbers can be values from 0 to 23.

Command Default

No default behavior or values

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for DS0 channel groups and E1 configuration was added.

Usage Guidelines

The **channel-group** command is available only on channelized SPAs.

Use the **channel-group** command in configurations in which the router must communicate with a T1 or an E1 fractional data line. The channel group number may be arbitrarily assigned and must be unique for the controller. An associated serial interface is created with each defined channel group.

Before the channel group configuration is valid, you must define the associated DS0 time slots using the **timeslots** command.

Use the **no channel group** command to delete a channel group.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enter channel group configuration mode for channel group number 5 and change the speed of the underlying DS0s in the channel group to 56 kbps:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1-channel_group)# speed 56
```

The following example shows how to associate DS0 time slots 1, 6, 8, 9, and 10 to channel group 5:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1-channel_group)# timeslots 1:6:8-10
```

Related Commands

Command	Description
bert pattern, on page 793	Enables a BERT pattern on a T3/E3 or T1/E1 line or an individual channel group.
framing (E1), on page 836	Selects the frame type for an E1 data line.
framing (T1), on page 838	Selects the frame type for a T1 data line.
mode, on page 859	Sets the mode of the T3/E3 or T1/E1 controller.
speed (DS0), on page 889	Specifies the speed of the underlying DS0s in a channel group.
timeslots, on page 890	Associates one or more DS0 time slots to a channel group and create an associated serial subinterface.

clear controller lnm

To clear link noise monitoring statistics or reset states, use the **clear controller lnm** command in EXEC mode .

clear controller {**t1** | **e1**} *interface-path-id* **lnm** {**state** | **statistics**}

Syntax Description

t1	Specifies clearing of LNM states or statistics for a T1 controller.
e1	Specifies clearing of LNM states or statistics for an E1 controller.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
state	Resets the LNM event states for the specified controller.
statistics	Clears the LNM statistics for the specified controller and resets them to zero.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.
  - *T1num*—T1 controller number.

There should not normally be any need to clear the LNM controller states. The **state** option resets the LNM configuration which causes an update of the current LNM states in the system. Therefore, under normal conditions, if the controller is in alarm state, the reset should continue to report the alarm state; alternatively, if the controller is clear of any alarms, the reset will show the stable state. The use of the **clear controller lnm state** command does not actually clear any alarms, but causes a refresh of their values in the system. Therefore, this command can be used if the reported controller state should happen to be out of synchronization with the actual controller state.

To view the status of the controllers, use the **show controllers t1** command.

Task ID

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

Examples

The following example shows how to reset link noise monitoring states for the channelized T1 controller 1 that is located in chassis 0, for a SIP installed in slot 1 with a SPA in subslot 0, and port 0 with T3 controller 1, and channelized T1 controller 1:

```
RP/0/RSP0/CPU0:router# clear controller t1 0/1/0/0/1/1 lnm state
```

The following example shows how to clear link noise monitoring statistics for the channelized T1 controller 1 that is located in chassis 0, for a SIP installed in slot 1 with a SPA in subslot 0, and port 0 with T3 controller 1, and channelized T1 controller 1:

```
RP/0/RSP0/CPU0:router# clear controller t1 0/1/0/0/1/1 lnm statistics
```

Related Commands

Command	Description
controller e1, on page 814	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 818	
lnm major-warning, on page 842	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events.
lnm minor-warning, on page 845	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
lnm remove, on page 848	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal the noise attribute to PPP for removal of an MLPPP bundle link.

Command	Description
lnm syslog, on page 851	Enables logging of link noise monitoring major, remove, and minor events and alarms.
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers lnm, on page 870	Displays information about LNM on T1 or E1 links.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

clear controller t1

To clear T1 controller data, use the **clear controller t1** command in EXEC mode .

clear controller t1 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.
  - *T1num*—T1 controller number.
- If specifying a virtual interface, the number range varies, depending on interface type.
- When specifying a virtual tributary group, the naming notation is *rack*/*slot*/*module*/*port*/*vtg*/*vt*. 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 or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
- *port*—Physical port number of the interface.
- *vtg*—Virtual tributary group.
- *vt*—Virtual tributary instance.

To view the status of the controllers, use the **show controllers t1** command.

Task ID

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

Examples

The following example shows how to clear controller data for the channelized T1 controller 1 that is located in chassis 0, for a SIP installed in slot 1 with a SPA in subslot 0, and port 0 with T3 controller 1, and channelized T1 controller 1:

```
RP/0/RSP0/CPU0:router# clear controller t1 0/1/0/0/1/1
```

Related Commands

Command	Description
controller t1, on page 818	
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

clear controller t3

To clear T3 controller data, use the **clear controller t3** command in EXEC mode .

clear controller t3 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

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

- When specifying a T3 controller, the naming notation is *rack*/*slot*/*module*/*port*/*T3num*. 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 or SIP.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.

To view the status of the controllers, use the **show controllers t3** command.

Task ID

Task ID	Operations
dwdm	read, write
interface	read, write

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to clear controller data for T3 controller 1 that is located in chassis 0, for a SIP installed in slot 6 with a SPA in subslot 2, and port 0 with T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
```

Related Commands

Command	Description
controller t3, on page 820	Configures a T3 controller and enters T3 configuration mode.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

clock source (T1/E1)

To set clocking for individual T1 or E1 links, use the **clock source** command in T1 or E1 configuration mode. To return to the default, use the **no** form of this command.

clock source {**internal** | **line**}

Syntax Description

internal	Specifies that the clock is generated from the internal clock of the T1 or E1 controller. The default is internal. **Note** When configuring clocking on a serial link, you need to configure one end to be **internal** and the other end to be **line**. If you configure **internal** clocking on both ends of a connection, framing slips occur. If you configure **line** clocking on both ends of a connection, the line does not come up.
line	Specifies that the clock on this controller derives its clocking from the external source to which the controller is connected, which is generally the telephone company central office (CO).

Command Default

The default clock source is internal.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the clocking on the T1 controller in slot 6, subslot 0 to internal:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1e1)# clock source internal
```

Related Commands

Command	Description
controller e1, on page 814	Configures an E1 controller and enters E1 configuration mode.

Command	Description
controller t1, on page 818	

clock source (T3/E3)

To set clocking for individual T3 or E3 links, use the **clock source** command in T3 or E3 configuration mode. To return to the default, use the **no** form of this command.

clock source {**internal** | **line**}

Syntax Description

internal	Specifies that the clock is generated from the internal clock of the T3 controller. The default is internal. **Note** When configuring clocking on a serial link, you need to configure one end to be **internal** and the other end to be **line**. If you configure **internal** clocking on both ends of a connection, framing slips occur. If you configure **line** clocking on both ends of a connection, the line does not come up.
line	Specifies that the clock on this controller derives its clocking from the external source to which the controller is connected, which is generally the telephone company central office (CO).

Command Default

The default clock source is internal.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

If you do not specify the **clock source** command, the default clock source is used.

Configure the **clock source line** command if your telephone company or the remote data service unit provides the reference clock of the T3 or E3 connection.

Configure the **clock source internal** command if your router provides the reference clock of the T3 or E3 connection.

Note For a back-to-back connection between two T3 network modules, one controller must be configured for internal clocking while the other controller must be configured for line clocking.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the clocking to line on the T3 controller 1 that is located in chassis 0, on a SIP installed in slot 6 with a SPA in subslot 0, on port 0 with T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0/1
RP/0/RSP0/CPU0:router(config-t3)# clock source line
```

Related Commands

Command	Description
controller e3, on page 816	Configures an E3 controller and enters E3 configuration mode.
controller t3, on page 820	Configures a T3 controller and enters T3 configuration mode.

controller e1

To configure an E1 controller and enter E1 configuration mode, use the **controller e1** command in Global Configuration mode . To return to the default state, use the **no** form of this command.

controller e1 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers 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

Command History

Release	Modification
Release 4.0.0	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 **controller e1** command is used in configurations in which the router is intended to communicate with an E1 fractional data line. The **controller e1** command is available only on channelized interfaces.

Use the **mode** command in T3 configuration mode to specify the mode for the port. The default mode for 2-Port and 4-Port Channelized T3 SPAs is T1.

Note If you do not use the **mode** command to define the port to be E1, you cannot configure the E1 controller.

To view the status of the controllers, use the **show controllers e1** command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter E1 configuration mode for a controller:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/1/0/0
RP/0/RSP0/CPU0:router(config-e1)#
```

Related Commands

Command	Description
mode, on page 859	Sets the mode of the T3/E3 or T1/E1 controller.
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.

controller e3

To configure an E3 controller and enter E3 configuration mode, use the **controller e3** command in Global Configuration mode . To return to the default state, use the **no** form of this command.

controller e3 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers 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

Command History

Release	Modification
Release 4.0.0	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.

To view the status of the controllers, use the **show controllers e3** command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter E3 configuration mode for a controller in slot 6, on the SPA in subslot 2, on E3 controller 0:

```
RP/0/RSP0/CPU0:router(config)# controller e3 0/6/2/0
RP/0/RSP0/CPU0:router(config-e3)#
```

Related Commands

Command	Description
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.

controller t1

To configure a T1 controller and enter T1 configuration mode, use the **controller t1** command in Global Configuration mode . To return to the default state, use the **no** form of this command.

controller t1 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers 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

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.
  - *T1num*—T1 controller number.
- If specifying a virtual interface, the number range varies, depending on interface type.
- When specifying a virtual tributary group, the naming notation is *rack*/*slot*/*module*/*port*/*vtg*/*vt*. 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 or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
- *port*—Physical port number of the interface.
- *vtg*—Virtual tributary group.
- *vt*—Virtual tributary instance.

The **controller t1** command is used in configurations in which the router is intended to communicate with a T1 fractional data line. The **controller t1** command is available only on channelized SPAs.

Use the **mode** command in T3 configuration mode to specify the mode for each T3 port.

To view the status of the controllers, use the **show controllers t1** command.

If the T1 framing type is super frame (SF), you should consider disabling yellow alarm detection as the yellow alarm can be incorrectly detected with SF framing.

Serial interface may flap and eventually, go down if yellow alarm detection is not disabled on its T1 controller configured with SF framing.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter T1 configuration mode for a controller:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/1/0/0/1
RP/0/RSP0/CPU0:router(config-t1)#
```

Related Commands

Command	Description
mode, on page 859	Sets the mode of the T3/E3 or T1/E1 controller.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

controller t3

To configure a T3 controller and enter T3 configuration mode, use the **controller t3** command in Global Configuration mode . To return to the default state, use the **no** form of this command.

controller t3 *interface-path-id*

Syntax Description

interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers 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

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

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

- When specifying a T3 controller, the naming notation is *rack*/*slot*/*module*/*port*/*T3num*. 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 or SIP.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.
- If specifying a virtual interface, the number range varies, depending on interface type.

To view the status of the controllers, use the **show controllers t3** command.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enter T3 configuration mode for T3 controller 1 that is located in chassis 0, for a SIP installed in slot 6 with a SPA in subslot 2, and port 0 with T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RSP0/CPU0:router(config-t3)#
```

Related Commands

Command	Description
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

delay clear (T1/E1)

To configure the amount of time before a T1 or E1 path delay trigger alarm is cleared, use the **delay clear** command in T1 or E1 configuration mode. To return the command to its default setting, use the **no** form of this command.

delay clear *value*

Syntax Description

value	Value, in milliseconds, before a T1 path delay trigger alarm is cleared. The range is from 0 through 180000. The default is 10 seconds.

Command Default

The default is 10 seconds.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify that T1 path delay trigger alarms should be cleared after 9000 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t1)#delay clear 9000
```

Related Commands

Command	Description
delay trigger (T1/E1), on page 824	Configures a time value for the T1 or E1 path delay trigger.

delay clear (T3/E3)

To configure the amount of time before a T3 or E3 path delay trigger alarm is cleared, use the **delay clear** command in T3 or E3 configuration mode. To return the command to its default setting, use the **no** form of this command.

delay clear *value*

Syntax Description

value	Value, in milliseconds, before a T3 or E3 path delay trigger alarm is cleared. The range is from 0 through 180000. The default is 10 seconds.

Command Default

The default is 10 seconds.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify that T3 path delay trigger alarms should be cleared after 9000 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# delay clear 9000
```

Related Commands

Command	Description
delay trigger (T3/E3), on page 825	Configures a time value for the T3 or E3 path delay trigger.

delay trigger (T1/E1)

To configure a time value for the T1 or E1 path delay trigger, use the **delay trigger** command in T1 or E1 configuration mode. To return the command to its default setting, use the **no** form of this command.

delay trigger *value*

Syntax Description

value	Sets the T1 path delay trigger value, in milliseconds. The range is from 0 through 60000. The default is 2.5 seconds.

Command Default

The default is 2.5 seconds.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration was added.

Usage Guidelines

If the timer for the T1 or E1 path delay trigger expires, an alarm is declared.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the T1 path delay trigger to 8000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/4/2/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# delay trigger 8000
```

Related Commands

Command	Description
delay clear (T1/E1), on page 822	Configures the amount of time before a T1 or E1 path delay trigger alarm is cleared.

delay trigger (T3/E3)

To configure a time value for the T3 or E3 path delay trigger, use the **delay trigger** command in T3 or E3 configuration mode. To return the command to its default setting, use the **no** form of this command.

delay trigger *value*

Syntax Description

value	Sets the T3 path delay trigger value, in milliseconds. The range is from 0 through 60000. The default is 2.5 seconds.

Command Default

The default is 2.5 seconds.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration was added.

Usage Guidelines

If the timer for the T3 or E3 path delay trigger expires, an alarm is declared.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the T3 path delay trigger to 8000 milliseconds:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# delay trigger 8000
```

Related Commands

Command	Description
delay clear (T3/E3), on page 823	Configures the amount of time before a T3 or E3 path delay trigger alarm is cleared.

description (T1/E1)

To configure a description for a T1 or E1 controller, use the **description** command in T1 or E1 configuration mode. To delete a T1 or E1 controller description, use the **no** form of this command.

description *text*

Syntax Description

text	A text string comprised of alphanumeric characters.

Command Default

No description is configured.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

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

Examples

The following example shows how to configure a description for a T1 controller:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/2/0
RP/0/RSP0/CPU0:router(config-t1)# description This is a sample description for T1 controller
 0/6/2/0
```

Related Commands

Command	Description
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

description (T3/E3)

To configure a description for a T3 or E3 controller, use the **description** command in T3 or E3 configuration mode. To delete a T3 controller description, use the **no** form of this command.

description *text*

Syntax Description

text	A text string comprised of alphanumeric characters.

Command Default

No description is configured.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

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

Examples

The following example shows how to configure a description for a T3 controller:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0
RP/0/RSP0/CPU0:router(config-t3)# description This is a sample description for T3 controller
 0/6/2/0
```

Related Commands

Command	Description
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

down-when-looped (T1/E1)

To configure a T1 or E1 controller to inform the system that it is down when loopback is detected, use the **down-when-looped** command in T1 or E1 configuration mode.

down-when-looped

Syntax Description

This command has no keywords or arguments.

Command Default

By default, a T1 or E1 controller does not inform the system that it is down when loopback is detected.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

This command does not have a **no** form.

Task ID

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

Examples

The following example shows how to configure a T1 controller to inform the system that the associated line is down if a loopback is detected:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/4/2/0/1
RP/0/RSP0/CPU0:router(config-t1)# down-when-looped

down-when-looped is a traffic-affecting operation if any loopback is present
```

Related Commands

Command	Description
loopback (T1/E1), on page 853	Loops individual T1 or E1 channels on the channelized T3 controller.

down-when-looped (T3/E3)

To configure a T3 or E3 controller to inform the system that it is down when loopback is detected, use the **down-when-looped** command in T3 or E3 configuration mode.

down-when-looped

Syntax Description

This command has no keywords or arguments.

Command Default

By default, a T3 or E3 controller does not inform the system that it is down when loopback is detected.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

This command does not have a **no** form.

Task ID

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

Examples

The following example shows how to configure a T3 controller to inform the system that the associated line is down if a loopback is detected:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/4/2/0
RP/0/RSP0/CPU0:router(config-t3)# down-when-looped

down-when-looped is a traffic-affecting operation if any loopback is present
```

Related Commands

Command	Description
loopback (T3/E3), on page 855	Loops the entire T3 or E3 line on the T3 controller or E3 controller.

dsu bandwidth

To specify the maximum allowable bandwidth used by a T3 or an E3 controller, use the **dsu bandwidth** command in T3 or E3 configuration mode. To return to the default state, use the **no** form of this command.

dsu bandwidth *kbps*

Syntax Description

kbps	Maximum bandwidth, in kilobits per second (kbps). Range is from 75 to 44210. The default is 44210.

Command Default

The default bandwidth is 44210.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

The local interface configuration must match the remote interface configuration. For example, if you reduce the maximum bandwidth to 16,000 on the local port, you must also do the same on the remote port.

The **dsu bandwidth** command reduces the bandwidth by padding the E3 and T3 frame.

To verify the data service unit (DSU) bandwidth configured on the interface, use the **show controllers t3** or **show controllers e3** command in EXEC mode.

When G.751 framing is used on E3 links, DSU bandwidth can be used to select a payload subrate from 34,010 kbps down to 22 kbps. Before framing bypass can be used, a DSU bandwidth of 34,010 kbps must be configured.

Although software allows the user to configure a continuous range of bandwidths in subrate modes, vendors support bandwidths only in quantums (for example, in a ADC Kentrox T3 link, bandwidth must be in multiples of 500 kbps). Therefore, the software sets the user-configured bandwidth to the closest vendor-supported bandwidth. Use the **show controllers t3** or **show controllers e3** command to display the actual bandwidth that is configured.

The following table shows DSU modes and vendor-supported bandwidths.

Table 56: DSU Modes and Vendor-supported Bandwidths

Mode	Bandwidth (in kbps)	Bandwidth Multiples (in kbps)
Digital Link or Cisco	358–34010 for E3300–44210 for T3	358 300.746
ADC Kentrox T3 IDSU	1000–34010 for E31500–44210 for T3	500 500
Larscom Access T45	3100–44210 kbps	3158

Mode	Bandwidth (in kbps)	Bandwidth Multiples (in kbps)
Adtran T3SU 300	75–44210 kbps	75.186
Verilink HDM 2182	1500–44210 kbps	1579

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the maximum allowable DSU bandwidth to 16,000 kbps on a SIP in slot 6, on the SPA in subslot 2, for port 0, and T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# dsu bandwidth 16000
```

Related Commands

Command	Description
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

dsu mode

To specify the interoperability mode used by a T3 or an E3 controller, use the **dsu mode** command in T3 or E3 configuration mode. To return to the default state, use the **no** form of this command.

dsu mode *mode*

Syntax Description

mode DSU mode. Valid values are as follows:

- (T3 only) **adtran**
- (E3 only) cisco
- digital-link
- kentrox
- (T3 only) **larscom**
- (T3 only) **verilink**

For T3, digital-link is default and for E3 cisco is default.

Command Default

For T3, digital-link is default and for E3 cisco is default.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

The default DSU mode Cisco is equivalent to Digilink Mode with Scrambling Enabled. This mode was added to enable scrambling along with Digilink mode on E3 Controllers.

Digilink Mode, by definition does not support scrambling for E3 Controllers though it supports the same for T3 Controllers. For T3 controllers, there is no functional default DSU mode. The DSU Mode Cisco is not applicable for T3 Controller.

For interoperability, it is recommended to always configure the DSU mode command under T3/E3 Controller by matching the DSU type of the remote port.

To enable Scrambling, configure Scramble under the respective Serial Interface for the T3/E3 Controller.

Refer to Table 56: DSU Modes and Vendor-supported Bandwidths, on page 830 for more information regarding the modes.

The local interface configuration must match the remote interface configuration. For example, if you define the data service unit (DSU) interoperability mode as **digital-link** on the local port, you must also do the same on the remote port.

You must know what type of DSU is connected to the remote port to determine if it interoperates with a T3 or an E3 controller. The **dsu mode** command enables and improves interoperability with other DSUs.

To verify the DSU mode configured on the interface, use the **show controllers t3** command in EXEC mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to set the DSU mode to **digital-link** for T3 controller 1 located in chassis 0, on a SIP in slot 6 and SPA in subslot 2, and port 0 with T3 controller 1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0/1
RP/0/RSP0/CPU0:router(config-t3)# dsu mode digital-link
```

Related Commands

Command	Description
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

dsu remote

To control the bandwidth usage with the remote port, use the **dsu remote** command in T3 or E3 configuration mode. To return to the default state, use the **no** form of this command.

dsu remote {**disable** | **fullrate**}

Syntax Description

disable	Denies incoming remote requests to reset the bandwidth to the full rate.
fullrate	Requests that the remote port set its bandwidth to full rate.

Command Default

Remote accept is the default.

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

To verify the DSU remote settings configured on the interface, use the **show controllers t3** command in EXEC mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to specify that the connected remote port set its bandwidth to full rate:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/2/0
RP/0/RSP0/CPU0:router(config-t3)# dsu remote fullrate
```

Related Commands

Command	Description
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

fdl

To enable or disable the transmission of performance reports through Facility Data Link (FDL) for a T1 channel on the channelized T3 interface, use the **fdl** command in T1 configuration mode. To return to the default state of performance reporting, use the **no** form of this command.

fdl {**ansi** | **att**} {**enable** | **disable**}

Syntax Description

ansi	Specifies the transmission of ANSI T1.403 once-per-second performance reports.
att	Specifies the transmission of AT&T TR54016 once-per-second performance reports.
enable	Enables transmission of the specified performance reports.
disable	Disables transmission of the specified performance reports. The default is disable.

Command Default

The transmission of ANSI T1.403 and AT&T TR54016 performance reports through FDL are disabled.

Command Modes

T1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

The **fdl** command applies only to T1 lines and can be used only if the T1 framing type is Extended Super Frame (ESF).

To display the performance report information, use the **show controllers t1** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable ANSI T1.403 performance reports for T1 channel 10:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/1/10
RP/0/RSP0/CPU0:router(config-t1e1)# fdl ansi enable
```

Related Commands

Command	Description
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

framing (E1)

To select the frame type for an E1 data line, use the **framing** command in E1 configuration mode. To disable E1 framing, use the **no** form of this command.

framing {**crc4** | **no-crc4** | **unframed**}

Syntax Description

crc4	Specifies framing with CRC-4 error-monitoring capabilities. The default is crc4.
no-crc4	Specifies framing without CRC-4 error-monitoring capabilities.
unframed	Specifies unframed E1.

Command Default

The default is **crc4**.

Command Modes

E1 configuration

Command History

Release	Modification
Release 4.0.0	This commnad was introduced.

Usage Guidelines

Use the **framing** command in configurations in which the router or access server is intended to communicate with E1 fractional data lines. The service provider determines the framing type required for your E1 circuit.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select E1 framing without CRC-4 error-monitoring capabilities:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# framing no-crc4
```

Related Commands

Command	Description
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.

framing (E3)

To select the frame type for E3 data lines, use the **framing** command in E3 configuration mode. To disable E3 framing, use the **no** form of this command.

framing {**g751** | **g832**}

Syntax Description

g751	Specifies that G.751 framing is used as the E3 framing type. The default is G.751.
g832	Specifies that G.832 framing is used as the E3 framing type.

Command Default

The default is G.751.

Command Modes

E3 configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

If you do not use the **framing** command, the default is used by the E3 controllers to automatically determine the framing type received from the far-end equipment. You can also set the framing for each T1/E1 channel by using the **framing** command in T1 or E1 configuration mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select G751 as the E3 frame type:

```
RP/0/RSP0/CPU0:router(config)# controller e3 0/6/0/0
RP/0/RSP0/CPU0:router(config-e3)# framing g751
```

Related Commands

Command	Description
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.

framing (T1)

To select the frame type for a T1 data line, use the **framing** command in T1 configuration mode. To disable T1 framing, use the **no** form of this command.

framing {**esf** | **sf**}

Syntax Description

esf	Specifies extended super frame as the T1 frame type. The default is **esf**.
sf	Specifies super frame as the T1 frame type.

Command Default

The default is **esf**.

Command Modes

T1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **framing** command in configurations in which the router or access server is intended to communicate with T1 fractional data lines. The service provider determines the framing type required for your T1 circuit.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select super frame as the T1 frame type:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# framing sf
```

Related Commands

Command	Description
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

framing (T3)

To select the frame type for T3 data lines, use the **framing** command in T3 configuration mode. To disable T3 framing, use the **no** form of this command.

framing {**c-bit** | **m23**}

Syntax Description

c-bit	Specifies that C-bit framing is used as the T3 framing type. The default is **c-bit**.
m23	Specifies that M23 framing is used as the T3 framing type.

Command Default

The default is **c-bit**.

Command Modes

T3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

If you do not use the **framing** command, the default is used by the T3 controllers to automatically determine the framing type received from the far-end equipment. You can also set the framing for each T1 or E1 channel by using the **framing** command in T1 or E1 configuration mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select M23 as the T3 frame type:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0/1
RP/0/RSP0/CPU0:router(config-t3)# framing m23
```

Related Commands

Command	Description
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

linecode

To select the line-code type for T1 or E1 lines, use the **linecode** command in T1 or E1 configuration mode. To return the line to the default line-code type, use the **no** form of this command.

linecode {**ami** | **b8zs** | **hdb3**}

Syntax Description

ami	Specifies alternate mark inversion (AMI) as the line-code type. This value is the default for E1 lines.
b8zs	(T1 only) Specifies B8ZS as the line-code type. This value is the default for T1 lines.
hdb3	(E1 only) Specifies high-density bipolar 3 (HDB3) as the line-code type.

Command Default

T1 lines: the default is B8ZS.

E1 lines: the default is AMI.

Command Modes

T1 configuration

E1 configuration

Command History

Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

Use this command in configurations where the router must communicate with T1 or E1 fractional data lines. The T1 or E1 service provider determines which line-code type is required for your T1 or E1 circuit.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to select AMI as the T1 line-code type:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# linecode ami
```

The following example shows how to select HDB3 as the E1 line-code type:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/4/1/1
RP/0/RSP0/CPU0:router(config-e1)# linecode hdb3
```

Related Commands

Command	Description
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.

Command	Description
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

lnm major-warning

To enable link noise monitoring and specify thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events, use the **lnm major-warning** command in T1 or E1 controller configuration mode. To disable link noise monitoring major warnings, use the **no** form of this command.

lnm major-warning [{**clear** | **set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

Syntax Description

clear	(Optional) Specifies threshold values for Line Code Violation (LCV) and Path Code Violation (PCV) errors that are used to determine when a recovery from a major warning has occurred and a "cleared" event is signalled. The clear threshold values cannot exceed the set threshold values.
set	(Optional) Specifies the high threshold values for LCV and PCV that are used to signal a major warning event on the link. When errors on the link are greater than or equal to these values, a major warning occurs and a "crossed" event is signalled.
line-code-violation *lcv-value*	(Optional) Specifies the threshold value for LCV errors (Bi-Polar Violation [BPV] or Excessive Zeroes [EXZ]), in the following possible ranges: • For T1 links, the range is 5 to 1544. The default is 1544. • For E1 links, the range is 7 to 2048. The default is 2048.
path-code-violation *pcv-value*	(Optional) Specifies the threshold value for PCV errors (CRC errors), in the following possible ranges: • For T1 links, the range is 3 to 320. The default is 320. • For E1 links, the range is 5 to 832. The default is 831.
duration *seconds*	(Optional) Specifies the period of time (in seconds) during which the number of link noise errors must continuously exceed the **set** threshold levels to signal a major warning, or remain below the **clear** threshold levels to signal a cleared event. The range is 4 to 600. The default is 10.

Command Default

Link noise monitoring is disabled.

If the **lnm major-warning** command is run without specifying **set** or **clear** options, then **set** is used as the default option with its default values. The **clear** option inherits the same threshold values as the default **set** threshold values.

If the **lnm major-warning** command is run and only the **set** option is configured, the threshold values defined for the **set** option are also used as the **clear** threshold values. Alternatively, if the **lnm major-warning** command is run and only the **clear** option is configured, the threshold values defined for the **clear** option are also used as the **set** threshold values.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

This command can only be configured on full T1 or E1 channel groups; it is not supported on fractional, or DS0 links.

The **lnm major-warning** command cannot be configured with the **lnm remove** command—they are mutually exclusive.

The major threshold values must be greater than the values configured in the **lnm minor-warning** command.

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a major warning threshold is exceeded resulting in a crossed event and alarm state reached, then a minor warning alarm state is suppressed and placed in stable state. The minor crossed event also is removed from the bistate log. Only a single crossed event for major warnings will appear in the bistate log for the controller. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

Task ID

Task ID	Operation
sonet-sdh	read, write

Examples

The following example shows how to enable link noise monitoring on a T1 channel group using the default values for the set and clear threshold values of 1544 LCVs and 320 PCVs for a duration of 10 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm major-warning
```

The following example shows how to specify set and clear thresholds on an E1 channel group:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/3/0/0/0/1
RP/0/RSP0/CPU0:router(config-e1)# lnm major-warning set line-code-violation 1500
path-code-violation 100 duration 30
RP/0/RSP0/CPU0:router(config-e1)# lnm major-warning clear line-code-violation 1400
path-code-violation 95 duration 30
```

Related Commands

Command	Description
clear controller lnm, on page 803	Clears link noise monitoring statistics or resets states.
controller e1, on page 814	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 818	

Command	Description
lnm minor-warning, on page 845	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
lnm syslog, on page 851	Enables logging of link noise monitoring major, remove, and minor events and alarms.
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers lnm, on page 870	Displays information about LNM on T1 or E1 links.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

lnm minor-warning

To enable link noise monitoring and specify thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events, use the **lnm minor-warning** command in T1 or E1 controller configuration mode. To disable link noise monitoring minor warnings, use the **no** form of this command.

lnm minor-warning [{**clear** | **set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

Syntax Description

clear	(Optional) Specifies threshold values for Line Code Violation (LCV) and Path Code Violation (PCV) errors that are used to determine when a recovery from a minor warning has occurred and a "cleared" event is signalled. The clear threshold values cannot exceed the set threshold values.
set	(Optional) Specifies the high threshold values for LCV and PCV that are used to signal a minor warning event on the link. When errors on the link are greater than or equal to these values, a minor warning occurs and a "crossed" event is signalled.
line-code-violation *lcv-value*	(Optional) Specifies the threshold value for LCV errors (Bi-Polar Violation [BPV] or Excessive Zeroes [EXZ]), in the following possible ranges: • For T1 links, the range is 5 to 1544. The default is 154. • For E1 links, the range is 7 to 2048. The default is 205.
path-code-violation *pcv-value*	(Optional) Specifies the threshold value for PCV errors (CRC errors), in the following possible ranges: • For T1 links, the range is 3 to 320. The default is 145. • For E1 links, the range is 5 to 832. The default is 205.
duration *seconds*	(Optional) Specifies the period of time (in seconds) during which the number of link noise errors must continuously exceed the **set** threshold levels to signal a minor warning, or remain below the **clear** threshold levels to signal a cleared event. The range is 4 to 600. The default is 10.

Command Default

Link noise monitoring is disabled.

If the **lnm minor-warning** command is run without specifying **set** or **clear** options, then **set** is used as the default option with its default values. The **clear** option inherits the same threshold values as the default **set** threshold values.

If the **lnm minor-warning** command is run and only the **set** option is configured, the threshold values defined for the **set** option are also used as the **clear** threshold values. Alternatively, if the **lnm minor-warning** command is run and only the **clear** option is configured, the threshold values defined for the **clear** option are also used as the **set** threshold values.

Command Modes

T1 configuration

E1 configuration

Command History

Release 4.0.0	This command was introduced.

Usage Guidelines

This command can only be configured on full T1 or E1 channel groups; it is not supported on fractional, or DS0 links.

The minor threshold values cannot be greater than the values configured in the **lnm major-warning** command.

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a major warning threshold is exceeded resulting in a crossed event and alarm state reached, then a minor warning alarm state is suppressed and placed in stable state. The minor crossed event also is removed from the bistate log. Only a single crossed event for major warnings will appear in the bistate log for the controller. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable link noise monitoring on a T1 channel group using the default values for the set and clear threshold values of 154 LCVs and 145 PCVs for a duration of 10 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm minor-warning
```

The following example shows how to specify set and clear thresholds on an E1 channel group:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/3/0/0/0/1
RP/0/RSP0/CPU0:router(config-e1)# lnm minor-warning set line-code-violation 200
path-code-violation 80 duration 30
RP/0/RSP0/CPU0:router(config-e1)# lnm minor-warning clear line-code-violation 150
path-code-violation 75 duration 30
```

Related Commands

Command	Description
clear controller lnm, on page 803	Clears link noise monitoring statistics or resets states.
controller e1, on page 814	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 818	
lnm major-warning, on page 842	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events.

Command	Description
lnm remove, on page 848	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal the noise attribute to PPP for removal of an MLPPP bundle link.
lnm syslog, on page 851	Enables logging of link noise monitoring major, remove, and minor events and alarms.
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers lnm, on page 870	Displays information about LNM on T1 or E1 links.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

lnm remove

To enable link noise monitoring and specify thresholds for noise errors on T1/E1 links that are used to signal the noise attribute to the Point-to-Point Protocol (PPP) for removal of a Multilink PPP (MLPPP) bundle link, use the **lnm remove** command in T1 or E1 controller configuration mode. To disable link removal signaling based on LNM thresholds, use the **no** form of this command.

lnm remove [{**clear** | **set**} [**line-code-violation** *lcv-value* [**path-code-violation** *pcv-value*]] [**duration** *seconds*]]

Syntax Description

clear	(Optional) Specifies threshold values for Line Code Violation (LCV) and Path Code Violation (PCV) errors that are used to determine when a recovery from a set threshold has occurred and a "cleared" event is signalled. The clear threshold values cannot exceed the set threshold values.
set	(Optional) Specifies the high threshold values for LCV and PCV that are used to signal the noise attribute to PPP on the link. When errors on the link are greater than or equal to these values, the noise attribute is set and a "crossed" event is signalled.
line-code-violation *lcv-value*	(Optional) Specifies the threshold value for LCV errors (Bi-Polar Violation [BPV] or Excessive Zeroes [EXZ]), in the following possible ranges: • For T1 links, the range is 5 to 1544. The default is 1544. • For E1 links, the range is 7 to 2048. The default is 2048.
path-code-violation *pcv-value*	(Optional) Specifies the threshold value for PCV errors (CRC errors), in the following possible ranges: • For T1 links, the range is 3 to 320. The default is 320. • For E1 links, the range is 5 to 832. The default is 831.
duration *seconds*	(Optional) Specifies the period of time (in seconds) during which the number of link noise errors must continuously exceed the **set** threshold levels to signal the noise attribute, or remain below the **clear** threshold levels to signal a cleared event. The range is 4 to 600. The default is 10.

Command Default

Link noise monitoring is disabled.

If the **lnm remove** command is run without specifying **set** or **clear** options, then **set** is used as the default option with its default values. The **clear** option inherits the same threshold values as the default **set** threshold values.

If the **lnm remove** command is run and only the **set** option is configured, the threshold values defined for the **set** option are also used as the **clear** threshold values. Alternatively, if the **lnm remove** command is run and only the **clear** option is configured, the threshold values defined for the **clear** option are also used as the **set** threshold values.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 4.1.0	This command was introduced.

Usage Guidelines

This command can only be configured on full T1 or E1 channel groups; it is not supported on fractional, or DS0 links.

The **lnm remove** command cannot be configured with the **lnm major-warning** command—they are mutually exclusive.

The remove threshold values must be greater than the values configured in the **lnm minor-warning** command.

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a remove threshold is exceeded resulting in a crossed event and alarm state reached, then a minor warning alarm state is suppressed and placed in stable state. The minor crossed event also is removed from the bistate log. Only a single crossed event for major warnings will appear in the bistate log for the controller. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

Task ID

Task ID	Operation
sonet-sdh	read, write

Examples

The following example shows how to enable link noise monitoring to signal the noise attribute to PPP for link removal on a T1 channel group using the default values for the set and clear threshold values of 1544 LCVs and 320 PCVs for a duration of 10 seconds:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm remove
```

The following example shows how to specify set and clear thresholds for link noise monitoring on an E1 channel group to signal the noise attribute to PPP for link removal:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/3/0/0/0/1
RP/0/RSP0/CPU0:router(config-e1)# lnm remove set line-code-violation 1500 path-code-violation
 100 duration 30
RP/0/RSP0/CPU0:router(config-e1)# lnm remove clear line-code-violation 1400
path-code-violation 95 duration 30
```

Related Commands

Command	Description
clear controller lnm, on page 803	Clears link noise monitoring statistics or resets states.
controller e1, on page 814	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 818	

Command	Description
lnm minor-warning, on page 845	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
lnm syslog, on page 851	Enables logging of link noise monitoring major, remove, and minor events and alarms.
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers lnm, on page 870	Displays information about LNM on T1 or E1 links.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

lnm syslog

To enable logging of link noise monitoring major, remove, and minor events and alarms, use the **lnm syslog** command in T1 or E1 controller configuration mode. To disable logging, use the **no**form of this command.

lnm syslog

Syntax Description

This command has no keywords or arguments.

Command Default

Logging of link noise monitoring messages and events is disabled.

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines



Caution Enabling LNM syslog messages can produce large amounts of console messages. If you want to avoid this and disable the LNM syslog, you can use the **show controllers lnm** command to view the most recent event messages and current LNM states.

When you enable syslog messages for LNM events using the **lnm syslog** command, LNM messages will appear in both the system log and in the log events buffer. You can display LNM events in the log events buffer using the **show logging events buffer bistate-alarms-set** command, and also using the **show logging** command, which are described in the *System Monitoring Command Reference for Cisco ASR 9000 Series Routers*

LNM supports hierarchical level alarm reporting as defined in the Telcordia (Bellcore) GR-253 standard. Hierarchical alarm reporting means that whenever a higher alarm is asserted, the lower alarm state is suppressed. When the high alarm is cleared, the lower alarm will re-assert if the condition still exists.

For LNM, this means that if a major warning threshold is continuously met or exceeded resulting in a crossed event and alarm state, then a minor warning alarm state is suppressed and returned to stable state. The minor crossed event also is removed from the bistate log. When the major warning is cleared, the minor warning alarm is asserted if the condition still exists.

Only a single crossed event for major warnings will appear in the bistate log for the controller. Therefore, you will see only a single log message for a controller if noise exists above configured threshold values.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to enable logging of link noise monitoring events:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/1/1
RP/0/RSP0/CPU0:router(config-t1)# lnm syslog

Wed May 12 15:42:54.679 PDT
WARNING: Enabling 'lnm syslog' could result in large amount of messages depending on the
number of links configured.
```

Related Commands

Command	Description
controller e1, on page 814	Configures an E1 controller and enters E1 configuration mode.
controller t1, on page 818	Configures a T1 controller and enters T1 configuration mode.
lnm major-warning, on page 842	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events.
lnm minor-warning, on page 845	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
show logging	Displays the contents of the logging buffer.
show logging events buffer	Displays messages in the logging events buffer.

loopback (T1/E1)

To loop individual T1 or E1 channels on the channelized T3 controller, use the **loopback** command in T1 or E1 configuration mode. To remove the loop, use the **no** form of this command.

loopback {**local** | **network** {**line** | **payload**} | **remote** {**line** {**fdl** {**ansi** | **bellcore**} | **inband**} | **payload fdl ansi**}}

Syntax Description

local	Loops the router output data back toward the router at the T1 framer and sends an alarm indication signal (AIS) signal out toward the network.
network {**line** | **payload**}	T1 loopback with encapsulation HDLC: Loops the data back toward the network before the T1 framer and automatically sets a local loopback at the High-Level Data Link Control (HDLC) controllers (line), or loops the payload data back toward the network at the T1 framer and automatically sets a local loopback at the HDLC controllers (payload). T1 loopback with encapsulation PPP: Loops the data back toward the network before the T1 framer and automatically sets a local loopback at the PPP serial interface (line), or loops the payload data back toward the network at the T1 framer and automatically sets a local loopback at the PPP serial interface (payload).
remote line fdl	(T1 only) Sends a repeating, 16-bit Extended Superframe (ESF) data link code word (00001110 11111111 for FDL ANSI and 00010010 11111111 for FDL Bellcore) to the remote end, requesting that it enter into a network line loopback.
remote line inband	(T1 only) Sends a repeating, 5-bit inband pattern (00001) to the remote end requesting that it enter into a network line loopback.
remote payload fdl	(T1 only) Sends a repeating, 16-bit ESF data link code word (00010100 11111111) to the remote end, requesting that it enter into a network payload loopback. Enables the remote payload FDL ANSI bit loopback on the T1 channel.
ansi	(T1 only) Enables the remote line Facility Data Link (FDL) ANSI bit loopback on the T1 channel, based on the ANSI T1.403 specification.
bellcore	(T1 only) Enables the remote SmartJack loopback on the T1 channel, based on the TR-TSY-000312 specification.

Command Default

No loops are configured.

Command Modes

T1 configuration

E1 configuration

Command History

Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

Use the **loopback** command for troubleshooting purposes. To verify that a loopback is configured on the interface, use the **show controllers t1** or **show controllers e1** command in EXEC mode .

For E1 lines, only the **local** and **network** options are valid. For T1 lines, all listed options are valid.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

This example shows how to configure the T1 for a local loopback:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1)# loopback local
```

Related Commands

Command	Description
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

loopback (T3/E3)

To loop the entire T3 or E3 line (all 28 T1 channels or all 21 E1 channels) on the T3 controller or E3 controller, use the **loopback** command in T3 or E3 configuration mode. To remove the loop, use the **no** form of this command.

loopback {**local** | {**network** | **remote** {**line** | **payload**}}}

Syntax Description

local	Loops the data back toward the router and sends an alarm indication signal (AIS) out toward the network.
network {**line** | **payload**}	Sets the loopback toward the network before going through the framer (**line**) or after going through the framer (**payload**).
remote {**line** | **payload**}	Sends a far-end alarm control (FEAC) request to the remote end requesting that it enter into a network line loopback. FEAC requests (and therefore remote loopbacks) are possible only when the T3 is configured for C-bit framing. The M23 format does not support remote loopbacks.

Command Default

No loops are configured on the T3 line.

Command Modes

T3 configuration

E3 configuration

Command History

Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration was added.

Usage Guidelines

Use the **loopback** command for troubleshooting purposes. To verify that a loopback is configured on the interface, use the **show controllers t3** or **show controllers e3** command in EXEC mode. Note that remote loopback is valid only in C-bit parity mode.

You can also loopback each T1 or E1 channel by using the **loopback** command in T1 or E1 configuration mode.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

This example shows how to configure the T3 for a local loopback:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/3/0/0
RP/0/RSP0/CPU0:router(config-t3)# loopback local
```

Related Commands

Command	Description
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

mdl

To configure the Maintenance Data Link (MDL) message defined in the ANSI T1.107a-1990 specification, use the **mdl** command in T3 configuration mode. To remove the message, use the **no** form of this command.

{**mdl string** {**eic** | **fi** | **fic** | **gen-number** | **lic** | **port-number** | **unit**} *string* | **transmit** {**idle-signal** | **path** | **test-signal**} {**disable** | **enable**}}

Syntax Description

string eic *string*	Specifies the Equipment Identification Code; can be up to 10 characters.
string fi *string*	Specifies the Facility Identification Code sent in the MDL Path message; can be up to 38 characters.
string fic *string*	Specifies the Frame Identification Code; can be up to 10 characters.
string gen-number *string*	Specifies the Generator number string sent in the MDL Test Signal message; can be up to 38 characters.
string lic *string*	Specifies the Location Identification Code; can be up to 11 characters.
string port-number *string*	Specifies the Port number string sent in the MDL Idle Signal message; can be up to 10 characters.
string unit *string*	Specifies the Unit Identification Code; can be up to 6 characters.
transmit idle-signal	Specifies the transmission of the MDL Idle Signal message.
transmit path	Specifies the transmission of the MDL Path message.
transmit test-signal	Specifies the transmission of the MDL Test Signal message.
disable | **enable**	Disables or enables transmission of the specified message.

Command Default

No MDL message is configured.

Command Modes

T3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Use the **show controllers t3** command to display MDL information (received strings). MDL information is displayed only when framing is set to C-bit.

Note MDL is supported only when the DS3 framing is C-bit parity.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows the **mdl** commands on a T3 controller in slot 1, subslot 2, port 0:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/1/2/0
RP/0/RSP0/CPU0:router(config-t3)# clock source line
RP/0/RSP0/CPU0:router(config-t3)# mdl string eic ID
RP/0/RSP0/CPU0:router(config-t3)# mdl string fic Building B
RP/0/RSP0/CPU0:router(config-t3)# mdl string unit ABC
RP/0/RSP0/CPU0:router(config-t3)# mdl string fi Facility Z
RP/0/RSP0/CPU0:router(config-t3)# mdl string port-number Port 7
RP/0/RSP0/CPU0:router(config-t3)# mdl transmit path enable
RP/0/RSP0/CPU0:router(config-t3)# mdl transmit idle-signal enable
```

Related Commands

Command	Description
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

mode

To set the mode of the T3/E3 or T1/E1 controller, use the **mode** command in T3, E3, T1, or E1 configuration mode. To disable the controller mode, use the **no** form of this command.

mode {**e1** | **serial** | **t1**}

Syntax Description

e1	(T3 and E3 only) Specifies the mode of the port to be channelized E1.
serial	(T3 and E3 only) Specifies the mode of the port to be clear channel serial. The default for the 2-Port and 4-Port Clear Channel T3/E3 SPAs is serial.
t1	(T3 and E3 only) Specifies the mode of the port to be channelized T1.

Command Default

There is no default for the 2-Port Channelized OC-12/DS0 SPA.

Command Modes

T3 configuration

E3 configuration

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 and E1 configuration modes was added.

Usage Guidelines

You can change the mode of a controller only when there are no subinterfaces defined for the controller. For example, if you previously defined channelized T1 subinterfaces on a T3 interface and now you want to change this to E1 subinterfaces or a clear channel interface, you must first clear the subinterfaces. To do this, use the **no controller t1** command for all defined T1/E1 subinterfaces. If you have defined serial parameters, you also need to use the **no interface serial** command.

For channelized SPAs, you must use the **mode** command before you can configure any channelized controllers.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to change the mode of a T3 port to channelized T1:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RSP0/CPU0:router(config-t3)# mode t1
```

Related Commands

Command	Description
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

national bits (E1)

To specify the national reserved bits for an E1 port, use the **national bits** command in E1 configuration mode. To revert to the default national bits, use the **no** form of this command.

national bits *bits*

Syntax Description

bits	Bit pattern. Values can be from 0 to 31. The default is 0.

Command Default

The default is 0, which corresponds to 0x1f.

Command Modes

E1 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
sonet-sdh	read, write

Examples

The following example shows how to specify the national bits for the E1 controller:

```
RP/0/RSP0/CPU0:router(config)# controller e1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# national bits 3
```

Related Commands

Command	Description
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.

national bits (E3)

To enable or disable the national reserved bit pattern on an E3 port, use the **national bits** command in E3 configuration mode. To revert to the default value, use the **no** form of this command.

national bits {**disable** | **enable**}

Syntax Description

disable	Disables national reserved bits for an E3 port.
enable	Enables national reserved bits for an E3 port. The default is **enable**.

Command Default

The default is **enable**.

Command Modes

E3 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
sonet-sdh	read, write

Examples

The following example shows how to enable the national bits for an E3 controller:

```
RP/0/RSP0/CPU0:router(config)# controller e3 0/6/2/0
RP/0/RSP0/CPU0:router(config-e3)# national bits enable
```

Related Commands

Command	Description
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.

show controllers e1

To display information about the E1 links and hardware and software drivers for the E1 controller, use the **show controllers e1** command in EXEC mode .

show controllers e1 *interface-path-id* [**all** | **bert** | **brief** | **internal-state** | **tabular**]

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.
all	Displays all information for the controllers.
bert	Displays internal E1 bit error rate test results.
brief	Displays summary information for the E1 controller.
internal-state	Displays internal E1 state information.
tabular	Displays E1 controller information in tabular format.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	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.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows sample output from the **show controllers e1** command for a single E1 channel:

```
RP/0/RSP0/CPU0:router# show controllers e1 0/1/0/0

  E1 0/1/0/0 is down
  timeslots:
  Receiver has no alarms.
  Framing is E1 CRC, Clock Source is internal
  Data in current interval (0 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
     0 Unavail Secs, 0 Stuffed Secs
     0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
```

Table 57: show controllers e1 Field Descriptions

Field	Description
E1 0/1/0/0 is down	E1 channel is not operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
timeslots	DS0 time slots assigned to the E1 channel.
Receiver has no alarms	Any alarms detected by the E1 controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
Framing	Framing type on the channelized controller.
Clock Source	Clock source controller. Values are internal and line.
Line Code Violations	Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.
P-bit Coding Violation	For all DS3 applications, a P-bit coding violation (PCV) error event is a P-bit parity error event. A P-bit parity error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally calculated code.

Field	Description
Slip Secs	Controlled slip second (CSS) is a 1-second interval that contains one or more controlled slips.
Fr Loss Secs	Frame loss seconds (SELS) is the number of seconds for which an out-of-frame error is detected.
Line Err Secs	Line errored seconds (LES) is a second in which one or more line code violation errors are detected.
Degraded Mins	Degraded minute (DM) is a minute in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3. For more information, see RFC 1406, *Definitions of Managed Objects for DS1 and E1 Interface Types*.
Errored Secs	Errored seconds (ES) is a second with one or more path coding violations, one or more out-of-frame defects, or one or more controlled slip events or a detected AIS defect.
Bursty Err Secs	Bursty errored seconds (BES) is a second with fewer than 320 and more than one path coding violation error events, no severely errored frame defects, and no detected incoming AIS defects. Controlled slips are not included in this parameter.
Severely Err Secs	Severely errored seconds (SES) is a second with 320 or more path code violation errors events, one or more out-of-frame defects, or a detected AIS defect.
Unavailable Secs	Number of seconds during which the interface was not available in this interval, referred to as UAS.
Stuffed Secs	Stuffed seconds (SS) is a second in which one more bit stuffings take place. This happens when the Pulse Density Enforcer detects a potential violation in the output stream and inserts a 1 to prevent it. Such bit stuffings corrupt user data and indicate that the network is configured incorrectly. This counter can be used to help diagnose this situation.
Near-end path failures	Path failure (PFC)
Far-end path failures	(PFCFE)
SEF/AIS Secs	(SAS)

Related Commands

Command	Description
controller e1, on page 814	Configures an E1 controller and enters E1 configuration mode.

show controllers e3

To display information about the E3 links and hardware and software drivers for the E3 controller, use the **show controllers e3** command in EXEC mode .

show controllers e3 *interface-path-id* [**all** | **bert** | **brief** | **internal-state** | **tabular**]

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.
all	Displays all information for the controllers.
bert	Displays internal E3 bit error rate test results.
brief	Displays summary information for the E3 controller.
internal-state	Displays internal E3 state information.
tabular	Displays E3 controller information in tabular format.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced on the .

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.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows sample output from the **show controllers e3** command for a single E3 port:

```
RP/0/RSP0/CPU0:router# show controllers e3 0/2/0/0

  E3 0/2/0/0 is down
  Transmitter is sending RAI.
  Receiver has loss of frame.
  Framing is G.751, Line Code is B3ZS, Clock Source is Internal
  Subrate is enabled. Mode: Cisco(default), Bandwidth: 34010 kbps
  Remote accept is enabled
  Remote fullrate has no request outstanding
  Data in current interval (360 seconds elapsed):
     0 Line Code Violations, 0 P-bit Coding Violation
     0 C-bit Coding Violation, 0 P-bit Err Secs
     0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
     360 Unavailable Secs, 0 Line Errored Secs
     0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
```

The following example shows sample output from the **show controllers e3** command using the **tabular** keyword, for a single E3 port:

```
RP/0/RSP0/CPU0:router# show controllers e3 0/2/0/0 tabular

  E3 0/2/0/0 is down
  Transmitter is sending RAI.
  Receiver has loss of frame.
  Framing is G.751, Line Code is B3ZS, Clock Source is Internal
  Subrate is enabled. Mode: Cisco(default), Bandwidth: 34010 kbps
  Remote accept is enabled
  Remote fullrate has no request outstanding
  INTERVAL      LCV   PCV   CCV   PES  PSES  SEFS   UAS   LES   CES  CSES
  07:49-07:56    0     0     0     0     0     0     380   0     0     0
  Data in current interval (380 seconds elapsed):
     0 Line Code Violations, 0 P-bit Coding Violation
     0 C-bit Coding Violation, 0 P-bit Err Secs
     0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
     380 Unavailable Secs, 0 Line Errored Secs
     0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
```

Table 58: show controllers e3 Field Descriptions

Field	Description
Transmitter is sending RAI	Any alarms detected by the controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
Framing	Framing type on the controller. Values are G.751 and G.832.
Line Code	Line coding format on the controller.
Clock Source	Clock source on the channelized controller. Values are internal and line.
Data in current interval (seconds elapsed)	Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. The accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer.
Line Code Violations	Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.
P-bit Coding Violation	For all DS3 applications, a P-bit coding violation (PCV) error event is a P-bit parity error event. A P-bit parity error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally calculated code.
C-bit Coding Violation	For C-bit parity and SYNTRAN DS3 applications, the C-bit coding violation (CCV) is the count of coding violations reported by the C-bits. For C-bit parity, it is the count of CP-bit parity errors that occur during the accumulation interval. For SYNTRAN, it is a count of CRC-9 errors that occur during the accumulation interval.
P-bit Err Secs	P-bit errored seconds (PES) is a second with one or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.
P-bit Severely Err Secs	P-bit severely errored seconds (PSES) is a second with 44 or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.
Severely Err Framing Secs	Severely errored framing seconds (SEFS) is a second with one or more out-of-frame defects or a detected incoming AIS.

Field	Description
Unavailable Secs	The number of unavailable seconds (UAS) is calculated by counting the number of seconds for which the interface is unavailable. For more information, see RFC 1407, *DS3 MIB Variables*.
Line Errored Secs	Line errored seconds (LES) is a second in which one or more code violations or one or more LOS defects occurred.
C-bit Errored Secs	C-bit errored seconds (CES) is a second with one or more C-bit code violations (CCV), one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.
C-bit Severely Errored Secs	C-bit severely errored seconds (CSES) is a second with 44 or more CCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.
Total Data (last 24 hours)	Shows the last 15-minute accumulation period.

Related Commands

Command	Description
controller e3, on page 816	Configures an E3 controller and enters E3 configuration mode.

show controllers lnm

To display information about link noise monitoring (LNM) on T1 or E1 links, use the **show controllers lnm** command in EXEC mode .

show controllers {**t1** | **e1**} *interface-path-id* **lnm** [**all** | **configuration** | **event** | **statistics**]

Syntax Description

t1	Displays LNM information for a T1 controller.
e1	Displays LNM information for an E1 controller.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show controllers** command to see a list of all controllers currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
all	(Optional) Displays LNM configuration, state, statistics, and event information.
configuration	(Optional) Displays LNM configuration and state information. This is the default.
event	(Optional) Displays LNM information about the last 5 events.
statistics	(Optional) Displays LNM statistics.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.

- *T3num*—T3 controller number.
- *T1num*—T1 controller number.

Task ID

Task ID	Operations
sonet-sdh	read

Examples

The following example shows sample output from the **show controllers t1 lnm** command with the **all** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm all

Thu May 13 10:28:26.474 PDT

Controller T1 0/1/1/0/1/1

Syslog   Monitoring type  State     Thresholds (lcv/pcv/duration)
-------------------------------------------------------------------
enabled   minor-warning   stable    Set(  15/  15/   4) Clear(  15/  15/   4)
          major-warning   stable    Set( 154/ 145/   4) Clear( 154/ 145/   4)

  Monitoring type           Minor-Warn      Major-Warn
  ---------------           ------------    ------------
  Create                    1               1
  Update                    0               0
  Delete                    0               0
  Clear                     0               0
  Noise Crossed             1               1
  Noise Cleared             1               1

Last Five Events
-------------------------------------------------------------------
MINWARNCROSS: Noise crossed minor-warn threshold at Thu May 13 09:54:10 2010
MAJWARNCROSS: Noise crossed major-warn threshold at Thu May 13 09:54:11 2010
MAJWARNCLEAR: Noise cleared major-warn threshold at Thu May 13 10:27:25 2010
MINWARNCLEAR: Noise cleared minor-warn threshold at Thu May 13 10:28:14 2010
```

The following example shows sample output from the **show controllers t1 lnm** command with the **configuration** keyword for a single T1 channel:

Note This is also the default output that is displayed if you run the **show controllers lnm** command without specifying any keyword options.

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm configuration

Thu May 13 10:28:26.474 PDT

Controller T1 0/1/1/0/1/1

Syslog   Monitoring type  State     Thresholds (lcv/pcv/duration)
-------------------------------------------------------------------
enabled   minor-warning   stable    Set(  15/  15/   4) Clear(  15/  15/   4)
```

```
            major-warning   stable    Set( 154/ 145/   4) Clear( 154/ 145/   4)
```

The following example shows sample output from the **show controllers t1 lnm** command with the **event** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm event

Thu May 13 10:28:26.474 PDT

Controller T1 0/1/1/0/1/1

Last Five Events
------------------------------------------------------------------------
MINWARNCROSS: Noise crossed minor-warn threshold at Thu May 13 09:54:10 2010
MAJWARNCROSS: Noise crossed major-warn threshold at Thu May 13 09:54:11 2010
MAJWARNCLEAR: Noise cleared major-warn threshold at Thu May 13 10:27:25 2010
MINWARNCLEAR: Noise cleared minor-warn threshold at Thu May 13 10:28:14 2010
```

The following example shows sample output from the **show controllers t1 lnm** command with the **statistics** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/1/1/0/1/1 lnm statistics

Thu May 13 10:28:26.474 PDT

Controller T1 0/1/1/0/1/1

Monitoring type            Minor-Warn      Major-Warn
  ---------------            ------------    ------------
  Create                     1               1
  Update                     0               0
  Delete                     0               0
  Clear                      0               0
  Noise Crossed              1               1
  Noise Cleared              1               1
```

Related Commands

Command	Description
clear controller lnm, on page 803	Clears link noise monitoring states or statistics.
lnm major-warning, on page 842	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal major warning events and recovery from those events.
lnm minor-warning, on page 845	Enables link noise monitoring and specifies thresholds for noise errors on T1/E1 links that are used to signal minor warning events and recovery from those events.
show logging	Displays the contents of the logging buffer.
show logging events buffer	Displays messages in the logging events buffer.

show controllers t1

To display information about the T1 links and hardware and software drivers for the T1 controller, use the **show controllers t1** command in EXEC mode .

show controllers t1 *interface-path-id* [**all** | **bert** | **brief** | **internal-state** | **remote** {**performance brief** | **tabular**} | **tabular**]

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.
all	Displays all information for the controllers.
bert	Displays internal T1 bit error rate test results.
brief	Displays summary information for the T1 controller.
internal-state	Displays internal T1 state information.
remote {**performance brief** | **tabular**}	Displays remote performance information in a brief summary or table format.
tabular	Displays T1 controller information in table format.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

When specifying a channelized T1 controller, use the following guidelines for the *interface-path-id*:

- The naming notation is *rack*/*slot*/*module*/*port*/*T3Num*/*T1num*.
- The slash between values is required as part of the notation.
- The following list describes the components of the notation:
  - *rack*—Chassis number of the rack.
  - *slot*—Physical slot number of the line card.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.

- *port*—Physical port number of the interface.
- *T3num*—T3 controller number.
- *T1num*—T1 controller number.

- If specifying a virtual interface, the number range varies, depending on interface type.
- When specifying a virtual tributary group, the naming notation is *rack*/*slot*/*module*/*port*/*vtg*/*vt*. 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 or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *vtg*—Virtual tributary group.
  - *vt*—Virtual tributary instance.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows sample output from the **show controllers t1** command with the **brief** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/4/2/0/1 brief

T1 0/4/2/0/1 is up
  mode: ATM
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  Receiver has no alarms.
  Framing is ESF, Line Code is B8ZS, Clock Source is internal
  Alarm Soaking Interval:
                 Alarm Declaring= 2500 msec
                 Alarm clearing = 10000 msec

  Bert Test on controller port : T1 0/4/2/0/1
  BERT test result (not running)
     Test Pattern : Not Configured, Status : not running, Sync Detected : 0
     Interval : 1 minute(s), Time Remain : 0 (ms)
     Bit Errors (since BERT started): 0 bits,
     Bits Received (since BERT started): 0 Kbits
     Bit Errors (since last sync): 0 bits
     Bits Received (since last sync): 0 Kbits
```

Table 59: show controllers t1 brief Field Descriptions

Field	Description
T1 0/4/2/0/1 is up	T1 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
mode	Mode of the T1 controller, which can be ATM.
timeslots	DS0 time slots assigned to the T1 channel.
FDL per *spec-name* spec.	Performance monitoring is through Facility Data Link based on ANSI T1.403 specification or AT&T standard specification number 54016.
Receiver has no alarms.	Any alarms detected by the T1 controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
Framing	Framing type on the channelized controller. Values are ESF and SF.
Line Code	Line coding format on the channelized controller. Values are AMI or B8ZS.
Clock Source	Clock source on the T1 channel. Values are internal and line.
Alarm Soaking Interval	Values of the following alarm soaking intervals: • Alarm declarings: amount of time, in milliseconds, after which an alarm is declared. • Alarm clearing: amount of time, in milliseconds, after which an alarm is cleared.
Bert Test on controller port	Indicates controller port on which BERT test can be run.
BERT test result	Indicates the current state of the test. Can be one of the following: • running— BER test is still in progress. • done—BER test is complete. • not running—BER test is not running on the controller.
Test Pattern	Indicates the test pattern you selected for the test.
Status	Indicates the current synchronization state (sync).
Sync Detected	Indicates the number of times synchronization has been detected during this test.
Interval	Indicates the length of the test.

Field	Description
Time Remain	Indicates the time remaining for the test to run. **Note** If you terminate a BER test, you receive a message similar to the following: Time Remain : 2 minute(s) (unable to complete) "(Unable to complete)" signifies that you interrupted the test.
Bit Errors (since BERT started)	Bit errors that have been detected since the test started.
Bits Received (since BERT started)	Total number of test bits that have been received since the test started.
Bit Errors (since last sync)	Bit errors that have been detected since the synchronization started.
Bits Received (since last sync)	Total number of test bits that have been received since the synchronization started.

The following example shows sample output from the **show controllers t1** command for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/4/2/0/1

T1 0/4/2/0/1 is up
  mode: ATM
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  Receiver has no alarms.
  Framing is ESF, Line Code is B8ZS, Clock Source is internal
  Data in current interval (38 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
     0 Unavail Secs, 0 Stuffed Secs
     0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
  Data in Interval 1:
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
     0 Unavail Secs, 0 Stuffed Secs
     0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
  Data in Interval 2:
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
     0 Unavail Secs, 0 Stuffed Secs
     0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
.
.
.
```

The following example shows sample output from the **show controllers t1** command with the **tabular** keyword for a single T1 channel:

```
RP/0/RSP0/CPU0:router# show controllers t1 0/4/2/0/1 tabular
```

```
T1 0/4/2/0/1 is up
  mode: ATM
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  Receiver has no alarms.
  Framing is ESF, Line Code is B8ZS, Clock Source is internal
  INTERVAL      LCV   PCV   CSS  SEFS   LES    DM    ES   BES   SES   UAS    SSS
  08:30-08:35    0     0     0     0     0     0     0     0     0     0     0
  08:15-08:30    0     0     0     0     0     0     0     0     0     0     0
  08:00-08:15    0     0     0     0     0     0     0     0     0     0     0
  07:45-08:00    0     0     0     0     0     0     0     0     0     0     0
  07:30-07:45    0     0     0     0     0     0     0     0     0     0     0
  07:15-07:30    0     0     0     0     0     0     0     0     0     0     0
  07:00-07:15    0     0     0     0     0     0     0     0     0     0     0
  06:45-07:00    0     0     0     0     0     0     0     0     0     0     0
  06:30-06:45    0     0     0     0     0     0     0     0     0     0     0
  06:15-06:30    0     0     0     0     0     0     0     0     0     0     0
  06:00-06:15    0     0     0     0     0     0     0     0     0     0     0
  05:45-06:00    0     0     0     0     0     0     0     0     0     0     0
  05:30-05:45    0     0     0     0     0     0     0     0     0     0     0
  05:15-05:30    0     0     0     0     0     0     0     0     0     0     0
.
.
.
```

Table 60: show controllers t1 and show controllers t1 tabular Field Descriptions

Field	Description
T1 0/4/2/0/1 is up	T1 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
mode	Mode of the T1 controller, which can be ATM.
timeslots	DS0 time slots assigned to the T1 channel.
FDL per *spec-name* spec.	Performance monitoring is through Facility Data Link based on ANSI T1.403 specification or AT&T standard specification number 54016.
Receiver has no alarms.	Any alarms detected by the T1 controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
Framing	Framing type on the channelized controller. Values are ESF and SF.
Line Code	Line coding format on the channelized controller. Values are AMI or B8ZS.
Clock Source	Clock source on the T1 channel. Values are internal and line.

Field	Description
Data in current interval (seconds elapsed)	Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. The accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer.
Line Code Violations	Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.
Slip Secs	Controlled slip second (CSS) is a 1-second interval that contains one or more controlled slips.
Fr Loss Secs	Frame loss seconds (SELS) is the number of seconds for which an out-of-frame error is detected.
Line Err Secs	Line errored seconds (LES) is a second in which one or more line code violation errors are detected.
Degraded Mins	Degraded minute (DM) is a minute in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3. For more information, see RFC 1406, *Definitions of Managed Objects for DS1 and E1 Interface Types*.
Errored Secs	Errored seconds (ES) is a second with one or more path coding violations, one or more out-of-frame defects, or one or more controlled slip events or a detected AIS defect.
Bursty Err Secs	Bursty errored seconds (BES) is a second with fewer than 320 and more than one path coding violation error events, no severely errored frame defects, and no detected incoming AIS defects. Controlled slips are not included in this parameter.
Severely Err Secs	Severely errored seconds (SES) is a second with 320 or more path code violation errors events, one or more out-of-frame defects, or a detected AIS defect.
Unavailable Secs	Number of seconds during which the interface was not available in this interval, referred to as UAS.
Stuffed Secs	Stuffed seconds (SSS) is a second in which one more bit stuffings take place. This happens when the Pulse Density Enforcer detects a potential violation in the output stream and inserts a 1 to prevent it. Such bit stuffings corrupt user data and indicate that the network is configured incorrectly. This counter can be used to help diagnose this situation.
Near-end path failures	Total number of near-end path failures.
Far-end path failures	Total number of far-end path failures.

Field	Description
SEF/AIS Secs	Total number or Severely Errored Framing (SEF) and Alarm Indication Signal (AIS) errors.

Related Commands

Command	Description
controller t1, on page 818	

show controllers t3

To display information about the T3 links and hardware and software drivers for the T3 controller, use the **show controllers t3** command in EXEC mode .

show controllers t3 *interface-path-id* [**all** | **bert** | **brief** | **internal-state** | **tabular**]

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.
all	Displays all information for the controllers.
bert	Displays internal T3 bit error rate test results.
brief	Displays summary information for the controller.
internal-state	Displays internal T3 state information.
tabular	Displays T3 controller information in tabular format.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

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

- When specifying a T3 controller, the naming notation is *rack*/*slot*/*module*/*port*/*T3num*. 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 or SIP.
  - *module*—Module number or subslot (for a SPA). A physical layer interface module (PLIM) is always 0.
  - *port*—Physical port number of the interface.
  - *T3num*—T3 controller number.

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

Task ID

Task ID	Operations
interface	read

Examples

The following example shows sample output from the **show controllers t3** command using the **brief** keyword for a single T3 port:

```
RP/0/RSP0/CPU0:router# show controllers t3 0/4/2/0/1 brief

T3 0/4/2/0 is up
  No alarms detected.
  mode: serial
  MDL transmission is disabled
    EIC: , LIC: , FIC: , UNIT:
     Path FI:
     Idle Signal PORT_NO:
     Test Signal GEN_NO:
  FEAC code received: No code is being received
  Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Internal
  Alarm Soaking Interval:
                 Alarm Declaring= 2500 msec
                 Alarm clearing = 10000 msec
  BERT test result (not running)
     Test Pattern : Not Configured, Status : not running, Sync Detected : 0
     Interval : 1 minute(s), Time Remain : 0 (ms)
     Bit Errors (since BERT started): 0 bits,
     Bits Received (since BERT started): 0 Kbits
     Bit Errors (since last sync): 0 bits
     Bits Received (since last sync): 0 Kbits
```

Table 61: show controllers t3 brief Field Descriptions

Field	Description
T3 0/4/2/0/1 is up	T3 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
No alarms detected	Any alarms detected by the controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
mode	Mode of the T3 controller, which can be ATM, serial, or T1serial or T1 .

Field	Description
MDL transmission	Status of the Maintenance Data Link (either enabled or disabled) and the values of the MDL message fields.
EIC	Equipment Identification Code.
LIC	Location Identification Code.
FIC	Frame Identification Code.
UNIT	Unit Identification Code.
Path FI	Path facility identifier.
Idle Signal PORT_NO	Identifies the port that initiates the idle signal message.
Test Signal GEN_NO	Generator number to send in test signal messages.
FEAC code received	Whether or not a far-end alarm code request is being received. Possible values are as follows: • DS3 Eqpt. Failure (SA) • DS3 LOS/HBER • DS3 Out-of-Frame • DS3 AIS Received • DS3 IDLE Received • DS3 Eqpt. Failure (NSA) • Common Eqpt. Failure (NSA) • Multiple DS1 LOS/HBER • DS1 Eqpt. Failure • Single DS1 LOS/HBER • DS1 Eqpt. Failure (NSA) • No code is being received
Framing	Framing type on the channelized controller. Values are auto-detect, M23, and C-Bit.
Line Code	Line coding format on the channelized controller. Values are AMI and B8ZS.
Clock Source	Clock source on the channelized controller. Values are internal and line.
Alarm Soaking Interval	Values of the following alarm soaking intervals: • Alarm declarings: amount of time, in milliseconds, after which an alarm is declared. • Alarm clearing: amount of time, in milliseconds, after which an alarm is cleared.
BERT test result	Indicates the current state of the test. Can be one of the following: • running—BER test is still in progress. • done—BER test is complete. • not running—BER test is not running on the controller.

Field	Description
Test Pattern	Indicates the test pattern you selected for the test.
Status	Indicates the current synchronization state (sync).
Sync Detected	Indicates the number of times synchronization has been detected during this test.
Interval	Indicates the length of the test.
Time Remain	Indicates the time remaining for the test to run. **Note** If you terminate a BER test, you receive a message similar to the following: Time Remain : 2 minute(s) (unable to complete) "(Unable to complete)" signifies that you interrupted the test.
Bit Errors (since BERT started)	Bit errors that have been detected since the test started.
Bits Received (since BERT started)	Total number of test bits that have been received since the test started.
Bit Errors (since last sync)	Bit errors that have been detected since the synchronization started.
Bits Received (since last sync)	Total number of test bits that have been received since the synchronization started.

The following example shows sample output from the **show controllers t3** command using the **tabular** keyword, for a single T3 port:

```
RP/0/RSP0/CPU0:router# show controllers 0/4/2/0/1 tabular

T3 0/4/2/0/1 is up
  INTERVAL      LCV    PCV    CCV    PES   PSES   SEFS   UAS    LES    CES   CSES
  09:00-09:02    0      0      0      0      0      0      0      0      0      0
  08:45-09:00    0      0      0      0      0      0      0      0      0      0
  08:30-08:45    0      0      0      0      0      0      0      0      0      0
  08:15-08:30    0      0      0      0      0      0      0      0      0      0
  08:00-08:15    0      0      0      0      0      0      0      0      0      0
  07:45-08:00    0      0      0      0      0      0      0      0      0      0
  07:30-07:45    0      0      0      0      0      0      0      0      0      0
.
.
.
```

The following example shows sample output from the **show controllers t3** command for a single T3 port:

```
RP/0/RSP0/CPU0:router# show controllers t3 0/4/2/0/1

  T3 0/4/2/0/1 is up
  No alarms detected.
  mode: serial
  MDL transmission is disabled
```

```
  EIC: , LIC: , FIC: , UNIT:
   Path FI:
   Idle Signal PORT_NO:
   Test Signal GEN_NO:
FEAC code received: No code is being received
Framing is C-BIT Parity, Line Code is B3ZS, Clock Source is Internal
Data in current interval (695 seconds elapsed):
   0 Line Code Violations, 0 P-bit Coding Violation
   0 C-bit Coding Violation, 0 P-bit Err Secs
   0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
   0 Unavailable Secs, 0 Line Errored Secs
   0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Data in Interval 1:
   0 Line Code Violations, 0 P-bit Coding Violation
   0 C-bit Coding Violation, 0 P-bit Err Secs
   0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
   0 Unavailable Secs, 0 Line Errored Secs
   0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Data in Interval 2:
   0 Line Code Violations, 0 P-bit Coding Violation
   0 C-bit Coding Violation, 0 P-bit Err Secs
   0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
   0 Unavailable Secs, 0 Line Errored Secs
   0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
Data in Interval 3:
   0 Line Code Violations, 0 P-bit Coding Violation
   0 C-bit Coding Violation, 0 P-bit Err Secs
   0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
   0 Unavailable Secs, 0 Line Errored Secs
   0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
.
.
.
```

Table 62: show controllers t3 and show controllers t3 tabular Field Descriptions

Field	Description
T3 0/4/2/0/1 is up	T3 channel is operating. The channel state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
No alarms detected	Any alarms detected by the controller are displayed here. Possible alarms are as follows: • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
mode	Mode of the T3 controller, which can be ATM, serial, T1, or E1 serial or T1 ATM or serial .
MDL transmission	Status of the Maintenance Data Link (either enabled or disabled) and the values of the MDL message fields.

Field	Description
EIC	Equipment Identification code.
LIC	Location Identification code.
FIC	Frame Identification code.
UNIT	Unit Identification code.
Path FI	Path facility identifier.
Idle Signal PORT_NO	Identifies the port that initiates the idle signal message.
Test Signal GEN_NO	Generator number to send in test signal messages.
FEAC code received	Whether or not a far-end alarm code request is being received. Possible values are as follows: • DS3 Eqpt. Failure (SA) • DS3 LOS/HBER • DS3 Out-of-Frame • DS3 AIS Received • DS3 IDLE Received • DS3 Eqpt. Failure (NSA) • Common Eqpt. Failure (NSA) • Multiple DS1 LOS/HBER • DS1 Eqpt. Failure • Single DS1 LOS/HBER • DS1 Eqpt. Failure (NSA) • No code is being received
Framing	Framing type on the channelized controller. Values are M23 and C-Bit.
Line Code	Line coding format on the channelized controller. Values are AMI and B8ZS.
Clock Source	Clock source on the channelized controller. Values are internal and line.
Data in current interval (seconds elapsed)	Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. The accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer.
Line Code Violations	Line Code Violations (LCVs) is a count of both Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that occur over the accumulation period. An EXZ increments the LCV by one regardless of the length of the zero string.
P-bit Coding Violation	For all DS3 applications, a P-bit coding violation (PCV) error event is a P-bit parity error event. A P-bit parity error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally calculated code.

Field	Description
C-bit Coding Violation	For C-bit parity and SYNTRAN DS3 applications, the C-bit coding violation (CCV) is the count of coding violations reported by the C-bits. For C-bit parity, it is the count of CP-bit parity errors that occur during the accumulation interval. For SYNTRAN, it is a count of CRC-9 errors that occur during the accumulation interval.
P-bit Err Secs	P-bit errored seconds (PES) is a second with one or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.
P-bit Severely Err Secs	P-bit severely errored seconds (PSES) is a second with 44 or more PCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge does not increment when unavailable seconds are counted.
Severely Err Framing Secs	Severely errored framing seconds (SEFS) is a second with one or more out-of-frame defects or a detected incoming AIS.
Unavailable Secs	The number of unavailable seconds (UAS) is calculated by counting the number of seconds for which the interface is unavailable. For more information, see RFC 1407, *DS3 MIB Variables*.
Line Errored Secs	Line errored seconds (LES) is a second in which one or more code violations or one or more LOS defects occurred.
C-bit Errored Secs	C-bit errored seconds (CES) is a second with one or more C-bit code violations (CCV), one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.
C-bit Severely Errored Secs	C-bit severely errored seconds (CSES) is a second with 44 or more CCVs, one or more out-of-frame defects, or a detected incoming AIS. This gauge is not incremented when UASs are counted.

Related Commands

Command	Description
controller t3, on page 820	Configures a T3 controller and enters T3 configuration mode.

shutdown (T1/E1)

To disable the T1 or E1 controller, use the **shutdown** command in T1 or E1 configuration mode. To restart a disabled T1 or E1 controller, use the **no** form of this command.

shutdown

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

T1 configuration

E1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E1 configuration mode was added.

Usage Guidelines

Shutting down the T1 or E1 controller disables all functions on the interface and sends an AIS alarm to the network. The **shutdown** command marks the interface as unavailable. To check if the controller is disabled, use the **show controllers t1** or **show controllers e1** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to bring up a controller that was previously shut down:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# no shutdown
```

Related Commands

Command	Description
show controllers e1, on page 863	Displays information about the E1 links and hardware and software drivers for the E1 controller.
show controllers t1, on page 873	Displays information about the T1 links and hardware and software drivers for the T1 controller.

shutdown (T3/E3)

To disable a T3 or E3 controller, use the **shutdown** command in T3 or E3 configuration mode. To restart a disabled T3 or E3 controller, use the **no** form of this command.

shutdown

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

T3 configuration

E3 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.
Release 4.0.0	Support for E3 configuration mode was added.

Usage Guidelines

Shutting down the T3 or E3 controller disables all functions on the interface and sends an AIS alarm to the network. The **shutdown** command marks the interface as unavailable. To check if the controller is disabled, use the **show controllers t3** or **show controllers e3** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to bring up a controller that was previously shut down:

```
RP/0/RSP0/CPU0:router(config)# controller t3 0/6/0/0
RP/0/RSP0/CPU0:router(config-t3)# no shutdown
```

Related Commands

Command	Description
show controllers e3, on page 866	Displays information about the E3 links and hardware and software drivers for the E3 controller.
show controllers t3, on page 880	Displays information about the T3 links and hardware and software drivers for the T3 controller.

speed (DS0)

To specify the speed of the underlying DS0s in a channel group, use the **speed** command in channel group configuration mode. To revert to the default speed, use the **no** form of this command.

Note This command is not applicable for E1 controllers.

speed *kbps*

Syntax Description

kbps	Speed of the underlying DS0s in kilobits per second (kbps). Valid values are 56 and 64. The default is 64 kbps.

Command Default

The default speed is 64 kbps.

Command Modes

Channel group configuration for T1

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

Before the channel group configuration is valid, you must define the associated DS0 time slots using the **timeslots** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to define the speed for the underlying DS0 to be 56 kbps:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1e1-channel_group)# speed 56
```

Related Commands

Command	Description
timeslots, on page 890	Associates one or more DS0 time slots to a channel group and create an associated serial subinterface.
channel-group, on page 801	Configures a DS0 channel group and enters channel group configuration mode.

timeslots

To associate one or more DS0 time slots to a channel group and create an associated serial subinterface, use the **timeslots** command in channel group configuration mode. To unassign the DS0 time slots and delete the associated serial interface, use the **no** form of this command.

timeslots *range*

Syntax Description

range

Command Default

No default behavior or values

Command Modes

Channel group configuration for T1 and E1

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

The time slot range must match the DS0 time slots assigned to the channel group. The service provider defines the DS0 time slots that compose a channel group.

Before the channel group configuration is valid, you must define the associated DS0 time slots using the **timeslots** command.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to associate DS0 time slots 1, 6, 8, 9 and 10 to channel group 5:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1e1-channel_group)# timeslots 1:6:8-10
```

The following example shows configuration of the full 24 timeslots on the 2-Port Channelized OC-12/DS0 SPA, which is required when configuring link noise monitoring:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# channel-group 5
RP/0/RSP0/CPU0:router(config-t1e1-channel_group)# timeslots 1-24
```

Related Commands

Command	Description
framing (E1), on page 836	Selects the frame type for an E1 data line.

Command	Description
framing (T1), on page 838	Selects the frame type for a T1 data line.
speed (DS0), on page 889	Specifies the speed of the underlying DS0s in a channel group.
channel-group, on page 801	Configures a DS0 channel group and enters channel group configuration mode.

yellow

To enable detection and generation of T1 yellow alarms, use the **yellow** command in T1 configuration mode. To disable detection and generation of T1 yellow alarms, use the **no** form of this command.

yellow {**detection** | **generation**} {**disable** | **enable**}

Syntax Description

detection	Detects yellow alarms.
generation	Generates yellow alarms.
disable	Disables detection or generation of T1 yellow alarms.
enable	Enables detection or generation of T1 yellow alarms. The default is enable.

Command Default

Yellow alarms are detected and generated on the T1 channel.

Command Modes

T1 configuration

Command History

Release	Modification
Release 3.9.0	This command was introduced.

Usage Guidelines

If the T1 framing type is super frame (SF), you should consider disabling yellow alarm detection as the yellow alarm can be incorrectly detected with SF framing.

Serial interface may flap and eventually, go down if yellow alarm detection is not disabled on its T1 controller configured with SF framing.

The default state of the **yellow** command is enabled. If you disable yellow alarm detection and want to reenable it, you can use the **no** form of the command. Alternatively, you can use the **enable** keyword.

The **yellow** command is only applicable to T1 lines.

Task ID

Task ID	Operations
sonet-sdh	read, write

Examples

The following example shows how to disable yellow alarm generation:

```
RP/0/RSP0/CPU0:router(config)# controller t1 0/6/0/0/10
RP/0/RSP0/CPU0:router(config-t1e1)# yellow generation disable
```



Traffic Mirroring Commands

This module describes the commands used to configure and monitor traffic mirroring.

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

- acl, on page 894
- clear monitor-session counters, on page 895
- destination interface, on page 896
- destination pseudowire, on page 898
- mirror enable, on page 899
- mirror first, on page 900
- mirror interval, on page 901
- monitor-session, on page 902
- monitor-session (interface-dynamic-template-BNG), on page 904
- monitor-session destination file, on page 906
- show monitor-session status, on page 907
- show monitor-session counters, on page 908

acl

To configure ACL-based traffic mirroring, use the **acl** command in monitor session configuration mode. To stop ACL-based traffic mirroring, use the **no** form of this command.

acl

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

If you use the **acl** command, traffic is mirrored according to the definition of the global interface access list (ACL) defined in one of the following commands: **ipv4 access-list**, **ipv6 access-list**, **ethernet-services access-list**.

Even when the **acl** command is configured on the source mirroring port, if the ACL configuration command does not use the **capture** keyword, no traffic gets mirrored.

If the ACL configuration uses the **capture** keyword, but the **acl** command is not configured on the source port, although traffic is mirrored, no access list configuration is applied.

Examples

This example shows how to configure ACL-based traffic mirroring on the interface:

```
RP/0/RSP0/CPU0:router(config)# monitor-session tm_example
RP/0/RSP0/CPU0:router(config)# ethernet-services access-list tm_filter
RP/0/RSP0/CPU0:router(config-es-acl)# 10 deny 0000.1234.5678 0000.abcd.abcd any capture
RP/0/RSP0/CPU0:router(config-es-acl)# exit
RP/0/RSP0/CPU0:router(config)# interface GigabitEthernet0/2/0/0
RP/0/RSP0/CPU0:router(config-if)# monitor-session tm_example direction rx-only
RP/0/RSP0/CPU0:router(config-if)# acl
RP/0/RSP0/CPU0:router(config-if)# l2transport
RP/0/RSP0/CPU0:router(config-if-l2)# exit
RP/0/RSP0/CPU0:router(config-if)# ethernet-services access-group tm_filter ingress
RP/0/RSP0/CPU0:router(config-if)# end
```

Related Commands

Command	Description
ethernet-services access-list	Defines an Ethernet services (Layer 2) access list by name.
ipv4 access-list	Defines an IPv4 access list by name.

clear monitor-session counters

To clear the traffic mirroring session statistics, use the **clear monitor-session counters** command in EXEC mode .

clear monitor-session counters [**interface** *type interface-path-id*]

Syntax Description

interface	Identifies the interface for which the counters are to be cleared.
type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
session-name	Name of the monitor session to clear.
ipv4	Specifies an ipv4 address.

Command Default

All stored statistics for all interfaces are cleared.

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	Operations
interface	read

Examples

This example shows how to clear the traffic mirroring statistic counters:

```
RP/0/RSP0/CPU0:routerclear monitor-session mon1 ipv6 counters
```

destination interface

To associate a destination interface with a traffic mirroring session, use the **destination interface** command in monitor session configuration mode. To remove the designated destination, use the **no** form of this command.

destination interface *type interface-path-id*

Syntax Description

type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No default behavior or values

Command Modes

Monitor sessions configuration

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

Use the **destination interface** command to assign a traffic monitoring session to a specific destination interface. This is the port to which a network analyzer is connected. This is generally called the monitoring port.

A destination port has these characteristics:

- A destination port must reside on the same switch as the source port.
- A destination port can be any Ethernet physical port, nV Satellite ICL port or EFP, or a bundle interface. Also, the ICL must not be a bundle interface.
- At any one time a destination port can participate in only one traffic mirroring session. A destination port in one traffic mirroring session cannot be a destination port for a second traffic mirroring session. In other words, no two monitor sessions can have the same destination port.
- A destination port cannot also be a source port.

Examples

This example shows how to configure a monitoring port for a traffic mirroring session:

```
RP/0/RP0/CPU0:router(config)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-mon)# destination interface gigabitethernet0/0/0/15
```

This example shows how to configure a bundle interface for a traffic mirroring session:

```
Router# configure
Router(config)# monitor-session ms1
```

```
Router(config-mon)# destination interface bundle-ether1
Router(config-mon)# commit
```

destination pseudowire

To direct mirrored traffic to a pseudowire, use the **destination pseudowire** command in monitor session configuration mode. To remove the pseudowire designation, use the **no** form of this command.

destination pseudowire

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Use the **destination pseudowire** command to direct the mirrored traffic to a pseudowire. A network analyzer in a central location can then be used to monitor the traffic. Use the monitor session command to define the exact pseudowire to which the monitored traffic should be replicated.

Examples

This example shows how to configure a monitoring port for a traffic mirroring session:

```
RP/0/RP0/CPU0:router(config)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-mon)# destination pseudowire
```

mirror enable

To copy files or directories automatically from `/harddisk:/mirror` location in active RP to `/harddisk:/mirror` location in standby RP or RSP without user intervention or EEM scripts, use `mirror enable` command. The `mirror enable checksum` command enables MD5 checksum across active to standby RP to check integrity of the files. This command is optional. A slight delay is observed in `show mirror` command output when mirror checksum configuration is enabled.

mirror enable

Command Default

The `/harddisk:/mirror` directory is created by default, but file mirroring functionality is only enabled by executing the `mirror enable` command from configuration terminal.

Command Modes

Monitor configuration

Command History

Release	Modification
Release 7.1.2	This command was introduced.

File mirroring has to be enabled explicitly on the router. It is not enabled by default.

```
RP/0/RSP0/CPU0:router#show run mirror
Thu Jun 25 10:12:17.303 UTC
mirror enable
mirror checksum
```

mirror first

To configure partial traffic mirroring, use the **mirror first** command in monitor session configuration mode. To stop mirroring a portion of the packet, use the **no** form of this command.

mirror first *bytes*

Syntax Description

bytes	Number of bytes mirrored. The mirrored packet length value can range from 65 to 128.

Command Default

The entire packet is mirrored.

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Usage Guidelines

Use the **mirror first** command to mirror the first 64 to 128 bytes of the packet. The actual mirrored packet is the configured partial packet monitoring size plus the 4-byte trailing CRC.

Examples

This example shows how to mirror the first 100 bytes of the packet:

```
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet0/0/0/11
RP/0/RSP0/CPU0:router(config-if)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-if-mon)# mirror first 100
```

Related Commands

Command	Description
monitor-session, on page 902	Defines a traffic mirroring session and enter monitor session configuration mode.

mirror interval

To configure mirror interval for a specified number of packets in traffic mirroring, use the **mirror interval** command in monitor session configuration mode. To stop mirroring the packet in the interval, use the **no** form of this command.

mirror interval {**512** | **1k** | **2k** | **4k** | **8k** | **16k**}

Syntax Description

interval Number of packets per mirror interval. The interval can be configured for every 512, 1k, 2k, 4k, 8k, or 16k packets.

Note
- port-level mirroring is only supported in the ingress direction.
- port-level mirroring is only supported in sampling mode with a minimal sampling rate of 1:512

Command Default

The mirror interval is set as per the specified packet count.

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 4.0.0	This command was introduced.

Examples

This example shows how to set the mirror interval for every 512 packets:

```
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet0/0/0/11
RP/0/RSP0/CPU0:router(config-if)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-if-mon)# mirror first 100
RP/0/RSP0/CPU0:router(config-if-mon)# mirror interval 512
```

Related Commands

Command	Description
monitor-session, on page 902	Defines a traffic mirroring session and enter monitor session configuration mode.

monitor-session

To define a traffic mirroring session and enter monitor session configuration mode, use the **monitor-session** command in global configuration mode. To remove the traffic mirroring session, use the **no** form of this command.

monitor-session *session-name*

Syntax Description

session-name	Name of the monitor session to configure.
ipv4	Specifies an ipv4 address as destination.
ipv6	Specifies an ipv6 address as destination.
destination	Configures the destination port. A destination port can be a ethernet physical port, EFP, pseudowire, or a bundle interface. The pseudowire carries only mirrored traffic, this traffic is generally unidirectional.
interface<*Interface*>	Specifies the interface name from where the packets are sent. The interface can be a local interface, a pseudo-wire interface or a next-hop IP address.

Command Default

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
Release 3.9.1	This command was introduced.
Release 4.3.0	This command was introduced.

Usage Guidelines

Before you can assign a monitor session to a specific interface, you must configure it using the **monitor-session** command. The *session-name* should not be the same as any interface name.

In monitor session configuration mode, you should define the destination interface to be used in the traffic mirroring session using the **destination** command.

For more information about monitoring a session, see *Configuring Traffic Monitoring* chapter in *Cisco ASR 9000 Series Aggregation Services Router Interface and Hardware Component Configuration Guide*.

Examples

This example shows how to enter monitor session configuration mode:

```
RP/0/RSP0/CPU0:router(config)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-mon)#
```

This example shows how to enter monitor session configuration mode for a bundle interface:

```
Router(config)# monitor-session ms1
Router(config-mon)#
```

Related Commands

Command	Description
destination interface, on page 896	Associates a destination interface with a traffic mirroring session.

monitor-session (interface-dynamic-template-BNG)

To associate a traffic mirroring session with a specific interface, use the **monitor-session** command in interface configuration mode or dynamic-template configuration mode. To remove the association between a traffic mirroring session and an interface, use the **no** form of this command.

monitor-session *session-name* [**direction** {**rx-only** | **tx-only**}] **[port-level]**

Syntax Description

session-name	Name of the monitor session to configure.
direction	Specifies that traffic replication is in only one direction.
rx-only	Specifies that only ingress traffic is replicated.
tx-only	Specifies that only egress traffic is replicated.

Command Default

Replicates both ingress and egress traffic.

Command Modes

Interface configuration

Dynamic template configuration (for BNG)

Command History

Release	Modification
Release 3.9.1	This command was introduced.
Release 4.0.0	The **acl** and **mirror first** keywords were added.
Release 5.1	The support for this command under dynamic-template configuration mode was added for BNG.

Usage Guidelines

Before you can associate a traffic mirroring session to a specific interface, you must define it using the **monitor-session** global configuration command. After the traffic mirroring session is defined, use the **monitor-session** interface configuration command or dynamic template configuration command to associate this session with a specific source interface. For BNG sessions, the subscriber is attached to the monitor session, only when the dynamic template is applied to the subscriber. When the session is associated, all specified traffic on the interface is then replicated to the destination location defined in the monitor session configuration.

The **monitor-session** interface configuration command also enters monitor session configuration mode for you to configure additional features of the mirroring session.

If a physical interface is configured for Layer 3, then the traffic mirroring session can be associated on physical interfaces. Example:

```
interface TenGigE0/1/0/0
ipv4 address 10.0.0.1 255.255.255.0
```

If a physical interface has sub-interfaces configured for Layer 3, then the traffic mirroring session must be associated on each sub-interface. Example:

```
interface TenGigE0/1/0/1.601
ipv4 address 10.0.1.1 255.255.255.0
encapsulation dot1q 601
```

For more information about monitoring a session, see *Configuring Traffic Monitoring* chapter in *Cisco ASR 9000 Series Aggregation Services Router Interface and Hardware Component Configuration Guide*.

Task ID

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

Examples

This example shows how to enter monitor session configuration mode:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface gigabitethernet0/0/0/11
RP/0/RSP0/CPU0:router(config-if)# l2transport
RP/0/RSP0/CPU0:router(config-if-l2)# monitor-session mon1
RP/0/RSP0/CPU0:router(config-if-mon)#
```

This example shows how to configure **monitor-session** command in the dynamic-template configuration mode for BNG:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# dynamic-template type ppp ppp_template
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# monitor-session mon1 direction rx-only

RP/0/RSP0/CPU0:router(config-dynamic-template-type)# acl
RP/0/RSP0/CPU0:router(config-dynamic-template-type)# mirror first 100
```

monitor-session destination file

This command configures a file destination for the current session. To create a monitor-session with the specified name and class, use the `monitor-session <name> [ethernet|ipv4|ipv6|mpls-ipv4|mpls-ipv6]` part of the command. To add a new `file` option to the existing destination, use the `destination file [size <kbytes>] [buffer-type linear]` part of the command.

monitor-session *name* { **ethernet** | **ipv4** | **ipv6** | **mpls-ipv4** | **mpls-ipv6** } **destination file [size <kbytes>] [buffer-type linear]**

Syntax Description

monitor-session *name*	Name of the monitor session to configure.
destination file [size *kbytes*]	Size of the destination file in kbytes. The size is specified by platform.
buffer-type linear	Buffer type is linear or circular. **Note** Circular is the default buffer-type.

Command Default

Size: Specified by platform.

Buffer-type: Circular

File format: PCAP

Command Modes

Monitor session configuration submode

Command History

Release	Modification
Release 7.1.2	This command was introduced.

Example

This example shows how to configure a file destination for the current monitor session:

```
monitor-session mon1 ethernet
          destination file size 230000 buffer-type circular
          !
          monitor-session mon3 ethernet
         destination file size 1000 buffer-type linear
         !
```

show monitor-session status

To display status information about configured traffic mirroring sessions, use the **show monitor-session status** command in EXEC mode .

show monitor-session [*session-name*] **status** [**detail**] [**errors**]

Syntax Description

session-name	Name of the monitor session to configure.
detail	Displays the full error string for any errors.
errors	Displays all sessions, but only source interfaces with errors are displayed (if no source interfaces have errors, then 'No errors' is displayed).

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.1	This command was introduced.

Usage Guidelines

The **show monitor-sessions status** command displays the following information:

- Destination information for the session (including the name of the interface).
- Destination status (interface state).
- List of source interfaces.
- Any other status information that may be pertinent, such as a software or hardware error that would stop sessions operating correctly. If an error is returned from interactions with another component, then the full error string is only displayed in detail output; standard tabular output reports that there has been an error but refers the user to the detailed output.

Examples

This example shows sample output from the **show monitor-session status** command:

```
RP/0/RSP0/CPU0:router# show monitor-session status

Monitor-session foo
Destination interface GigabitEthernet 0/0/0/0
================================================================================
Source Interface      Dir   Status
--------------------- ----  ------------------------------------------------
Gi0/1/0/0.10          Both  Operational
Gi0/1/0/0.11          Rx    Operational
Gi0/1/0/0.12          Tx    Operational
```

show monitor-session counters

To display statistics regarding traffic mirroring sessions, use the **show monitor-session counters** command in EXEC mode .

show monitor-session [*session-name*] **counters**

Syntax Description

session-name	Name of the monitor session to configure.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.1	This command was introduced.
Release 4.3.0	This command was introduced.

Usage Guidelines

The **show monitor-sessions counters** command displays a list of all source interfaces, and the replicated packet statistics for each interface. The full set of statistics displayed for each interface is:

- Ingress replicated packets and octets
- Egress replicated packets and octets
- Non-replicated packets and octets

Examples

This example shows sample output from the **show monitor-session counters** command:

```
RP/0/RSP0/CPU0:router show monitor-session 2 counters

Monitor session 2
  GigabitEthernet 0/3/0/0.100:
    Rx Replicated: 100 Packets 8000 Bytes
    Tx Replicated: 2 Packets 3000 Bytes
    Non Replicated: 0 Packets 0 Bytes
```



VLAN Subinterface Commands

This module provides command line interface (CLI) commands for configuring IEEE 802.1Q VLANs on the Cisco ASR 9000 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.

- dot1q vlan, on page 910
- interface (VLAN), on page 912

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 3.7.2	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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RSP0/CPU0:router(config-subif)# dot1q vlan 10
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1
RP/0/RSP0/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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# interface TenGigE 0/2/0/4.1 l2transport
RP/0/RSP0/CPU0:router(config-subif)# dot1q vlan 10 any
```

interface (VLAN)

To create a VLAN subinterface, use the **interface** command in Global Configuration 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 3.7.2	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/RSP0/CPU0:router(config)# interface TenGigE 0/0/0/1.2
RP/0/RSP0/CPU0:router(config-subif)# dot1q vlan 1
RP/0/RSP0/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/RSP0/CPU0:router(config)# interface GigabitEthernet 0/4/0/1.1
RP/0/RSP0/CPU0:router(config-if-l2)#
```

Related Commands

Command	Description
dot1q vlan, on page 910	Assigns a VLAN ID to a subinterface (or modifies the VLAN ID that is currently assigned to a 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 ASR 9000 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, on page 916
- clear counters wanphy, on page 917
- controller wanphy, on page 918
- report sd-ber, on page 920
- report sf-ber disable, on page 921
- show controllers wanphy, on page 922
- threshold sd-ber, on page 928
- threshold sf-ber, on page 929

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 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 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
interface	read, write, execute

Examples

This example shows how to configure a 10-Gigabit Ethernet WAN PHY controller in Slot 6:

```
RP/0/RSP0/CPU0:router # clear controller wanphy 0/6/0/0 stats
```

Related Commands

Command	Description
show controllers wanphy, on page 922	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 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 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
interface	read, write, execute

Examples

This example shows how to clear the alarms counters for a 10-Gigabit Ethernet WAN interface:

```
RP/0/RSP0/CPU0:router # clear counters wanphy 0/6/0/0 stats
```

Related Commands

Command	Description
show controllers wanphy, on page 922	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.
clear controller wanphy, on page 916	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 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 3.9.0	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/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# controller wanphy 0/6/0/0
RP/0/RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
show controllers wanphy, on page 922	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RSP0/CPU0:router(config-wanphy)# report sd-ber
RP/0/RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sf-ber disable, on page 921	Disables SF BER reporting.
show controllers wanphy, on page 922	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.
threshold sf-ber, on page 929	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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RSP0/CPU0:router(config-wanphy)# report sf-ber disable
RP/0/RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sd-ber, on page 920	Enables Signal Degrade (SD) Bit Error Rate (BER) reporting.
show controllers wanphy, on page 922	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.
threshold sf-ber, on page 929	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 mode.

show controller wanphy *interface-id* [**alarms** | **all**]

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.

Command Default

No default behavior or values

Command Modes

EXEC

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
interface	read

Examples

This example shows sample output from the **show controllers wanphy** command with the **all** keyword:

```
RP/0/RSP0/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 63: 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. • 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/RSP0/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 63: show controllers wanphy Command Output Fields, on page 923.

Related Commands

Command	Description
clear controller wanphy, on page 916	Clears the alarms counters for a specific 10-Gigabit Ethernet WAN PHY controller.

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 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/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RSP0/CPU0:router(config-wanphy)# threshold sd-ber 9
RP/0/RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sd-ber, on page 920	Enables Signal Degrade (SD) Bit Error Rate (BER) reporting.
report sf-ber disable, on page 921	Disables SF BER reporting.
threshold sf-ber, on page 929	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 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/RSP0/CPU0:router # configure
RP/0/RSP0/CPU0:router(config)# controller wanphy 0/6/1/0
RP/0/RSP0/CPU0:router(config-wanphy)# threshold sf-ber 9
RP/0/RSP0/CPU0:router(config-wanphy)#
```

Related Commands

Command	Description
report sd-ber, on page 920	Enables Signal Degrade (SD) Bit Error Rate (BER) reporting.
report sf-ber disable, on page 921	Disables SF BER reporting.
show controllers wanphy, on page 922	Displays alarms, registers, and module information for a 10-Gigabit Ethernet WAN PHY controller.



Hardware Redundancy and Node Administration Commands

This module describes the commands used to manage the hardware redundancy, power, and administrative status of the nodes on a router running Cisco IOS XR software.

- clear canbus, on page 934
- clear plugin slot counts, on page 935
- environment altitude, on page 936
- environment graceful-shutdown disabled, on page 937
- fabric enable mode, on page 938
- fpd auto-upgrade, on page 940
- fpd auto-upgrade (Cisco IOS XR 64-bit), on page 941
- fpd auto-reload, on page 942
- fpd auto-reload (Cisco IOS XR 64-bit), on page 943
- hw-module cmp disable, on page 944
- hw-module external-usb disable, on page 945
- hw-module high-bandwidth, on page 946
- hw-module location port breakout, on page 947
- hw-module location breakout, on page 949
- hw-module location bay port port-mode, on page 951
- hw-module location reload, on page 952
- hw-module location slice config-mode, on page 954
- hw-module location slice power-down , on page 955
- hw-module mac-move police-mode, on page 956
- hw-module power location, on page 957
- hw-module power disable, on page 959
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- hw-module processor location mode, on page 962
- hw-module profile feature, on page 964
- hw-module profile itcam, on page 965
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- isolation enable, on page 978
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- show dsc, on page 1000
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- show fpd package, on page 1006
- show hw-module fpd, on page 1009
- show hw-module profile, on page 1012
- show hw-module subslot brief, on page 1013
- show hw-module subslot config, on page 1015
- show hw-module subslot counters, on page 1018
- show hw-module subslot errors, on page 1021
- show hw-module subslot plim-subblock, on page 1024
- show hw-module subslot registers, on page 1026
- show hw-module subslot status, on page 1029
- show inventory, on page 1031
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- show power allotted, on page 1041
- show power capacity, on page 1043
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- show redundancy, on page 1050
- show version, on page 1052
- upgrade hw-module fpd, on page 1055
- show environment all, on page 1058
- show environment altitude, on page 1063
- show environment fans, on page 1064
- show environment power-supply, on page 1066
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- show inventory (Cisco IOS XR 64-bit), on page 1073

- show platform vm, on page 1077
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- show hw-module fpd (Cisco IOS XR 64-bit), on page 1082
- upgrade hw-module location, on page 1084

clear canbus

To clear the counters used for statistics regarding the CAN bus, use the **clear canbus** command in administration EXEC mode.

clear canbus {**client-stats** | **controller-stats** | **server-stats**} **location** {**all***node-id*}

Syntax Description

client-stats	Clears CAN bus client statistics.
controller-stats	Clears CAN bus controller statistics.
server-stats	Clears CAN bus server statistics.
location {**all** | *node-id*}	Clears the CAN bus statistics for a specific node or all nodes.

Command Default

None

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

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

Task ID

Task ID	Operation
sysmgr	read

The following example illustrates how to use the **clear canbus** command:

```
RP/0/RSP0/CPU0:router(admin)# clear canbus server-stats location all
```

clear plugin slot counts

To clear the running counts of the backplane connector slot plugins, use the **clear plugin slot counts** command in administration EXEC mode.

clear plugin slot counts location *node-id*

Syntax Description

location *node-id*	Clears plugin slot counts on the designated node. The *node-id* argument is expressed in the *rack/slot/module* notation.

Command Default

None

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.9.1	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 **clear plugin slot counts** command can be used only if the revised backplane ID card (BPID-02) is installed. If the BPID-02 card is not installed, the following error message is displayed:

```
0/1/CPU0 slot counts 'current' ...Response error: 'ENVMON' detected the 'warning' condition
'Hardware not available'
```

Task ID

Task ID	Operation
sysmgr	execute

The following example illustrates how to use the **clear plugin slot counts** command:

```
RP/0/RSP0/CPU0:router(admin)# clear plugin slot counts location 0/FT1/SP

Fri Jan 15 10:15:55.388 pst

 0/FT1/SP slot counts 'current' ... cleared
RP/0/RSP0/CPU0:router(admin)# show plugin slot counts location 0/FT1/SP

Fri Jan 15 10:16:15.503 pst

Backplane connector slot plugin counters

                        Current         Cumulative
0/FT1/SP                0               14
```

environment altitude

To specify the chassis altitude, so the system can adjust the fan speed to compensate for lower cooling capability at higher altitudes, use the environment altitude command in administration configuration mode. To remove the altitude setting, use the no form of this command.

environment altitude *altitude* **rack** *rack-no*
no environment altitude *altitude* **rack** *rack-no*

Syntax Description

altitude	Chassis location altitude in meters. Values can range from 0 to 4000.
rack *rack-no*	Specifies the rack number of the chassis.

Command Default

1800 meters

Command Modes

Administration configuration

Command History

Release	Modification
Release 4.2.0	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	Operation
root-system	read, write

This example specifies that the chassis is located at sea level:

```
RP/0/RSP0/CPU0:router(admin-config)#environment altitude 0 rack 0
```

environment graceful-shutdown disabled

To prevent router shut down due to low voltage (between 38.5V and 40V) in DC-powered Cisco ASR 9000 series routers,, you can disable the graceful system shutdown by executing the **environment graceful-shutdown disabled** command in the Global Configuration mode. To enable the graceful system shutdown, use the **no** form of this command

environment graceful-shutdown disabled

no environment graceful-shutdown disabled

Syntax Description

This command has no keywords or arguments.

Command Default

Graceful system shutdown is enabled

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 25.2.1	This command was introduced.

Usage Guidelines

During voltage drops in DC-powered Cisco ASR 9000 series routers, the Cisco IOS XR software raises alarms: a minor alarm for <44V, a major alarm for <42V, and a critical alarm for <40V. These alarms can be viewed using the **show alarms** command. When the critical alarm is raised, the router shuts down. From Release 25.2.1, to prevent router shut down due to low voltage (between 38.5V and 40V), you can disable graceful system shutdown by executing the **environment graceful-shutdown disabled** command. With graceful-shutdown disabled, the DC-powered Cisco ASR 9000 series routers power-down only if the input voltage goes below 38.5V. The routers automatically power-up again when the input voltage is restored to a value above 42.5V (within the range of 42.5V to 54V).

Example

The following example shows how to disable graceful shutdown

```
Router#config
Router(config)#environment graceful-shutdown disabled
Router(config)#commit
```

fabric enable mode

To change the fabric operation mode on Cisco ASR 9922 Series routers, use the **fabric enable mode** command in the Admin Configuration mode.

fabric enable mode [highbandwidth | a99-highbandwidth]

Syntax Description

highbandwidth	Enables high scale Virtual Queuing Instance (VQI). In this mode, the maximum number of VQI that can be defined on the router is 2048. In the default mode, a maximum of 1024 VQI is supported and only first five switch fabric links can be used in each line card slot.
a99-highbandwidth	Enables the use of all seven switch fabric links in each line card slot. In this mode, the maximum number of VQI that can be defined on the router is 2048. **Note** This keyword is allowed only when all the line cards in the chassis are of A99 type (for example, A99-12X100GE, A99-8X100GE, and so on).

Command Default

In Cisco IOS XR, default operating mode is not configured (None).

In Cisco IOS XR 64 bit, default operating mode is **highbandwidth** .

Command Modes

Admin Configuration mode.

Command History

Release	Modification
Release 6.1.2	a99-highbandwidth keyword support was introduced.
Release 5.3.0	This command was introduced.

Usage Guidelines

In Cisco IOS XR 64 bit, **highbandwidth** mode is enabled by default. Therefore, only **a99-highbandwidth** keyword can be used during command execution on Cisco IOS XR 64 bit routers.



Note Ensure to remove all the line cards that are unsupported for an operating mode before executing this command; the command will otherwise be rejected.

Note Remove all unsupported line cards in the chassis before enabling the **highbandwidth** operating mode. This mode is **NOT** available on the following line cards:

- A9K-2X100GE
- A9K-1X100GE
- A9K-36X10GE
- A9K-24X10GE
- A9K-MOD160
- A9K-MOD80
- A9K-16T
- A9K-8T
- A9K-4T
- A9K-2T20GE
- A9K-40GE
- A9K-SIP-700

Example:

This example shows the available fabric operating modes:

```
RP/0/RSP0/CPU0:router (admin-config) # fabric enable mode ?
A99-highbandwidth  A99 High bandwidth cards only
highbandwidth      High bandwidth cards only
```

fpd auto-upgrade

To enable the automatic upgrade of FPD images during a software upgrade, use the **fpd auto-upgrade** command in Admin Configuration mode. To disable automatic FPD upgrades, use the **no** form of this command.

fpd auto-upgrade

Syntax Description

This command has no keywords or arguments.

Command Default

FPD images are not automatically upgraded.

Command Modes

Admin Configuration mode

Command History

Release	Modification
Release 4.0.1	This command was introduced.

Usage Guidelines

By default automatic upgrades of the FPD images are not performed during a software upgrade. Once the **fpd auto-upgrade** command is enabled, when you upgrade the software and an FPD upgrade is required, the FPD upgrade is done automatically before the router is rebooted. The automatic FPD upgrade works only if the FPD image is upgraded together with the mini installation PIE. For example, use the **install add** and **install activate** commands as shown here:

```
(admin)# install add comp-hfr-mini.pie hfr-fpd.pie hfr-mpls-p.pie
(admin)# install activate disk0:/comp-hfr-mini.pie disk0:/hfr-fpd.piedisk0: hfr-mpls-p.pie
```

Task ID

Task ID	Operation
system	read, write

The following example shows how to enable automatic FPD upgrades:

```
RP/0/RSP0/CPU0:router(admin-config)# fpd auto-upgrade
```

fpd auto-upgrade (Cisco IOS XR 64-bit)

To enable or disable the automatic upgrade of FPD images during a software upgrade, use the **fpd auto-upgrade** command in Admin Configuration mode or XR Configuration mode.

fpd auto-upgrade { **enable** | **disable** }

Syntax Description

enable	Enables auto upgrade of FPD images.
disable	Disables auto upgrade of FPD images.

Command Default

FPD images are not automatically upgraded.

Command Modes

- Admin Configuration mode
- XR Configuration mode

Command History

Release	Modification
Release 4.0.1	This command was introduced.

Usage Guidelines

By default automatic upgrades of the FPD images are not performed during a software upgrade. Once the **fpd auto-upgrade** command is enabled, when you upgrade the software and an FPD upgrade is required, the FPD upgrade is done automatically before the router is rebooted. The automatic FPD upgrade works only if the FPD image is upgraded together with the mini installation PIE. For example, use the **install add** and **install activate** commands as shown here:

```
(admin)# install add comp-hfr-mini.pie hfr-fpd.pie hfr-mpls-p.pie
(admin)# install activate disk0:/comp-hfr-mini.pie disk0:/hfr-fpd.piedisk0: hfr-mpls-p.pie
```

Task ID

Task ID	Operation
system	read, write

The following example shows how to enable or disable automatic FPD upgrades in Admin configuration mode:

```
RP/0/RSP0/CPU0:router(admin-config)# fpd auto-upgrade enable
RP/0/RSP0/CPU0:router(admin-config)# fpd auto-upgrade disable
```

The following example shows how to enable or disable automatic FPD upgrades in XR configuration mode:

```
RP/0/RSP0/CPU0:router(config)# fpd auto-upgrade enable
RP/0/RSP0/CPU0:router(config)# fpd auto-upgrade disable
```

fpd auto-reload

To enable the automatic reload of a line card after successful FPD software upgrade, use the **fpd auto-reload** command in Admin Configuration mode. To disable automatic LC reload, use the **no** form of this command.

fpd auto-reload

Syntax Description

This command has no keywords or arguments.

Command Default

None.

Command Modes

Admin Configuration mode

Command History

Release	Modification
Release 6.5.1	This command was introduced.

Usage Guidelines

The **fpd auto-reload** command works only if **fpd auto-upgrade** command is configured.

```
(admin-config)#fpd auto-reload
(admin-config)#fpd auto-upgrade
(admin-config)#commit
```

This command is supported on Cisco IOS XR 32-bit OS.

Task ID

Task ID	Operation
system	read, write

The following example shows how to enable automatic LC reload after FPD upgrades:

```
RP/0/RSP0/CPU0:router(admin-config)# fpd auto-reload
```

fpd auto-reload (Cisco IOS XR 64-bit)

To enable or disable automatic reload of a line card after successful FPD upgrade, use the **fpd auto-reload** command in Global Configuration mode.

fpd auto-reload {**enable** | **disable**}

Syntax Description

enable	Enables LC auto reload after FPD auto upgrade.
disable	Disables LC auto reload after FPD auto upgrade.

Command Default

None.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 6.5.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit OS.

Task ID

Task ID	Operation
system	read, write

The following example shows how to enable automatic LC reload after successful FPD upgrades:

```
RP/0/RSP0/CPU0:router(config)# fpd auto-reload enable
```

hw-module cmp disable

To disable the Console Management Port (CMP) on a RSP880/RP2, use the **hw-module cmp disable** command in Admin Configuration mode. Disabling unused CMP ensures a higher level of security.

To enable a CMP, use the **no** form of this command.

hw-module cmp disable
no hw-module cmp disable

Syntax Description

location	*loc-name*	RSP880/RP2 location.

Command Default

CMP on a RSP880/RP2 is **enabled**.

Command Modes

Admin configuration

Command History

Release	Modification
Release 6.3.1	This command was introduced.

Usage Guidelines

By default, CMP on a RSP880/RP2 is **enabled** and you can disable the port later by executing the command. If CMP is already disabled using this command, it will automatically be re-enabled when the RSP is re-loaded (at boot-up). However, after the RSP is in a stable state/UP state, the port gets disabled again as the configuration is automatically re-applied.

Note After CMP is disabled using this command, the CMP shell access session will be terminated.

This command can be executed only RSPs; not on Line Cards.

This example shows how to disable CMP on a RSP/RP:

```
RP/0/RSP0/CPU0:router (admin-config) # hw-module cmp disable location 0/RSP0/CPU0
```

This example shows how to enable CMP on a RSP/RP:

```
RP/0/RSP0/CPU0:router (admin-config) # no hw-module cmp disable location 0/RSP0/CPU0
```

hw-module external-usb disable

To disable USB ports on any RSP, use the **hw-module external-usb disable** command in Admin Configuration mode. Disabling unused USB ports ensures a higher level of security.

To enable a USB port, use the **no** form of this command.

On Cisco IOS XR 64 bit, use **external-usb disable** and **no external-usb disable** commands in Admin Configuration mode for the same.

hw-module external-usb disable
no hw-module external-usb disable

Syntax Description

This command has no keywords or arguments.

Command Default

USB port on a RSP is **enabled**.

Command Modes

Admin configuration

Command History

Release	Modification
Release 6.3.1	This command was introduced.

Usage Guidelines

By default, USB port on a RSP is **enabled**. If USB is already inserted into a port and then the USB port is disabled using this command, the existing USB continues to be recognized until it is removed.

Note Inserting a USB will **not** be detected after a USB port is disabled using this command.

This command can be executed only RSPs; not on Line Cards.

This example shows how to disable a USB port on a RSP:

```
RP/0/RSP0/CPU0:router (admin-config) # hw-module external-usb disable
```

This example shows how to enable a USB port on a RSP:

```
RP/0/RSP0/CPU0:router (admin-config) # no hw-module external-usb disable
```

hw-module high-bandwidth

To upgrade the RSP3 Lite card from 80Gig per line card capacity to 220Gig per Line card capacity (for Enhanced ethernet linecards), use the **hw-module high-bandwidth** command in the appropriate mode. To restore the default capacity, use the **no** form of the command.

hw-module high-bandwidth
no hw-module high-bandwidth

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

Admin config

Command History

Release	Modification
Release 5.3.0	This command was introduced.

Usage Guidelines

This command can be used only after applying the appropriate license to RSPLite3. Traditional or smart licensing can be used.

Task ID

Task ID	Operation
sysmgr	execute

Example

This example shows how to use the **hw-module high-bandwidth** command:

```
RP/0/RSP0/CPU0:router (config) # hw-module high-bandwidth
```

hw-module location port breakout

To convert the speed of a interface port from one to another, for example, 100G port to 40G port, use the **hw-module location** *node-id* **port** *port number***breakout** *interface* command in the global configuration mode.

hw-module location *node-id* **port** *number* **breakout** *interface*

Syntax Description

node-id	Node whose hardware attributes you want to configure. The *node-id* argument is expressed in the *rack/slot/module* notation. **Note** Enter the **show platform** command to see the location of all nodes installed in the router.
port *port-number*	Indicates the optics port number. Depending on the line card, the port numbers and its type might vary.
breakout *interface*	Configures the breakout interface.

Command Default

No default behavior or values

Command Modes

Global configuration mode

Command History

Release	Modification
Release 6.4.2	This command was introduced.
Release 7.1.3	This command was updated. The command is supported on two new hardware: • Cisco ASR 9000 12-Port 100GE line card (A99-12x100GE) • Cisco ASR 9000 4-Port 100GE line card (A9K-4x100GE)
Release 7.4.1	The **4xHundredGigE** keyword is supported on the following ASR 9000 series line cards: • Cisco ASR 9000 2T Combo Line Card (A9K-20HG-FLEX) • Cisco ASR 9000 800G Combo Line Card (A9K-8HG-FLEX)

Usage Guidelines

This command is supported only on these routers and line cards:

- Cisco ASR 9901 Routers
- Cisco ASR 9000 12-Port 100GE line card (A99-12x100GE)
- Cisco ASR 9000 4-Port 100GE line card (A9K-4x100GE)
- Cisco ASR 9000 2T Combo Line Card (A9K-20HG-FLEX)
- Cisco ASR 9000 800G Combo Line Card (A9K-8HG-FLEX)

Task ID

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

This example shows how to convert 100G port to 40G port:

```
RP/0/RSP0/CPU0:router(config)# hw-module location 0/0/CPU0 port 20 breakout 1xFortyGigE
```

This example shows how to enable 4x100GE breakout:

```
RP/0/RSP0/CPU0:router(config)# hw-module location 0/0/0/0 port 0 breakout 4xHundredGigE
```

hw-module location breakout

To configure the breakout option for a specified interface, use the **hw-module location breakout** command in the appropriate mode. To disable the breakout option, use the **no** form of the command.

hw-module location *node-id* [**preconfigure**] **bay** *bay-number* **port** *port-number* **breakout** *interface*

Syntax Description

location *node-id*	Interface details.
preconfigure	(Optional) Enables the user to preconfigure breakout on an empty slot.
bay *bay-number*	Bay number of the device (Upper, left, right, lower).
port *port-number*	Specifies the port on which you want to enable breakout.
breakout *interface*	Enables the breakout option. For information on supported port modes, see *System Management Configuration Guide for Cisco ASR 9000 Series Routers*.

Command Default

None

Command Modes

Global config

Command History

Release	Modification
Release 5.3.0	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.

SR10 CPAK can operate in the 10x10GE mode.

Use the **show ipv4 interfaces brief** command to get the details of the breakout interfaces:

```
show ipv4 interfaces brief | include Ten
TenGigE0/0/0/2/0              unassigned      Shutdown              Down
TenGigE0/0/0/2/1              unassigned      Shutdown              Down
TenGigE0/0/0/2/2              unassigned      Shutdown              Down
TenGigE0/0/0/2/3              unassigned      Shutdown              Down
TenGigE0/0/0/2/4              unassigned      Shutdown              Down
TenGigE0/0/0/2/5              unassigned      Shutdown              Down
TenGigE0/0/0/2/6              unassigned      Shutdown              Down
TenGigE0/0/0/2/7              unassigned      Shutdown              Down
TenGigE0/0/0/2/8              unassigned      Shutdown              Down
TenGigE0/0/0/2/9              unassigned      Shutdown              Down
```

Task ID

Task ID	Operation
sysmgr	read

Example

This example shows how to use the **hw-module location breakout** command:

```
RP/0/RSP0/CPU0:router (config) # hw-module location 0/0/CPU0 bay 0 port 2 breakout 10xTenGigE
```

This example shows how to use the **hw-module location breakout** command to enable 1 GbE optics speed with the 5x1GE-5x10GE option on port 10:

```
RP/0/RSP0/CPU0:router (config) # hw-module location 0/0/CPU0 bay 0 port 10 breakout
5x1GE-5x10GE
```

This example shows how to use the **hw-module location breakout** command to enable 1 GbE optics speed with the 10x1GE option on port 10:

```
RP/0/RSP0/CPU0:router (config) # hw-module location 0/0/CPU0 bay 0 port 10 breakout 10x1GE
```

hw-module location bay port port-mode

To configure an MPA with optics in 200G mode use the `hw-module location bay port port-mode` command in the global configurion mode.

Note Staircase FEC is supported only in 100gig mode.

hw-module location *location* **bay** *bay-number* **port** *port-number* **port-mode** *port-mode*

Syntax Description

location *location*	Indicates the location of the MPA, which is the line card ID.
bay *bay-number*	Indicates the bay number of the line card.
port *port-number*	Indicates the port number of the optical-module or optic. You can configure the port number with only the value, 0.
port-mode *port-mode*	Configures the 200G port mode. Port mode can be: • *2xHundredGigE-16QAM*: Configures 200G 16QAM port mode for EP • *2xHundredGigE-8QAM*: Configures 200G 8QAM port mode for EP A higher QAM value leads to higher data transmission rates, but also increases the risk of errors that necessitates re-sends.

Command Default

If this command is not configured, the MPA and optics work in 100G mode.

Command Modes

Global configuration

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

You can configure this command only at port 0 of a router.

Task ID

Task ID	Operation
root-system	read, write
root-lr	read, write

This example shows how to configure 200G for an optical module of a router.

```
Router(config)# hw-module location 0/2/CPU0 bay 0 port 0 port-mode 2xHundredGigE-16QAM
```

hw-module location reload

To reset the power-cycle or reload the hardware for a specific node, or for all nodes installed in the router, use the **hw-module location reload** command in EXEC or administration EXEC mode.

hw-module location *node-id* **reload** {*path* | **warm**}

Syntax Description

node-id	Node whose hardware attributes you want to configure. The *node-id* is expressed in the *rack/slot/module* notation. **Note** Enter the **show platform** command to see the location of all nodes installed in the router.
path	TFTP or disk path to the image you want to download onto the specific node or nodes.
warm	Specifies a warm reload of the node.

Command Default

No default behavior or values

Command Modes

EXEC

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

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

To reset a specific node, use the **hw-module location reload** command in EXEC mode.

To reset a specific node or all nodes, use the **hw-module location reload** command in administration EXEC mode.

Note Before reloading nodes, we recommend using the **cfs check** command to check the sanity of the configuration file system and attempt to recover from internal inconsistencies.

Task ID

Task ID	Operations
root-lr	execute (in EXEC mode)
sysmgr	execute (in EXEC mode and administration EXEC mode)

This example shows how to reset the hardware on a specific node from EXEC mode:

```
RP/0/RSP0/CPU0:router # hw-module location 0/1/CPU0 reload
```

This example shows how to reset the hardware on a specific node from administration EXEC mode:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# hw-module location 0/3/CPU0 reload
```

This example shows how to reset the hardware on a specific fabric card node:

```
RP/0/RSP0/CPU0: router (admin) # hw module location 0/fc0/SP reload
```

hw-module location slice config-mode

To convert the speed of a interface port from one to another, for example, 10GE port to 1GE port, use the **hw-module location** *node-id* **slice** *number***config-mode** *interface* command in the global configuration mode.

hw-module location *node-id* **slice** *number* **config-mode** *interface*

Syntax Description

node-id	Node whose hardware attributes you want to configure. The *node-id* argument is expressed in the *rack*/*slot*/*module* notation. **Note** Enter the **show platform** command to see the location of all nodes installed in the router.

Command Default

No default behavior or values

Command Modes

Global configuration mode

Command History

Usage Guidelines

This command is supported on Cisco ASR 9902 router, Cisco A9903-8HG-PEC port expansion card, and on the following line cards:

- A9K-4HG-FLEX-SE/TR
- A99-4HG-FLEX-SE/TR
- A9K-4HG-FLEX-FC
- A99-4HG-FLEX-FC

The 5x1GE_5x10GE port mode enables 1GbE support in the following ports:

- Slice 0: Ports 1, 3, 5, 7, 13, 15, 17, 19, 21, and 23
- Slice 1: Ports 25, 27, 29, 31, 33, 35, 41, 43, 45, and 47

Task ID

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

This example shows how to enable 5x1GE_5x10GE port mode:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 slice 0 config-mode config-mode
1x100GE,1x100GE,5x1GE_5x10GE,5x1GE_5x10GE
RP/0/RP0/CPU0:ios(config)#commit
```

hw-module location slice power-down

To power off a specified slice, use the **hw-module location slice power-down** command in the Global Configuration mode. To power on a slice, use the **no** form of the command.

hw-module location *node-id* **slice** *number* **power-down**

Syntax Description

location *node-id*	Specifies the line card node location.
slice *number*	Specifies the slice number that should be power off.

Command Default

All slices are power on.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This feature is supported on the Cisco ASR 9000 4th Generation Ethernet line cards.

Note It is necessary to reload the line card after executing the **hw-module location slice power-down** command.

Task ID

Task ID	Operation
sysmgr	read, write

Example

This example shows how to power down slice 3, and 7 of the line card at node 0:

```
RP/0/RSP0/CPU0:router (config) # hw-module location 0/0/CPU0 slice 3 power-down
RP/0/RSP0/CPU0:router (config) # hw-module location 0/0/CPU0 slice 7 power-down
RP/0/RSP0/CPU0:router (config) # commit
RP/0/RSP0/CPU0:router (config) # end
RP/0/RSP0/CPU0:router # admin
RP/0/RSP0/CPU0:router (sysadmin) # hw-module location 0/0/CPU0 reload
```

hw-module mac-move police-mode

To avoid impact on network processors (NP) during high MAC moves by limiting the MAC moves, use the **hw-module mac-move police-mode** command in the appropriate mode.

MAC moves are policed to avoid stress and impact on NPs during high mac move situations such as the bridge loop. The negative on this are cases where another device fails-over, and sends a packet to move MAC tables but does not send continuous traffic. In some cases, the MAC move can be dropped and tables not updated until the device sends another packet. The new MAC move police mode (mode `on`) solves these issues.

hw-module mac-movepolice-mode*on* | *off*

Syntax Description

on	Forces NP to utilize the new MAC move control approach. There is no MAC move policing when traffic load on NP is low. Start MAC move policing when NP is in risk of dropping traffic, congestion when the default policing is done at 1000 per second.
off	Forces NP go back to default mode. MAC move policing is done always at 1000 per second. This is the default mode.

Command Default

None

Command Modes

Administration configuration

Command History

Release	Modification
Release 5.1.3	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	Operation
sysmgr	read

hw-module power location

To power on a specified line card, use the **hw-module power location** command in administration configuration mode.

hw-module power [**override**] **location** *node-id*

Syntax Description

location *node-id*	Identifies the node to power on. The *node-id* argument is expressed in the *rack*/*slot*/*module* notation.
override	Allows the card to be powered up even though there is no power consumption value programmed on the manufacturing EEPROM of the card.

Command Default

Power is on for all nodes.

Command Modes

Administration configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

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

The **hw-module power location** command is available for line cards only; it is not available for route switch processor (RSP) cards.

Use the **hw-module power disable location** command to power off a line card.

Use the **show platform** command to view a summary of the nodes in the router, including status information.

By default, cards that do not have a power consumption value programmed on the manufacturing EEPROM cannot be powered up or booted. To correct an issue with such cards, that possibly is because of an incorrectly programmed EEPROM, you can use the **hw-module power** command with the **override** option.

Task ID

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

The following example shows how to power on a line card:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# configure
RP/0/RSP0/CPU0:router(admin-config)# hw-module power location 0/1/0
```

The following example shows how to disable the power-on feature for a line card:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# configure
RP/0/RSP0/CPU0:router(admin-config)# hw-module power disable location 0/SM3/SP
```

hw-module power disable

To disable the node power-on feature on a specific line card, use the **hw-module power disable** command in administration configuration mode. To reenable the node power-on feature on a line card, use the **no** form of this command.

hw-module power [**override**] **disable location** *node-id*
no hw-module power [**override**] **disable location** *node-id*

Syntax Description

override	Specifies to power up the card regardless of the available power budget.
location *node-id*	Identifies the node whose power-on feature you want to disable. The *node-id* argument is expressed in the *rack/slot/module* notation.

Command Default

Power is on for all nodes.

Command Modes

Administration configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

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

Use the **show platform** command to view a summary of the nodes in the router, including status information.

The **hw-module power disable** command is available for line cards only; it is not available for RP cards.

Cards that do not have a power consumption value programmed on the manufacturing EEPROM do not power up or boot. Use the **override** option with the **hw-module power disable** command to power up the card to correct any issue about an incorrectly programmed manufacturing EEPROM. In any event, the system is not allowed to go over the maximum power budget for the system.

Task ID

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

The following example shows how to disable the node power-on feature on a line card:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# configure
RP/0/RSP0/CPU0:router(admin-config)# hw-module power disable location 0/0/CPU0
```

The following example shows how to disable the node power-on feature on a fabric card:

```
RP/0/RSP0/CPU0:router (admin-config) # hw-module power disable location 0/fc0/SP
```

hw-module power saving

To configure the power saving mode for a specified slice, use the **hw-module power saving** command in the appropriate mode. To delete the power saving option, use the **no** form of the command.

hw-module power saving location *location* **slice** *number*
no hw-module power saving location *location* **slice** *number*

Syntax Description

location *location*	The interface details.
slice *number*	The slice number on which power save mode needs to be enabled. Each slice has two physical ports. Slice 1, 2 ,3 can be configured to the power saving mode. Power save option is not applicable for slice 0.

Command Default

None

Command Modes

Admin config

Command History

Release	Modification
Release 5.3.0	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.

Once a slice is configured in the power saving mode, the interfaces will be deleted and hence all traffic passing through the interfaces will be dropped.

Task ID

Task ID	Operation
sysmgr	read, write

Example

This example shows how to use the **hw-module power saving** command:

```
RP/0/RSP0/CPU0:router (admin-config) # hw-module power saving location 0/1/cpu0 slice 3
```

hw-module processor location mode

To configure processor array clusters setting for an ASR 9900 Series 16-Port 100 Gigabit Ethernet Service Edge Line Card, use the **hw-module processor location mode** command in global configuration mode.

hw-module processor location *node-id* **mode** {**mode-default** | **mode-full**}

The **no** format of the above command is not available. To move back to default mode, use the **hw-module processor location** *node-id* **mode mode-default** command form.

Syntax Description

location *node-id*	Specifies the node whose hardware attributes you want to configure. (The *node-id* is expressed in the rack/slot/module notation, such as **0/8/CPU0**).
mode-default	Specifies that processor array clusters are used as defined in the (default) line card profile setting.
mode-full	Specifies that all processor array clusters are fully utilized.

Command Default

The processor array clusters are used as per the line card profile setting (the mode is set to **mode-default**).

Command Modes

Global configuration

Command History

Release	Modification
Release 6.6.2	This command was introduced.

Usage Guidelines

- The **hw-module processor location mode** command is only supported on the Cisco ASR 9900 Series 16-Port 100 Gigabit Ethernet Service Edge Line Card (whose part number is A99-16X100GE-X-SE).
- The command is only applicable for IOS XR 64 Bit version on ASR 9000 Enhanced XR (eXR).
- To change the cluster setting to **mode-full**, use the **hw-module processor location** *node-id* **modemode-full** command form.
- To change the cluster setting from **mode-full** to **mode-default**, use the **hw-module processor location** *node-id* **mode mode-default** command form, and not the **no** form of the command.
- You must reload the line card XR VM after setting the new mode. You cannot enable it when the line card is in use. Any traffic on the line card is impacted until the line card becomes operational with the new mode.

Example

This example shows how to set the clusters' usage setting on the A99-16X100GE-X-SE line card to **mode-full**:

```
RP/0/RP1/CPU0:ios(config)# hw-module processor location 0/8/CPU0 mode mode-full
RP/0/RP1/CPU0:ios(config)# commit
RP/0/RP1/CPU0:ios(config)# exit
RP/0/RP1/CPU0:ios# reload location 0/8/CPU0
```

```
Proceed with reload? [confirm]
Reloading node 0/8/CPU0
```

This example shows how to set the clusters' usage setting on the A99-16X100GE-X-SE line card from **mode-full** to **mode-default**:

```
RP/0/RP1/CPU0:ios(config)# hw-module processor location 0/8/CPU0 mode mode-default
RP/0/RP1/CPU0:ios(config)# commit
RP/0/RP1/CPU0:ios(config)# exit
RP/0/RP1/CPU0:ios# reload location 0/8/CPU0
Proceed with reload? [confirm]
Reloading node 0/8/CPU0
```

Related Commands

Command	Description
show platform	Displays information and status for each node in the system.

hw-module profile feature

To enable a feature bundle on the router, use the **hw-module profile feature** command in administration configuration mode. To disable a feature bundle, use the **no** form of this command.

hw-module profile feature {**default**}
no hw-module profile feature {**default**}

Syntax Description

default	Feature profile that supports all features .

Command Default

The default feature profile is **default**.

Command Modes

Administration configuration

Command History

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	Operation
system	read, write
root-lr	read, write

hw-module profile itcam

To configure internal TCAM profile partition allocation for line cards, use the **hw-module profile itcam** command in the Global Configuration mode.

hw-module profile itcam { **to-profile-se1** | **to-profile-se2** | **to-profile-se3** | **to-profile-se4** | **to-default** } **location** *location*

Table 64: Syntax Description

to-profile-se1	Recarves the internal TCAM partitions and modifies the scale to: • 4K entries in the L2 table • 15K entries in the V4 table • 3.25K entries in the V6 table
to-profile-se2	Recarves the internal TCAM partitions and modifies the scale to: • 4K entries in the L2 table with: • 2.5K entries in partition 4 • 1.5K entries in partition 3 • 15K entries in the V4 table • 3.25K entries in the V6 table
to-profile-se3	Recarves the internal TCAM partitions and modifies the scale to: • 4K entries in the L2 table with: • 3K entries in partition 4 • 1K entries in partition 3 • 15K entries in the V4 table • 3.25K entries in the V6 table

to-profile-se4	Recarves the internal TCAM partitions and modifies the scale to: • 6K entries in the L2 table with: • 4K entries in partition 4 • 2K entries in partition 3 • 13K entries in the V4 table • 3.25K entries in the V6 table
to-default	Sets the default scale limit for internal TCAM partitions to: • 1K entries in the L2 table • 24K entries in the V4 table • 1.75K entries in the V6 table
location *location*	Sets the location.

Command Mode

Global Configuration mode

Command History

Release	Modification
Release 6.6.2	This command was introduced.
Release 24.4.1	The **to-profile-se2** and **to-profile-se3** keywords were introduced in the command to modify the partition 3 and 4 scale in the L2 table.
Release 25.4.1	A new keyword, **to-profile-se4**, was introduced in the command to modify the partition 3 and 4 scale to 4K entries and 2K entries respectively in the L2 table.

Usage Guidelines

These iTCAM profiles can be applied only on the A99-12X100GE or A99-4X100GE line cards:

- **to-default**
- **to-profile-se1**
- **to-profile-se2**
- **to-profile-se3**
- **to-profile-se4**

When switching between the **to-default**, **to-profile-se1**, **to-profile-se2**, **to-profile-se3**, and **to-profile-se4** profiles, if the current iTCAM usage on the L2, V4, and V6 tables exceeds the maximum supported scale of the target profile, then the configuration of the target profile is rejected.

To enable the specified profile configuration, you must reload the line cards after the configuration.

To return to the default profile mode, use the **to-default** option.

Task ID	Operation
root-lr	read, write
system	read, write

Example

This example shows how to configure **hw-module profile itcam to-profile-se1** command:

```
Router# configure
Router(config)#hw-module profile itcam to-profile-se1 location 0/0/CPU0
Sun Mar  3 07:44:23.066 UTC
In order to activate this new internal tcam partition profile, you must manually reload the
 line card.
Router(config)#
```

This example verifies the modified scale in the L2, V4, and V6 tables for line cards on an interface, using the **show prm server tcam summary all all np0 location** *location* command.

```
Router# show prm server tcam summary all all np0 location 0/0/CPU0


                Node: 0/0/CPU0:
----------------------------------------------------------------


TCAM summary for NP0:

  TCAM Logical Table: TCAM_LT_L2 (1)
    Partition ID: 0, valid entries: 2, free entries: 22
    Partition ID: 1, valid entries: 0, free entries: 24
    Partition ID: 2, valid entries: 0, free entries: 24
    Partition ID: 3, valid entries: 0, free entries: 2012
    Partition ID: 4, valid entries: 2, free entries: 2010
  TCAM Logical Table: TCAM_LT_ODS2 (2), max entries: 15360, num free: 15237
    Application ID: NP_APP_ID_IFIB (0).
      VMR ID:    1, used entries:   45, allocated entries:  123
     Total vmr_ids per app id: 1, Total used entries per app id: 45 Total allocated entries:
 123
    Application ID: NP_APP_ID_QOS (1)
      Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_ACL (2)
      Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_AFMON (3)
      Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_LI (4)
      VMR ID:    2, used entries:    0, allocated entries:    0
     Total vmr_ids per app id: 1, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_PBR (5)
```

```
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
0
 TCAM Logical Table: TCAM_LT_ODS8 (3), max entries: 3328, num free: 3295
   Application ID: NP_APP_ID_IFIB (0).
     VMR ID:    1, used entries:   33, allocated entries:   33
    Total vmr_ids per app id: 1, Total used entries per app id: 33 Total allocated entries:
33
   Application ID: NP_APP_ID_QOS (1)
    Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
0
   Application ID: NP_APP_ID_ACL (2)
    Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
0
   Application ID: NP_APP_ID_PBR (5)
    Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
0
   Application ID: NP_APP_ID_EDPL (6)
    Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
0
```

This example shows how to configure **hw-module profile itcam to-profile-se2** command:

```
Router# configure
Router(config)#hw-module profile itcam to-profile-se2 location 0/0/CPU0
Sun Mar  3 07:44:23.066 UTC
In order to activate this new internal tcam partition profile, you must manually reload the
 line card.
Router(config)#
```

This example verifies the modified scale in partition 3 to 1.5K entries and in partition 4 to 2.5K entries in the L2 table using the **show prm server tcam summary all all np0 location 0/0/CPU0**

```
Router# show prm server tcam summary all all np0 location 0/0/CPU0

                Node: 0/0/CPU0:
----------------------------------------------------------------

TCAM summary for NP0:

  TCAM Logical Table: TCAM_LT_L2 (1)
    Partition ID: 0, valid entries: 2, free entries: 22
    Partition ID: 1, valid entries: 0, free entries: 24
    Partition ID: 2, valid entries: 0, free entries: 24
    Partition ID: 3, valid entries: 0, free entries: 1512
    Partition ID: 4, valid entries: 2, free entries: 2510
  TCAM Logical Table: TCAM_LT_ODS2 (2), max entries: 15360, num free: 15237
    Application ID: NP_APP_ID_IFIB (0)
      VMR ID:    1, used entries:   35, allocated entries:  123
     Total vmr_ids per app id: 1, Total used entries per app id: 35 Total allocated entries:
123
    Application ID: NP_APP_ID_QOS (1)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
0
    Application ID: NP_APP_ID_ACL (2)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
0
    Application ID: NP_APP_ID_AFMON (3)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
0
    Application ID: NP_APP_ID_LI (4)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
0
```

This example shows how to configure **hw-module profile itcam to-profile-se3** command:

```
Router# configure
Router(config)#hw-module profile itcam to-profile-se3 location 0/0/CPU0
Sun Mar  3 07:44:23.066 UTC
In order to activate this new internal tcam partition profile, you must manually reload the
 line card.
Router(config)#
```

This example verifies the modified scale in partition 3 to 1K entries and in partition 4 to 3K entries in the L2 table using the **show prm server tcam summary all all np0 location 0/0/CPU0** command.

```
Router# show prm server tcam summary all all np0 location 0/0/CPU0


                Node: 0/0/CPU0:
----------------------------------------------------------------
TCAM summary for NP0:
 TCAM Logical Table: TCAM_LT_L2 (1)
 Partition ID: 0, valid entries: 2, free entries: 22
 Partition ID: 1, valid entries: 0, free entries: 24
 Partition ID: 2, valid entries: 0, free entries: 24
 Partition ID: 3, valid entries: 0, free entries: 1012
 Partition ID: 4, valid entries: 2, free entries: 3010
 TCAM Logical Table: TCAM_LT_ODS2 (2), max entries: 15360, num free: 15237
 Application ID: NP_APP_ID_IFIB (0)
 VMR ID: 1, used entries: 37, allocated entries: 123
 Total vmr_ids per app id: 1, Total used entries per app id: 37 Total allocated entries:
123
 Application ID: NP_APP_ID_QOS (1)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
 Application ID: NP_APP_ID_ACL (2)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
 Application ID: NP_APP_ID_AFMON (3)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
 Application ID: NP_APP_ID_LI (4)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
 Application ID: NP_APP_ID_PBR (5)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
 TCAM Logical Table: TCAM_LT_ODS8 (3), max entries: 3328, num free: 3285
 Application ID: NP_APP_ID_IFIB (0)
 VMR ID: 1, used entries: 43, allocated entries: 43
 Total vmr_ids per app id: 1, Total used entries per app id: 43 Total allocated entries:
43
 Application ID: NP_APP_ID_QOS (1)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
 Application ID: NP_APP_ID_ACL (2)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
 Application ID: NP_APP_ID_LI (4)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
 Application ID: NP_APP_ID_PBR (5)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
 Application ID: NP_APP_ID_EDPL (6)
 Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries: 0
```

This example shows how to configure **hw-module profile itcam to-profile-se4** command:

```
Router# configure
Router(config)#hw-module profile itcam to-profile-se4 location 0/0/CPU0
Sun Mar  3 07:44:23.066 UTC
In order to activate this new internal tcam partition profile, you must manually reload the
 line card.
Router(config)#
```

This example verifies the modified scale in partition 3 to 2K entries and in partition 4 to 4K entries in the L2 table using the **show prm server tcam summary all all np0 location 0/0/CPU0** command.

```
Router# show prm server tcam summary all all np0 location 0/0/CPU0

                Node: 0/0/CPU0:
----------------------------------------------------------------

TCAM summary for NP0:

  TCAM Logical Table: TCAM_LT_L2 (1)
    Partition ID: 0, valid entries: 2, free entries: 22
    Partition ID: 1, valid entries: 0, free entries: 24
    Partition ID: 2, valid entries: 0, free entries: 24
    Partition ID: 3, valid entries: 0, free entries: 2036
    Partition ID: 4, valid entries: 2, free entries: 4034
  TCAM Logical Table: TCAM_LT_ODS2 (2), max entries: 13312, num free: 13189
    Application ID: NP_APP_ID_IFIB (0)
      VMR ID:    1, used entries:   35, allocated entries:  123
     Total vmr_ids per app id: 1, Total used entries per app id: 35 Total allocated entries:
 123
    Application ID: NP_APP_ID_QOS (1)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_ACL (2)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_AFMON (3)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_LI (4)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_PBR (5)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
  TCAM Logical Table: TCAM_LT_ODS8 (3), max entries: 3328, num free: 3285
    Application ID: NP_APP_ID_IFIB (0)
      VMR ID:    1, used entries:   43, allocated entries:   43
     Total vmr_ids per app id: 1, Total used entries per app id: 43 Total allocated entries:
 43
    Application ID: NP_APP_ID_QOS (1)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_ACL (2)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_LI (4)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_PBR (5)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
    Application ID: NP_APP_ID_EDPL (6)
     Total vmr_ids per app id: 0, Total used entries per app id: 0 Total allocated entries:
 0
```

This example shows how to configure **hw-module profile itcam to-default** command:

```
Router# config
Router(config)#hw-module profile itcam to-default location 0/0/CPU0
Sun Mar  3 07:45:22.198 UTC
In order to activate this new internal tcam partition profile, you must manually reload the
 line card.
Router(config)#
```

Related Commands

Command	Description
show prm server tcam summary all all detail all location 0/0/CPU0	This command output shows modified TCAM values with increased limits for L2 and V6 entries.

hw-module profile scale

To specify a scale profile for the router, use the **hw-module profile scale** command in administration configuration mode.



Note This command is applicable only to Cisco IOS XR 32-bit operating system on Cisco ASR 9000 Series Routers.

hw-module profile scale { **default** | **l3** | **l3xl** }

Syntax Description

bng-max	This is an unused scale profile and will be deprecated in a future Cisco IOS XR software release.
default	Scale profile applicable for deployments that require large Layer 2 MAC tables (up to 512,000 entries) and a relatively small number of Layer 3 routes (less than 512,000).
l3	Scale profile applicable for deployments that require more Layer 3 routes (up to 1 million) and smaller Layer 2 MAC tables (less than 128,000 entries).
l3xl	Scale profile applicable for deployments that require a very large number of Layer 3 routes (up to 1.3 million) and minimal Layer 2 functionality.

Command Default

default is the default scale profile

Command Modes

Administration configuration

Command History

Release	Modification
Release 5.1.2	**lsr** and **sat** keywords were introduced.
Release 5.1.1	The default scale profile for ASR 9000 Ethernet Line Cards was changed from **l2** to **l3**.
Release 4.0.1	The **l3xl** keyword was introduced. This command was moved to administration configuration mode.
Release 3.9.1	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.

Use the **hw-module profile scale** command to configure the router to perform more efficiently depending on the use of the router.

- Specify the scale profile to be **default** in situations where the router is used as a Layer 2 transport device that requires the router to support high Layer 2 scale numbers.
- Specify the scale profile to be **l3xl** in situations where the router is used primarily as a Layer 3 box to provide Layer 3 VPN services. In this case, the router needs to support a high number of Layer 3 routes.



Note When you upgrade to a release that supports the **hw-module profile scale** command in administration configuration mode, the non-administration configured settings are retained and used. Once you configure the scale profile in the administration plane, it has higher priority than the non-administration plane, and it replaces the non-administration scale profile configuration.

Task ID

Task ID	Operation
system	read, write
root-lr	read, write

Example

The following example shows how to set the scale profile to Layer 3:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# configure
RP/0/RSP0/CPU0:router(admin-config)# hw-module profile scale l3

Tue Aug 24 23:52:51.828 UTC
In order to activate this new memory resource profile,
you must manually reboot the system.
RP/0/RSP0/CPU0:router(admin-config)# commit
```

hw-module port-control license

To request (and apply) license for (A9K-4T16GE-TR and A9K-4T16GE-SE) combo card , use the **hw-module port-control license** command in the appropriate mode. To remove the applied license, use the **no** form of the command.

hw-module port-control license location *node-id*
no hw-module port-control license location *node-id*

Syntax Description

location *node-id*	Interface details.

Command Default

None

Command Modes

Global configuration

Command History

Release	Modification
Release 5.3.0	This command was introduced.

Usage Guidelines

The **hw-module port-control license** command is used to apply the requested license on the combo card. The granted license is permanent , unless the user wants to remove license on this card and use it on some other card. LC reload is mandatory for the license to take effect. When the LC comes up after the reload, the licenses are installed and can be verified using the **show license entitlement** command.

If the user wants to use the combo license on some other line-card instead of the current one, then the license has to be removed. The **no hw-module port-control license** command removes the applied license.

Task ID

Task ID	Operation
sysmgr	execute

Example

This example shows how to use the **hw-module port-control license** command:

```
RP/0/RSP0/CPU0:router (config) # hw-module port-control license location 0/1/CPU0
```

hw-module port-control non-combo-mode

To use all the four Tengig ports, instead of the Gigabit ethernet ports, use the **hw-module port-control non-combo-mode** command in the appropriate mode. To remove the non-combo configuration, use the **no** form of the command.

hw-module port-control non-combo-mode location *linecard-slot*
no hw-module port-control non-combo-mode location *linecard-slot*

Syntax Description

location *linecard-slot*	The interface and slot details.

Command Default

None

Command Modes

Global configuration

Command History

Release	Modification
Release 5.3.0	This command was introduced.

Usage Guidelines

On the (A9K-4T16GE-TR and A9K-4T16GE-SE) combo card, the customer can either use 16Gigabit Ethernet + 2Tengig or 4Tengig ports. This option is when the customer does not have the Wildchild combo license. If the License is installed, all the ports will be enabled. In case, the license is not available and the customer wants to use all the 4 Tengig ports instead of the Gigabit ethernet ports, then , this command needs to be used. This is the non-combo mode.

Note LC reload is mandatory for the mode to take effect.

If the **hw-module port-control non-combo-mode** command is not configured, the line card will operate in the default mode. In the default mode, the two Tengig ports which are enabled are - 0/*/0/16 and 0/*/0/17.

Task ID

Task ID	Operation
sysmgr	execute

Example

This example shows how to use the **hw-module port-control non-combo-mode** command:

```
RP/0/RSP0/CPU0:router (config) # hw-module port-control non-combo-mode location 0/1/CPU0
```

hw-module reset auto

To reset a specific node, use the **hw-module reset auto** command in administration configuration mode. To disable the reset feature on a specific node, use the **no** form of this command.

hw-module reset auto [**disable**] **location** *node-id*
no hw-module reset auto [**disable**] **location** *node-id*

Syntax Description

disable	Disables the node reset feature on the specified node.
location *node-id*	Identifies the node you want to reload. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

The node reset feature is enabled for all nodes.

Command Modes

Administration configuration

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

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

The **hw-module reset auto** command is used to reload Cisco IOS XR software on a specific node. The node reloads with the current running configuration and active software set for that node.

Task ID

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

The following example shows how to reload a node:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# configure
RP/0/RSP0/CPU0:router(admin-config)# hw-module reset auto location 0/2/CPU0

RP/0/RP0/CPU0:router# RP/0/RP0/CPU0:Apr  2 22:04:43.659 : shelfmgr[294]:
%S HELFMGR-3-USER_RESET : Node 0/2/CPU0 is reset due to user reload request
```

hw-module subslot reload

To reload Cisco IOS XR software on a specific subslot, use the **hw-module subslot reload** command in EXEC mode.

hw-module subslot *subslot-id* **reload**

Syntax Description

subslot-id	Specifies the subslot to be restarted. The *subslot-id* argument is entered in the *rack/slot/subslot* notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

This command reloads Cisco IOS XR software on the specified shared port adapter (SPA) and restarts the SPA interfaces. The SPA reloads with the current running configuration and active software set for the SPA.

Task ID

Task ID	Operations
root-lr	read, write

The following example shows how to restart the SPA in slot 2, subslot 1:

```
RP/0/RSP0/CPU0:router# hw-module subslot 0/2/1 reload
```

isolation enable

To configure the route processor to collect debug information like a process coredump from a failed route processor, when NSR triggers failover, use the **isolation enable** command in global configuration mode. To disable RP isolation during failover, use the **no** form of this command.

Note This command is applicable only to Cisco IOS XR 32-bit operating system on Cisco ASR 9000 Series Routers.

isolation enable
no isolation enable

Syntax Description

This command has no keywords or arguments.

Command Default

If the **isolation enable** is not configured, the **nsr process-failures switchover** command immediately restarts the active RP during NSR failover and hence the active RP cannot collect the required debug information to identify the cause of the failure.

Command Modes

Global configuration

Command History

Release	Modification
Release 4.1.0	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.

During RP failover, the standby RP takes over as the active RP immediately without a protocol flap and NSR restarts the active RP. This switchover time is less than the timeout for the protocol to flap. Because the active RP is restarted immediately, it is not possible to get debug details to identify the cause of the failure.

The **isolation enable** command enables NSR to trigger RP switchover without protocol flap and collect the required debug information to identify the cause of the failure. The RP isolation feature keeps the active RP in an isolated state wherein it continues to operate even after the switchover. Using the **isolation enable** command you can enable RP isolation, thereby providing sufficient time for the failed RP to collect the necessary debug information like a process coredump before restarting a failed route processor.

Task ID

Task ID	Operation
transport	read, write

This example shows how to configure the route processor to collect debug information when NSR triggers failover:

```
RP/0/RSP0/CPU0:router# config
RP/0/RSP0/CPU0:router(config)# isolation enable
RP/0/RSP0/CPU0:router(config)#
```

isolation multiple

To configure the route processor to collect debug information of multiple protocols from a failed route processor when multiple protocols trigger NSR, which in turn triggers failover, use the **isolation multiple** command in the global configuration mode. To disable RP isolation during failover, caused by multiple protocols, use the **no** form of this command.

isolation multiple
no isolation multiple

Syntax Description

This command has no keywords or arguments.

Command Default

If the **isolation multiple** command is not configured and the failover is triggered by multiple protocols, the **isolation enable** command enables a failed RP to collect the required debug information of only the first failed protocol.

Command Modes

Global configuration

Command History

Release	Modification
Release 4.2.1	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.

During RP failover, the standby RP takes over as the active RP immediately and restarts the active RP to support NSR without a protocol flap. This switchover time is less than the timeout for the protocol to flap. Because the active RP is restarted immediately, it is not possible to get debug details to identify the cause of the failure.

The **isolation enable** command enables NSR to trigger RP switchover without protocol flap and collect the required debug information to identify the cause of the failure.

If multiple protocols trigger NSR, the **isolation enable** command does not enable the RP to collect the required debug information. Use the **isolation multiple** command to enable the active RP to collect debug information even if the failure is caused by multiple protocols.

Task ID

Task ID	Operation
transport	read, write

This example shows how to configure the route processor to collect debug information when multiple protocols trigger NSR, which in turn triggers failover:

```
RP/0/RSP0/CPU0:router#config
RP/0/RSP0/CPU0:router(config)#isolation multiple
RP/0/RSP0/CPU0:router(config)#
```

led mode

To change the message, mode or status of a router card LED display, use the **led mode** command in administration configuration mode. To revert to the default message, mode or status, use the **no** form of this command.

led mode {**default** | **scroll**} {**lock** | **unlock**} *message* **location** *node-id*

Syntax Description

{**default** | **scroll**}	Specifies the mode of the card LED display.
{**lock** | **unlock**}	Specifies the status of the card LED display.
message	Specifies the message to display on the card LED.
location *node-id*	Specifies the node for which to configure the LED information. The *node-id* argument is expressed in the *rack*/*slot*/*module* notation.

Command Default

Mode: default; status: unlocked; message: according to the state of the software

Command Modes

Administration configuration

Command History

Release	Modification
Release 3.8.0	This command was introduced.

Usage Guidelines

You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Use the **show led** command to display the LED settings for a card or all cards.

Task ID

Task ID	Operation
system	read, write

This example shows how to change the message displayed on the card LED and the subsequent display in the **show led** command output:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# configure
RP/0/RSP0/CPU0:router(admin-config)# led mode default unlock STBY_RP location 0/rp0/cpu0
RP/0/RSP0/CPU0:router(admin-config)# end

Uncommitted changes found, commit them? [yes]:
RP/0/RSP0/CPU0:router(admin)# show led location all | i 0/RP0/CPU0

     LOCATION        MESSAGE        MODE      STATUS
    ================================================
```

```
    0/0/SP       IOX-RUN       DEFAULT   UNLOCKED
    0/1/SP       IOX-RUN       DEFAULT   UNLOCKED
0/RP0/CPU0        STBY_RP       DEFAULT   UNLOCKED
0/RP1/CPU0       ACTV RP       DEFAULT   UNLOCKED
```

power budget enforcement disable

To disable the power budget calculation and allow line cards to boot in an over-budget condition, use the **power budget enforcement disable** command in administration configuration mode. To enable the power budget calculation once again, use the **no** form of this command.

power budget enforcement disable
no power budget enforcement disable

Syntax Description

This command has no keywords or arguments.

Command Default

Power budget is enforced.

Command Modes

Administration 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.

The power manager automatically reads the required power supply values from the EEPROM on all cards and calculates the required power budget. The system can power up line cards only if there is sufficient power. Use the **power budget enforcement disable** command to disable the power budget calculation and to allow the system to boot cards in an over-budget condition.

Use the **show environment** command with the **power** option to display the current power current and draw.

If the system is running with a power budget deficiency and the **power budget enforcement disable** command is not configured, a reset of a line card powers down the line card. Beginning with Cisco IOS XR Release 4.3.1, if you configure the **power budget enforcement disable** command, behavior is normal even if the system has a power budget deficiency.

Task ID

Task ID	Operation
root-system	read, write

The following example shows how to disable the power management calcuations:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# config
RP/0/RSP0/CPU0:router(admin-config)# power budget enforcement disable
```

Related Commands

Command	Description
show environment, on page 1001	Displays environmental monitor parameters for the system.

power budget reservation

To release the standby route switch processor (RSP) power budget reservation, use the **power budget reservation** command in administration configuration mode. To re-reserve the standby RSP power budget reservation, use the **no** form of this command.

power budget reservation standby-rsp disable
no power budget reservation standby-rsp disable

Syntax Description

standby-rsp disable	Disables the power budget reservation for the standby RSP.

Command Default

Power is reserved for the standby RSP.

Command Modes

Administration 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.

Use the power budget reservation command to disable the **power budget reservation** for the standby RSP if you only have one RSP installed in the router and you need additional power for other cards. Use the **show environment** command with the **power-supply** keyword to view the available power budget on the system.

Task ID

Task ID	Operation
root-system	read, write

Example

The following example shows how to disable the power budget for the standby RSP:

```
RP/0/RSP1/CPU0:router(admin-config)# power budget reservation standby-rsp disable
```

Related Commands

Command	Description
show environment, on page 1001	Displays environmental monitor parameters for the system.

power budget enforcement n-plus-1 redundancy

To configure N+1 power redundancy protection mode on Cisco ASR 9910 Routers and Cisco ASR 9010 Routers (AC), use **power budget enforcement n-plus-1-redundancy** command in administration configuration mode. To remove configuration, use the **no** form of this command.

power budget enforcement n-plus-1-redundancy

Syntax Description

This command has no keywords or arguments.

Command Default

NA

Command Modes

Administration configuration

Command History

Release	Modification
Release 6.3.3	This command was introduced.

Usage Guidelines

Power on Cisco ASR 9000 Series Routers (ASR-9010-AC and ASR-9910-AC) was previously conserved based on the N+N power redundancy protection mode. The chassis had to be powered up in advance and for longer time than desired. The system will recalculate the power requirements based on the N+1 mode after this command is configured.

Note By default, the power requirements are calculated based on the N+N power redundancy mode when the router is powered on.

Note When the system is in N+1 power redundancy mode and a there is a switchover, the new Active RSP powers up with power calculations based on N+N power redundancy mode. After parsing this configuration, system recalculates the power requirements based on the N+1 power redundancy mode.

Note This configuration is only supported on AC power module varients of Cisco ASR 9910 Routers and Cisco ASR 9010 Routers.

The following example shows how to enable N+1 power redundancy protection mode:

```
RP/0/RSP0/CPU0:router#admin
RP/0/RSP0/CPU0:router(admin)#config
RP/0/RSP0/CPU0:router(admin-config)#power budget enforcement n-plus-1-redundancy
```

power single-feed location

To configure single-feed mode, where the system supports the operating of one or all power modules (V1 DC, V2 DC, V3 AC and V3 DC) with only one feed, without raising an error message or an alarm for any missing feeds, use the **power single-feed location** command in administration configuration mode. To disable the single-feed mode, use the **no** form of this command.

power single-feed location {**all***name*}
no power single-feed location {**all***name*}

Syntax Description

all	Enables single-feed mode for all the power modules.
name	Specifies the power module node name in the *Rack*/PS*x*/M*y*/SP format. Explanation of each component of the naming notation is as follows: • *Rack*- Chassis number of the rack. In a single-shelf system, the rack number is 0. In a multi-shelf system, the LCC rack number range is 0 to 255 and the FCC rack number range is F0 to F7. • PS*x*- Power Slot. • M*y*- Power Module. • SP- Service Processor node type. This is used for fan trays, power modules and any other node that is not an RSP/RP or an LC.

Command Default

Both the power feeds are enabled.

Command Modes

Administration Configuration

Command History

Release	Modification
Release 5.3.0	This command was introduced.

Usage Guidelines

- The power feed configuration is verified by the software at the boot-up time prior to generating any warning messages.
- For a V2 AC power module, configuring the single-feed mode is not possible and an error message is displayed.
- A syslog message is displayed at the boot-up time when the single-feed mode configuration is enabled. The syslog message indicates that notifications are disabled for loss of one feed of each power module.

Task ID

Task ID	Operation
root-system	read, write

The following example enables the single power feed mode for the 0/PS2/M0/SP power module:

```
RP/0/RSP0/CPU0:router#admin
RP/0/RSP0/CPU0:router(admin)#config
RP/0/RSP0/CPU0:router(admin-config)#power single-feed location 0/PS2/M0/SP
```

power-mgmt action

To disable the power budget control, use the **power-mgmt action disable** command in the System Admin Config mode.

power-mgmt action disable

Syntax Description

disable	Disables the power budget control.

Command Default

Power budget control is set to (N+1) and enabled by default.

Command Modes

Command History

Release	Modification
Release 6.5.1	This command was introduced.

Usage Guidelines

This command is available in Cisco IOS XR 64 bit OS.

Power-management action is done at the chassis level.

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 power manager automatically calculates power required for each card. The system will only power up line cards if there is sufficient power. Use the **power-mgmt action disable** command to disable enforcement of power budgeting line card boot requests. This is not recommended, allowing for situations where chassis can overdraw current, causing instability or immediate chassis reset.

Use the **show environment** command with the **power** option to display power related information.

Use show power budge profile to view power requirements for each card type.

Before a card powers up its basic or upper layers, it must request budget. If that budget is not available, the boot request is denied.

If **power-mgmt action** command is enabled, it only prevents previously unpowered line cards from coming up in the event of low power budget scenarios. Reloading an operational line card cannot release its reserved budget. Therefore, a line card can be reloaded, even in low power budget scenarios, and allowed to return to operational. If configured with **power-mgmt action disable** command, line cards can always be given an allocated power budget and allowed to boot, regardless of available power.

This example shows you how to disable the chassis power management control:

```
sysadmin-vm:0_RP0# config
sysadmin-vm:0_RP0(config)# power-mgmt action disable
```

power-mgmt redundancy

To control the power budget so as to not exceed the power capacity, use the **power-mgmt redundancy**-num-pms command. To restore default (N+1) power module redundancy, use the **no** form of this command.

By default, power module redundancy is set to (N+1). There is no power tray level redundancy.

power-mgmt redundancy-num-pms [*integer*]
no power-mgmt redundancy-num-pms [*integer*]

Syntax Description

integer	Number of redundant power modules that the user wants to configure. The total number of functioning power modules in the system is at least *integer* number more than the number of power modules needed to support the power required for all the cards in the system. Range of *integer* is from 0 to 8. 0 means no power redundancy is required.

Command Default

The Cisco ASR9000 router family has one logical power shelf consisting of one or more power trays, where each power tray contains three or four power modules.

Command Modes

Command History

Release	Modification
Release 6.5.1	This command was introduced.

Usage Guidelines

This command is available in Cisco IOS XR 64 bit OS.

If the system is planned to have power module redundancy (N+x), then this command can be used to set the number of power modules required for power redundancy.

This example shows how to configure power module level redundancy:

```
sysadmin-vm:0_RP0#config
sysadmin-vm:0_RP0(config)#power-mgmt redundancy-num-pms 2
sysadmin-vm:0_RP0(config)#commit
Tue Sep  3  12:17:53.891 UTC
Commit complete.
```

redundancy switchover

To cause the primary (active) route processor (RP) to fail over to the redundant standby RP, use the **redundancy switchover** command in

EXEC or administration EXEC

mode. To disable the forced switchover, use the **no** form of this command.

redundancy switchover [**location** *node-id*]
no redundancy switchover [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Specifies the primary RP on which to force a switchover. The *node-id* argument is expressed in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

EXEC

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

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

Use the **redundancy switchover** command to trigger a switchover from the primary RP to the standby RP. When the **redundancy switchover** command is issued, the running (committed) configuration is automatically saved and loaded during switchover, and the standby RP becomes the active primary RP, while the original primary RP becomes the standby RP.

Note The **redundancy switchover** command can be used only if the standby RP is in the ready state. Use the **show redundancy** command to view the status of the RPs.

Task ID

Task ID	Operations
root-lr	read, write

The following example shows partial output for a successful redundancy switchover operation:

```
RP/0/RSP0/CPU0:router# show redundancy
```

```
  Redundancy information for node 0/RP0/CPU0:
  ==========================================
  Node 0/RP0/CPU0 is in ACTIVE role
  Partner node (0/RP1/CPU0) is in STANDBY role
  Standby node in 0/RP1/CPU0 is ready

  Reload and boot info
  ----------------------
  RP reloaded Tue Mar 28 09:02:26 2006: 5 hours, 41 minutes ago
  Active node booted Tue Mar 28 09:02:56 2006: 5 hours, 41 minutes ago
  Last switch-over Tue Mar 28 09:09:26 2006: 5 hours, 34 minutes ago
  Standby node boot Tue Mar 28 09:10:37 2006: 5 hours, 33 minutes ago
  Standby node last went not ready Tue Mar 28 09:25:49 2006: 5 hours, 18 minutes
  go
  Standby node last went ready Tue Mar 28 09:25:51 2006: 5 hours, 18 minutes ago
  There has been 1 switch-over since reload
  ....
RP/0/RSP0/CPU0:router# redundancy switchover

  Initializing DDR SDRAM...found 2048 MB
  Initializing ECC on bank 0
  ...
  Turning off data cache, using DDR for first time

  Initializing NVRAM...
  Testing a portion of DDR SDRAM ...done
  Reading ID EEPROMs ...
  Initializing SQUID ...
  Initializing PCI ...

  PCI0 device[1]: Vendor ID 0x10ee

  Configuring MPPs ...
  Configuring PCMCIA slots ...
  --More--
```

If the standby RP is not in the ready state, the switchover operation is not allowed. The following example shows output for a failed redundancy switchover attempt:

```
RP/0/RSP0/CPU0:router# show redundancy

  This node (0/RP0/CPU0) is in ACTIVE role
  Partner node (0/RP1/CPU0) is in UNKNOWN role

RP/0/RSP0/CPU0:router# redundancy switchover

  Standby card not running; failover disallowed.
```

show apm psa status

To display the PSA status for APM, use the **show apm psa status** command in EXEC mode.

show apm psa status location *node-id*

Syntax Description

location *node-id*	The interface details.

Command Default

None

Command Modes

Admin EXEC

Command History

Release	Modification
Release 5.3.0	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	Operation
sysmgr	read

Example

This example shows how to use the **show apm psa status** command:

```
RP/0/RSP0/CPU0:router (admin) # show apm psa status location 0/0/CPU0

0/0/CPU0

PSA Client Status
DIAG            ENVMON          INVMGR          FIA             PCIE            LDA  \
            PRM
Registered      Registered      Registered      Registered      Registered           \
Registered      Registered

PSA Slice Status
Slice   0: Power On     Completed     1: Power On     Completed     2: Power On      \
Completed     3: Power Saving Completed
DIAG       Completed                     Completed                     Completed     \
               Completed
ENVMON     Completed                     Completed                     Completed     \
               Completed
INVMGR     Completed                     Completed                     Completed     \
               Completed
FIA        Completed                     Completed                     Completed     \
               Completed
PCIE       Completed                     Completed                     Completed     \
               Completed
```

```
LDA         Completed                   Completed                   Completed     \
                  Completed
PRM         Completed                   Completed                   Completed     \
                  Completed
```

show apm psm status

To display the PSM status for APM, use the **show apm psm status** command in EXEC mode.

show apm psa status location *node-id*

Syntax Description

location *node-id*	The interface details.

Command Default

None

Command Modes

Admin EXEC

Command History

Release	Modification
Release 5.3.0	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	Operation
sysmgr	read

Example

This example shows how to use the **show apm psa status** command:

```
RP/0/RSP0/CPU0:router (admin) #  show apm psm status location 0/0/CPU0
PSM Status
----------
PSM Client Status
        ENVMON:         Registered
        DIAG0:          Registered
        DIAG1:          Registered
        INVMGR:         Registered
        0/0/CPU0 PSA:   Registered

LC Status
---------
Line Card       Slice   Config  Status          ENVMON          DIAG0               \
DIAG1           INVMGR          PSA
0/0/CPU0        0       On      Completed       Completed       Completed           \
Completed       Completed       Completed
                1       On      Completed       Completed       Completed           \
Completed       Completed       Completed
                2       On      Completed       Completed       Completed           \
Completed       Completed       Completed
                3       Saving  Completed       Completed       Completed           \
Completed       Completed       Completed
```

show canbus

To display statistics regarding the CAN bus, use the **show canbus** command in administration EXEC mode.

show canbus {**client-stats** | **controller-stats** | **server-stats**} **location** {**all***node-id*}

Syntax Description

client-stats	Displays CAN bus client statistics.
controller-stats	Displays CAN bus controller statistics.
server-stats	Displays CAN bus server statistics.
location {**all** | *node-id*}	Displays the status of the CAN bus for a specific node or all nodes.

Command Default

None

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

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

Use the **show canbus** command with the **server-stats** keyword to determine if the revised backplane ID board (BPID-02) is installed in the router.

Task ID

Task ID	Operation
sysmgr	read

Example

The following example illustrates sample output from the **show canbus** command with the **server-stats** keyword:

```
RP/0/RSP0/CPU0:router(admin)# show canbus server-stats location all

       Slot   State Partition-A Rev Partition-B Rev Active-Partition
   0/0/CPU0  Online            2.01            2.02      Partition B
   0/1/CPU0  Online            2.01            2.02      Partition B
   0/2/CPU0 Offline --------------- --------------- ----------------
   0/3/CPU0 Offline --------------- --------------- ----------------
0/RSP0/CPU0  Online            1.01            1.02      Partition B
0/RSP1/CPU0  Online            1.01            1.02      Partition B
   … snip …
```

```
  0/FT0/SP  Online          4.00          4.00      Partition A
  0/FT1/SP  Online          4.00          4.00      Partition B
0/BPID0/SP  Online          7.00          7.00      Partition B
```

Related Commands

Command	Description
clear plugin slot counts	Clears the running counts of the backplane connector slot plugins.
show plugin slot counts	Displays cumulative and running counts of card insertions per slot.

show controllers pm ixdb

To display the platform manager output for Cisco ASR 9000 Series line cards, use the **show controllers pm ixdb** command in EXEC mode.

show controllers pm ixdb location [**location** {*node-id* | **all**}]

Syntax Description

ixdb	Displays the platform manager database utilization.
location {*node-id* | **all**}	Specifies the location of the node. The *node-id* argument is entered in the *rack*/*slot*/*module* notation. The **all** keyword specifies all nodes.

Command Default

None

Command Modes

EXEC

Command History

Command History

Release	Modification
Release 6.2.1	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 controllers pm ixdb** command displays the platform manager output equivalent to the PM shell command **pkg/bin/show_ixdb -f vkg_pmlib_ixdb -s** for Cisco ASR 9000 Series line cards.

Task ID

Task ID	Operations
sonet-sdh	read
dwdm	read
interface	read
drivers	read

The following example shows sample output from the **show controllers pm ixdb** command for the specified node location:

```
RP/0/RSP0/CPU0:router# show controllers pm ixdb location 0/1/CPU0

Sun Oct  9 12:19:41.245 UTC

ixdb header Information:(0/1/CPU0)
==================================
ixdb version                = 1
ispec version               = 1
```

```
pathname                    = vkg_pmlib_ixdb
Hash collisions possible    = Yes
invalid_key                 = 0x0
hashsize                    = 163840
db_size                     = 81920
rec_size                    = 752
db_keys_offset              = 331776
hashtable_offset            = 987136
pool0_offset                = 1642520
db_offset                   = 3281056
start_alloc_index           = 12
alloc_index_tail            = 81919
serial                      = 1

========= DB Allocation ==========
last db alloc happened = 105 seconds ago

Number of allocated db records = 12,
Number of free db records = 81908,

========= Hash Table Datas =========
Used hash table entries = 12,
Unused hash table entries = 163828,
Collisions = 0,

========== Pools stats ===========
Pool0 linked list pool information
version = 0,    magic = 0xfeef1f00,
pool id/ serial = 0/0,
size in bytes  = 1638536,
Total entries = 81920,
Free entries = 81908,
next pool size = 0
```

The following example shows sample output from the **show controllers pm ixdb** command for all node locations:

```
RP/0/RSP0/CPU0:router# show controllers pm ixdb location all
  Sun Oct  9 12:19:58.154 UTC

ixdb header Information:(0/1/CPU0)
==================================
ixdb version                = 1
ispec version               = 1
pathname                    = vkg_pmlib_ixdb
Hash collisions possible    = Yes
invalid_key                 = 0x0
hashsize                    = 163840
db_size                     = 81920
rec_size                    = 752
db_keys_offset              = 331776
hashtable_offset            = 987136
pool0_offset                = 1642520
db_offset                   = 3281056
start_alloc_index           = 12
alloc_index_tail            = 81919
serial                      = 1

========= DB Allocation ==========
last db alloc happened = 122 seconds ago

Number of allocated db records = 12,
```

```
Number of free db records = 81908,

========= Hash Table Datas =========
Used hash table entries = 12,
Unused hash table entries = 163828,
Collisions = 0,

========== Pools stats ===========
Pool0 linked list pool information
version = 0,    magic = 0xfeef1f00,
pool id/ serial = 0/0,
size in bytes  = 1638536,
Total entries = 81920,
Free entries = 81908,
next pool size = 0


ixdb header Information:(0/2/CPU0)
==================================
ixdb version                = 1
ispec version               = 1
pathname                    = vkg_pmlib_ixdb
Hash collisions possible    = Yes
invalid_key                 = 0x0
hashsize                    = 163840
db_size                     = 81920
rec_size                    = 752
db_keys_offset              = 331776
hashtable_offset            = 987136
pool0_offset                = 1642520
db_offset                   = 3281056
start_alloc_index           = 0
alloc_index_tail            = 81919
serial                      = 1

========= DB Allocation ==========
DB alloc never happened
Number of allocated db records = 0,
Number of free db records = 81920,

========= Hash Table Datas =========
Used hash table entries = 0,
Unused hash table entries = 163840,
Collisions = 0,

========== Pools stats ===========
Pool0 linked list pool information
version = 0,    magic = 0xfeef1f00,
pool id/ serial = 0/0,
size in bytes  = 1638536,
Total entries = 81920,
Free entries = 81920,
next pool size = 0
```

show dsc

To display the current designated shelf controller (DSC) configuration for the shelf or for the system, enter the **show dsc** command in administration EXEC mode.

show dsc

Command Default This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

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

For more information about identifying and selecting a DSC on your router, see *Cisco ASR 9000 Series Aggregation Services Router Getting Started Guide*.

Task ID

Task ID	Operations
system	read

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

```
RP/0/RSP0/CPU0:PE44_ASR-9010(admin)# show dsc

Thu Jul 30 02:51:59.628 DST
NODE         ROLE
=======================
0/RSP0/CPU0  DSC
```

show environment

To display environmental monitor parameters for the system, use the **show environment** command in the appropriate mode.

EXEC Mode:
show environment [**all** | **last** | **leds** | **table** | **temperatures** | **voltages**] [*node-id*]
Administration EXEC Mode:
show environment [**all** | **fans** | **last** | **leds** | **power-supply** | **table** | **temperatures** | **trace** | **voltages**] [*node-id*]

Syntax Description

all	(Optional) Displays information for all environmental monitor parameters.
fans	(Optional) Displays information about the fans.
last	(Optional) Displays the environmental statistics at the time of the last shutdown.
leds	(Optional) Displays monitor parameters for LEDs on all cards in the node.
power-supply	(Optional) Displays power supply voltage and current information.
table	(Optional) Displays environmental parameter ranges.
temperatures	(Optional) Displays system temperature information.
voltages	(Optional) Displays system voltage information.
node-id	(Optional) Node whose information you want to display. The *node-id* argument is expressed in the *rack*/*slot*/*module* notation.

Command Default

All environmental monitor parameters are displayed.

Command Modes

EXEC

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Release	Modification
Release 6.3.3	**power-supply** field descriptions modified to include Power Budget Mode and N+1 mode related details

Usage Guidelines

The **show environment** command displays information about the hardware that is installed in the system, including fans, LEDs, power supply voltage, and current information and temperatures.

Task ID

Task ID	Operations
system	read

The following example shows sample output from the **show environment** command with the **temperatures** keyword:

```
RP/0/RSP0/CPU0:router# show env temperatures

Sun Aug  8 23:18:15.153 ABC

R/S/I   Modules          Inlet              Hotspot
                         Temperature        Temperature
                         (deg C)            (deg C)

0/RSP0/*
        host               21.2               30.8
0/RSP1/*
        host               20.5               30.3
0/5/*
        host               23.2               30.9
```

Table 65: show environment temperatures Field Descriptions, on page 1002 describes the significant fields shown in the display.

Table 65: show environment temperatures Field Descriptions

Field	Description
R/S/I	Rack number, slot number, and interface for which information is displayed, in the format *rack/slot/module*.
Modules	Module for which temperature information is displayed.
Inlet Temperature (deg C)	Current temperature of the inlet sensor, in degrees Celsius. **Note** The inlet temperature corresponds to the room air temperature entering the router.
Exhaust Temperature (deg C)	Current temperature of the exhaust sensor, in degrees Celsius. **Note** The exhaust temperature corresponds to the air being exhausted from the router.

Field	Description
Hotspot Temperature (deg C)	Current temperature of the hotspot, in degrees Celsius.

```
RP/0/RSP0/CPU0:router# show env leds

Sun Aug  8 23:18:19.416 ABC
R/S/I   Modules LED             Status
0/RSP0/*
        host    Critical-Alarm  Off
        host    Major-Alarm     Off
        host    Minor-Alarm     Off
        host    ACO             Off
        host    Fail            Off
0/RSP1/*
        host    Critical-Alarm  On
        host    Major-Alarm     Off
        host    Minor-Alarm     Off
        host    ACO             Off
        host    Fail            Off
```

Table 66: show environment leds Field Descriptions, on page 1003describes the significant fields shown in the display.

Table 66: show environment leds Field Descriptions

Field	Description
rack_num/*slot_num*/*:	Rack number and slot number where the node resides.
Module (host) LED status says:	Current LED status of the specified node.

The following example shows sample output from the **show environment** command the with the **power-supply** keyword:

```
RP/0/RSP0/CPU0:router(admin)# show environment power-supply

Wed Aug  4 23:38:25.033 DST
R/S/I   Modules         Capacity        Status
                        (W)
0/PM0/*
        host    PM      3000            Ok
0/PM1/*
        host    PM      3000            Ok
0/PM2/*
        host    PM      3000            Ok

R/S/I   Power Draw      Voltage         Current
        (W)             (V)             (A)
0/PM0/* 494.9           53.8            9.2
0/PM1/* 581.0           53.8            10.8
0/PM2/* 0.0             54.1            0.0
--------------
Total:  1075.9

Power Shelves Type: AC

Total Power Capacity:                           9000W
```

```
Usable Power Capacity:                          9000W
Supply Failure Protected Capacity:              6000W
Feed Failure Protected Capacity:                3000W
Worst Case Power Used:                          2720W

 Slot                                                      Max Watts
 ----                                                      ---------
 0/1/CPU0                                                        350
 0/RSP0/CPU0                                                     235
 0/RSP1/CPU0                                                     235  (default)
 0/4/CPU0                                                        350
 0/6/CPU0                                                        350
 0/FT0/SP                                                        600
 0/FT1/SP                                                        600

Worst Case Power Available:             6280W
Supply Protected Capacity Available:    3280W
Feed Protected Capacity Available:       280W
```

This table describes the significant fields shown in the display.

Table 67: show environment power-supply Field Descriptions

Field	Description
R/S/I	Rack number, slot number, and interface for which information is displayed, in the format PEM/Power Module/* (for example 0/PM0/*).
Modules	Module for which power information is displayed.
Capacity	Power capacity of each power module in Watts.
Status	Operational status of power modules.
Power Draw	Real (measured) power drawn from each power module.
Voltage	Real (measured) power module voltage.
Current	Real (measured) power module current draw.
Power Shelves Type	AC or DC.
Total Power Capacity	Sum of the power capacity of each of the modules installed in the chassis.
Usable Power Capacity	Sum of the power capacity of each of the powered and operational power modules installed in the chassis.
Supply Failure Protected Capacity	Protected power capacity of the chassis with power module redundancy (ASR 9010 AC 3+3, ASR 9010 DC 5+1, ASR 9006 AC 2+1, ASR 9010 DC 2+1).
Feed Failure Protected Capacity	Feed protected power capacity. This value applies to the ASR 9010 AC system only.
Worst Case Power Used	Sum of the estimated power draw of each of the load modules in the chassis. Load modules can be fan trays, RSPs and line cards.
Worst Case Power Available	Usable power capacity minus the worst case power used.

Field	Description
Supply Protected Capacity Available	Supply failure protected capacity minus the worst case power used.
Feed Protected Capacity Available	Feed failure protected capacity minus the worst case power used.
Power Budget Enforcement	This field displays the Power Budget Enforcement status as Enabled or Disabled.
Power Budget Mode	This field displays the power redundancy mode used (for example, N+1).
N+1 Supply Failure Protected Capacity	This field represents the Supply Protected Power capacity of the chassis with power module redundancy in N+1 mode.

show fpd package

To display which shared port adapters (SPA) and SPA interface processors (SIPs) are supported with your current Cisco IOS XR software release, which field-programmable device (FPD) image you need for each SPA and SIP, and what the minimum hardware requirements are for the SPA and SIP modules, use the **show fpd package** command in administration EXEC mode.

show fpd package

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

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

If there are multiple FPD images for your card, use the **show fpd package** command to determine which FPD image to use if you only want to upgrade a specific FPD type.

Task ID

Task ID	Operations
sysmgr	read

The following example shows sample output from the **show fpd package** command:

```
show fpd package
Tue Jan 22 13:56:00.212 UTC

================================ ============================================
                                        Field Programmable Device Package
                                 ============================================
                                                 Req     SW      Min Req   Min Req
Card Type            FPD Description             Reload  Ver     SW Ver  Board Ver
================== ========================== ====== ======= ======== =========
--------------------------------------------------------------------------------
NC55-1200W-ACFW      LIT-PriMCU-ACFW(A)          NO      2.09    2.09    0.0
--------------------------------------------------------------------------------
NC55-900W-ACFW-I     LIT-PriMCU-ACFW-I(A)        NO      1.04    1.04    0.0
--------------------------------------------------------------------------------
NC55-900W-DCFW-I     LIT-PriMCU-DCFW-I(A)        NO      2.260   2.260   0.0
--------------------------------------------------------------------------------
NC55-930W-DCFW-C     LIT-PriMCU-DCFW-C(A)        NO      2.259   2.259   0.0
--------------------------------------------------------------------------------
NC55-MPA-12T-S       MPAFPGA                     YES     0.27    0.27    0.0
--------------------------------------------------------------------------------
NC55-MPA-1TH2H-S     -WDM-D-1HL_DCO_2            NO     38.518  38.518   0.1
```

```
                    MPAFPGA                   YES      0.53    0.53    0.0
                    WDM-DE-1HL_DCO_2          NO      38.518  38.518   0.1
                    WDM-DS-1HL_DCO_2          NO      38.268  38.268   0.1
--------------------------------------------------------------------------------
NC55-MPA-2TH-HX-S   -WDM-D-1HL_DCO_0          NO      38.518  38.518   0.1
                    -WDM-D-1HL_DCO_1          NO      38.518  38.518   0.1
                    MPAFPGA                   YES      0.53    0.53    0.0
                    WDM-DE-1HL_DCO_0          NO      38.518  38.518   0.1
                    WDM-DE-1HL_DCO_1          NO      38.518  38.518   0.1
                    WDM-DS-1HL_DCO_0          NO      38.268  38.268   0.1
                    WDM-DS-1HL_DCO_1          NO      38.268  38.268   0.1
--------------------------------------------------------------------------------
NC55-MPA-2TH-S      -WDM-D-1HL_DCO_0          NO      38.518  38.518   0.1
                    -WDM-D-1HL_DCO_1          NO      38.518  38.518   0.1
                    MPAFPGA                   YES      0.53    0.53    0.0
                    WDM-DE-1HL_DCO_0          NO      38.518  38.518   0.1
                    WDM-DE-1HL_DCO_1          NO      38.518  38.518   0.1
                    WDM-DS-1HL_DCO_0          NO      38.268  38.268   0.1
                    WDM-DS-1HL_DCO_1          NO      38.268  38.268   0.1
--------------------------------------------------------------------------------
NC55-MPA-4H-HD-S    MPAFPGA                   YES      0.53    0.53    0.0
--------------------------------------------------------------------------------
NC55-MPA-4H-HX-S    MPAFPGA                   YES      0.53    0.53    0.0
--------------------------------------------------------------------------------
NC55-MPA-4H-S       MPAFPGA                   YES      0.53    0.53    0.0
--------------------------------------------------------------------------------
NC55A2-MOD-SE-H-S   Bootloader(A)             YES      1.11    1.11    0.0
                    CPU-IOFPGA(A)             YES      1.18    1.18    0.1
                    MB-IOFPGA(A)              YES      0.18    0.18    0.1
                    MB-MIFPGA                 YES      0.19    0.19    0.0
                    SATA(A)                   NO       5.00    5.00    0.0
--------------------------------------------------------------------------------
NCS-55A2-MOD-HD-S   Bootloader(A)             YES      1.11    1.11    0.0
                    CPU-IOFPGA(A)             YES      1.18    1.18    0.1
                    MB-IOFPGA(A)              YES      0.18    0.18    0.1
                    MB-MIFPGA                 YES      0.19    0.19    0.0
                    SATA(A)                   NO       5.00    5.00    0.0
--------------------------------------------------------------------------------
NCS-55A2-MOD-HX-S   Bootloader(A)             YES      1.11    1.11    0.0
                    CPU-IOFPGA(A)             YES      1.18    1.18    0.1
                    MB-IOFPGA(A)              YES      0.18    0.18    0.1
                    MB-MIFPGA                 YES      0.19    0.19    0.0
                    SATA(A)                   NO       5.00    5.00    0.0
--------------------------------------------------------------------------------
NCS-55A2-MOD-S      Bootloader(A)             YES      1.11    1.11    0.0
                    CPU-IOFPGA(A)             YES      1.18    1.18    0.1
                    MB-IOFPGA(A)              YES      0.18    0.18    0.1
                    MB-MIFPGA                 YES      0.19    0.19    0.0
                    SATA(A)                   NO       5.00    5.00    0.0
--------------------------------------------------------------------------------
NCS-55A2-MOD-SE-S   Bootloader(A)             YES      1.11    1.11    0.0
                    CPU-IOFPGA(A)             YES      1.18    1.18    0.1
                    MB-IOFPGA(A)              YES      0.18    0.18    0.1
                    MB-MIFPGA                 YES      0.19    0.19    0.0
                    SATA(A)                   NO       5.00    5.00    0.0
                    STATSFPGA                 YES      0.01    0.01    0.0
```

This table describes the significant fields shown in the display:

Table 68: show fpd package Field Descriptions

Field	Description
Card Type	Module part number.
FPD Description	Description of all FPD images available for the line card.
Type	Hardware type. Possible types can be: • spa—Shared port adapter • lc—Line card
Subtype	FPD subtype. These values are used in the **upgrade hw-module fpd** command to indicate a specific FPD image type to upgrade.
SW Version	FPD software version recommended for the associated module running the current Cisco IOS XR software.
Min Req SW Vers	Minimum required FPD image software version to operate the card. Version 0.0 indicates that a minimum required image was not programmed into the card.
Min Req HW Vers	Minimum required hardware version for the associated FPD image. A minimum hardware requirement of version 0.0 indicates that all hardware can support this FPD image version.



Note In the **show fpd package** command output, the "subtype" column shows the FPDs that correspond with each line card image. To upgrade a specific FPD with the **upgrade hw-module fpd** command, replace the *fpga-type* argument with the appropriate FPD from the "subtype" column, as shown in the following example:

```
RP/0/RSP0/CPU0:router(admin)# upgrade hw-module fpd fpga2 location 0/3/1 reload
```

show hw-module fpd

To display field-programmable device (FPD) compatibility for all modules or a specific module, use the **show hw-module fpd** command in the EXEC or administration EXE mode.

show hw-module fpd location {*node-id* | **all**}

Syntax Description

location {*node-id* | **all**}	Specifies the location of the module. The *node-id* argument is expressed in the *rack/slot/module* notation. Use the **all** keyword to indicate all nodes.

Command Default

No default behavior or values

Command Modes

EXEC

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	Support was added for the 2-port channelized OC-12/DS0 SPA.
Release 4.3.2	Support for Back-plane identification (BPID) nodes.

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
sysmgr	read
root-lr	read

The following example shows how to display FPD compatibility for all modules in the router:

```
RP/0/RSP0/CPU0:router# ios#show hw-module fpd
Tue Jan 22 13:56:55.082 UTC
                                                                    FPD Versions
                                                                    ================
Location   Card type        HWver FPD device       ATR Status   Running Programd
-------------------------------------------------------------------------------
0/RP0      NCS-55A2-MOD-S    0.3   MB-MIFPGA            CURRENT    0.19    0.19
0/RP0      NCS-55A2-MOD-S    0.3   Bootloader           CURRENT    1.10    1.10
0/RP0      NCS-55A2-MOD-S    0.3   CPU-IOFPGA           CURRENT    1.18    1.18
0/RP0      NCS-55A2-MOD-S    0.3   MB-IOFPGA            CURRENT    0.18    0.18
0/PM0      NC55-1200W-ACFW   1.0   LIT-PriMCU-ACFW      NEED UPGD  2.08    2.08
0/PM1      NC55-1200W-ACFW   1.0   LIT-PriMCU-ACFW      NEED UPGD  2.08    2.08
RP/0/RP0/CPU0:ios#.
```

Note After Release 5.3.x, Upg/Dng? will display Yes only for upgrade.

The following example shows the FPD for which upgrage will be skipped.

```
RP/0/RSP1/CPU0:router# show hw-module fpd location all

Mon Jun 29 05:38:50.332 PST

==================================== ========================================
                                     Existing Field Programmable Devices
                                     ========================================
                                       HW                          Current SW Upg/
Location     Card Type               Version Type Subtype Inst   Version    Dng?
============ ======================= ======= ==== ======= ==== =========== ====
0/RSP0/CPU0  A9K-RSP-4G                4.8   lc   fpga3   0       1.13     No
                                             lc   fpga1   0       1.5      No
                                             lc   fpga2   0       1.14     No
                                             lc   cbc     0       1.2      No
                                             lc   fpga4   0       1.6      No
                                             lc   rommon  0       1.0      No
-------------------------------------------------------------------------------
0/RSP0/CPU0  ASR-9010-FAN              1.0   lc   cbc     1       4.0      No
-------------------------------------------------------------------------------
0/RSP0/CPU0  ASR-9010-FAN              1.0   lc   cbc     2       4.0      No
-------------------------------------------------------------------------------
0/1/CPU0     A9K-40GE-B                1.0   lc   fpga1   0       0.38     No
                                             lc   fpga2   0       0.8      No
                                             lc   cbc     0       2.2      No
                                             lc   cpld1   0       0.15     No
                                             lc   rommon  0       1.0      No
-------------------------------------------------------------------------------
0/1/CPU0     A9K-40GE-B                1.0   lc   fpga1   1       0.38     No
-------------------------------------------------------------------------------
0/4/CPU0     A9K-8T/4-B                1.0   lc   fpga1   0       0.38     No
                                             lc   fpga2   0       0.10     No
                                             lc   cbc     0       2.2      No
                                             lc   cpld2   0       0.7      No
                                             lc   cpld1   0       0.15     No
                                             lc   cpld3   0       0.3      No
                                             lc   rommon  0       1.0      No
                                             lc   fpga3   0      14.42     No
-------------------------------------------------------------------------------
0/4/CPU0     A9K-8T/4-B                1.0   lc   fpga1   1       0.38     No
-------------------------------------------------------------------------------
0/6/CPU0     A9K-4T-B                  1.0   lc   fpga1   0       0.38     No
                                             lc   fpga2   0       0.10     No
                                             lc   cbc     0       2.2      No
                                             lc   cpld2   0       0.7      No
                                             lc   cpld1   0       0.15     No
                                             lc   cpld3   0       0.3      No
                                             lc   rommon  0       1.0      No
                                             lc   fpga3   0      14.42     No
-------------------------------------------------------------------------------
0/6/CPU0     A9K-4T-B                  1.0   lc   fpga1   1       0.38     No
-------------------------------------------------------------------------------
```

The following example shows how to display FPD compatibility for a specific module in the router:

Table 69: show hw-module fpd Field Descriptions

Field	Description
Location	Location of the module in the *rack*/*slot*/*module* notation.
Card Type	Module part number.
HW Version	Hardware model version for the module.
Type	Hardware type. Can be one of the following types: • spa—Shared port adapter • lc—Line card
Subtype	FPD type. Can be one of the following types: • fabldr—Fabric downloader • fpga1—Field-programmable gate array • fpga2—Field-programmable gate array 2 • fpga3—Field-programmable gate array 3 • fpga4—Field-programmable gate array 4 • fpga5—Field-programmable gate array 5 • rommonA—Read-only memory monitor A • rommon—Read-only memory monitor B
Inst	FPD instance. The FPD instance uniquely identifies an FPD and is used by the FPD process to register an FPD.
Current SW Version	Currently running FPD image version.
Upg/Dng?	Specifies whether an FPD upgrade or downgrade is required. A downgrade is required in rare cases when the version of the FPD image has a higher major revision than the version of the FPD image in the current Cisco IOS XR software package.

show hw-module profile

To display the active profiles on the router, use the **show hw-module profile** command in EXEC mode.

Syntax Description

feature	Displays information regarding active feature profiles.
location *node-id*	Displays the active profile for a particular node.

Command Modes

EXEC

Command History

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 hw-module profile** command displays only active profiles. If a profile has been configured and the line card has not be reloaded since the configuration, the profile is not active. Use the **show running-config hw-module profile** command to view configured profiles.

Task ID

Task ID	Operation
root-lr	read

This example shows sample output from the **show hw-module profiles** command with the **feature** keyword:

Related Commands

Command	Description
hw-module profile feature, on page 964	Enables a feature bundle on the router.

show hw-module subslot brief

To display summary information related to a specified internal hardware device on a shared port adapter (SPA), use the **show hw-module subslot brief** command in

EXEC

mode.

show hw-module subslot [*node-id*] **brief** [*device* [*device-index* [*device-subindex*]]]

Syntax Description

node-id	(Optional) Location for which to display the specified information. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.
device	(Optional) Internal hardware device for which to display the specified information. Valid devices include: • **analog-digital-converter**—Displays analog-to-digital converter information. • **c2w**—Displays Cisco-to-wire bus device information. • **fpga**—Displays SPA field-programmable gate array information. • **framer**—Displays SONET framer information. (Not applicable to Ethernet SPAs.) • **hdlc**—Displays SPA hdlc information, where applicable. • **l2-tcam**—Displays SPA Layer 2 ternary content addressable memory information. (Not applicable to POS SPAs.) • **mac**—Displays SPA MAC information. (Not applicable to POS SPAs.) • **pluggable-optics**—Displays pluggable-optics module information. • **power-margining**—Displays power-margining device information. • **sar**—Displays SPA ATM SAR information. • **sdcc**—Displays section data communications channel device information. (Not applicable to Ethernet SPAs.) • **serdes**—Displays SPA serializer/deserializer information. • **spi4**—Displays system packet interface level 4.2 bus device information. • **temperature-sensor**—Displays temperature sensor information.
device-index	(Optional) Index of the specific device if there are multiple devices of the same type.
device-subindex	(Optional) Subindex of the specific device if there are multiple devices of the same device index.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

You can also enter a partially qualified location specifier by using the wildcard (*) character. For example, 0/1/* would display information for all modules on slot 1 in rack 0.

Use the **show hw-module subslot brief** command to obtain summary diagnostic information about a device on an interface on the SPA.

Task ID

Task ID	Operations
root-lr	read

The following example shows sample output for the **show hw-module subslot brief** command:

```
RP/0/RSP0/CPU0:router# show hw-module subslot 0/1/0 brief

  Subslot 0/1/0 brief info:
  -------------------------
  SPA inserted: YES
  SPA type:     4xOC3 POS SPA
  SPA operational state: READY
  SPA cfg admin up: YES
```

Table 70: show hw-module subslot config Field Descriptions

Field	Description
SPA inserted	Indicates if a SPA is currently detected in the subslot.
SPA type	Description of SPA including the technology type, number of ports, height of SPA (HHSPA—single height, FHSPA—double height), and optics type.
SPA operational state	Current state of the SPA module.
SPA cfg admin up	Configured state of the SPA: YES—the SPA is not shut down; NO—the SPA is shut down.

show hw-module subslot config

To display information related to configuration of the specified internal hardware device on a shared port adapter (SPA), use the **show hw-module subslot config** command in EXEC

mode.

show hw-module subslot [*node-id*] **config** [*device* [*device-index* [*device-subindex*]]]

Syntax Description

node-id	(Optional) Location for which to display the specified information. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.
device	(Optional) Internal hardware device for which to display the specified information. Valid devices include: • **analog-digital-converter**—Displays analog-to-digital converter information. • **c2w**—Displays Cisco-to-wire bus device information. • **fpga**—Displays SPA field-programmable gate array information. • **framer**—Displays SONET framer information. (Not applicable to Ethernet SPAs.) • **hdlc**—Displays SPA hdlc information, where applicable. • **l2-tcam**—Displays SPA Layer 2 ternary content addressable memory information. (Not applicable to POS SPAs.) • **mac**—Displays SPA MAC information. (Not applicable to POS SPAs.) • **pluggable-optics**—Displays pluggable-optics module information. • **power-margining**—Displays power-margining device information. • **sar**—Displays SPA ATM SAR information. • **sdcc**—Displays section data communications channel device information. (Not applicable to Ethernet SPAs.) • **serdes**—Displays SPA serializer/deserializer information. • **spi4**—Displays system packet interface level 4.2 bus device information. • **temperature-sensor**—Displays temperature sensor information.
device-index	(Optional) Index of the specific device if there are multiple devices of the same type.
device-subindex	(Optional) Subindex of the specific device if there are multiple devices of the same device index.

Command Default

No default behavior or values

Command Modes

EXEC

Release 5.0.0

Command History

Release	Modification
Release 3.9.0	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.

You can also enter a partially qualified location specifier by using the wildcard (*) character. For example, 0/1/* would display information for all modules on slot 1 in rack 0.

Use the **show hw-module subslot config** command to obtain diagnostic information about the configuration of an interface on the SPA.

Task ID

Task ID	Operations
root-lr	read

The following example shows sample output for the **show hw-module subslot config** command:

```
RP/0/RSP0/CPU0:router# show hw-module subslot 0/6/cpu0 config

 Thu Feb 19 00:33:02.921 PST

Subslot 0/6/0 config info:
------------------------
SPA inserted: YES
SPA cfg admin up: YES
SPA cfg power up: YES

Subslot 0/6/1 config info:
------------------------
SPA inserted: YES
SPA cfg admin up: YES
SPA cfg power up: YES

Subslot 0/6/2 config info:
------------------------
SPA inserted: NO
SPA cfg admin up: YES
SPA cfg power up: NO

Subslot 0/6/3 config info:
------------------------
SPA inserted: NO
SPA cfg admin up: YES
SPA cfg power up: NO

Subslot 0/6/4 config info:
------------------------
SPA inserted: NO
SPA cfg admin up: YES
SPA cfg power up: NO

Subslot 0/6/5 config info:
------------------------
SPA inserted: NO
```

```
SPA cfg admin up: YES
SPA cfg power up: NO
```

Table 71: show hw-module subslot config Field Descriptions

Field	Description
SPA inserted	Indicates if a SPA is currently detected in the subslot.
SPA cfg admin up	Configured state of the SPA: YES—the SPA is not shut down; NO—the SPA is shut down.
SPA cfg power up	Indicates whether the subslot is currently configured as powered or not.

Related Commands

Command	Description
show controllers	Displays the controller type and other information.

show hw-module subslot counters

To display statistics related to the processing of internal hardware devices for a shared port adapter (SPA), use the **show hw-module subslot counters** command in EXEC

mode.

show hw-module subslot [*node-id*] **counters** [*device* [*device-index* [*device-subindex*]]]

Syntax Description

node-id	(Optional) Location for which to display the specified information. The *node-id* argument is entered in the *rack/slot/module* notation.
device	(Optional) Internal hardware device for which to display the specified information. Valid devices include: • **analog-digital-converter**—Displays analog-to-digital converter information. • **c2w**—Displays Cisco-to-wire bus device information. • **fpga**—Displays SPA field-programmable gate array information. • **framer**—Displays SONET framer information. (Not applicable to Ethernet SPAs.) • **hdlc**—Displays SPA hdlc information, where applicable. • **l2-tcam**—Displays SPA Layer 2 ternary content addressable memory information. (Not applicable to POS SPAs.) • **mac**—Displays SPA MAC information. (Not applicable to POS SPAs.) • **pluggable-optics**—Displays pluggable-optics module information. • **power-margining**—Displays power-margining device information. • **sar**—Displays SPA ATM SAR information. • **sdcc**—Displays section data communications channel device information. (Not applicable to Ethernet SPAs.) • **serdes**—Displays SPA serializer/deserializer information. • **spi4**—Displays system packet interface level 4.2 bus device information. • **temperature-sensor**—Displays temperature sensor information.
device-index	(Optional) Index of the specific device if there are multiple devices of the same type.
device-subindex	(Optional) Subindex of the specific device if there are multiple devices of the same device index.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

You can also enter a partially qualified location specifier by using the wildcard (*) character. For example, 0/1/* would display information for all modules on slot 1 in rack 0.

Use the **show hw-module subslot counters** command to display statistics related to the processing by the specified internal hardware device.

Task ID

Task ID	Operations
root-lr	read

The following example shows sample output for the **show hw-module subslot counters** command:

```
RP/0/RSP0/CPU0:router# show hw-module subslot 0/1/cpu0 counters

Subslot 0/1/0 counts info:
------------------------
SPA inserted: YES
SPA type:     8xGE SPA
SPA operational state: READY
SPA insertion time:  Wed Jan 14 11:33:24 2009
SPA last time ready: Wed Jan 14 11:33:37 2009
SPA uptime [HH:MM:SS]: 852:54:24

Subslot 0/1/1 counts info:
------------------------
SPA inserted: YES
SPA type:     5xGE SPA
SPA operational state: READY
SPA insertion time:  Wed Jan 14 11:33:24 2009
SPA last time ready: Wed Jan 14 11:33:38 2009
SPA uptime [HH:MM:SS]: 852:54:23
 --More--
```

Table 72: show hw-module subslot counters Field Descriptions

Field	Description
SPA inserted	Indicates if a SPA is currently detected in the subslot.
SPA type	Description of SPA including the technology type, number of ports, height of SPA (HHSPA—single height, FHSPA—double height), and optics type.
SPA operational state	Current state of the SPA module.
SPA insertion time	Time the SPA module was last physically inserted or power-cycled.

Field	Description
SPA last time ready	Time the SPA module last changed state to up or ready (the last time the module was loaded or reloaded).
SPA uptime	The time in service or amount of time since the module was last out of service due to a reload, power cycle, or configuration event.

The following example shows sample output for the **show hw-module subslot counters** command with the **framer** keyword:

```
RP/0/RSP0/CPU0:router# show hw-module subslot counters framer

  SPA device framer index 0 subindex 0 info:

  Milan Framer counters:
  STREAM 0
  Rx Bytes (48-bit) (#0x381fa078-0x883c): 163857232569448
  Rx Good Bytes (48-bit) (#0x381fa080-0x8840): 1964924
  Rx Good Packets (48-bit) (#0x381fa040-0x8820): 26234
  Tx Byte Cnt Reg (48-bit) (#0x381fe070-0xa838): 9375380
  Tx Good Bytes Cnt Reg (48-bit) (#0x381fe068-0xa834): 8909442
  Tx Transmitted Packet Cnt Reg (48-bit) (#0x381fe040-0xa820): 114692
```

show hw-module subslot errors

To display error information about internal hardware devices for a shared port adapter (SPA), use the **show hw-module subslot errors** command in

EXEC

mode.

show hw-module subslot [*node-id*] **errors** [*device* [*device-index* [*device-subindex*]]]

Syntax Description

node-id	(Optional) Location for which to display the specified information. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.
device	(Optional) Internal hardware device for which to display the specified information. Valid devices include: • **analog-digital-converter**—Displays analog-to-digital converter information. • **c2w**—Displays Cisco-to-wire bus device information. • **fpga**—Displays SPA field-programmable gate array information. • **framer**—Displays SONET framer information. (Not applicable to Ethernet SPAs.) • **hdlc**—Displays SPA hdlc information, where applicable. • **l2-tcam**—Displays SPA Layer 2 ternary content addressable memory information. (Not applicable to POS SPAs.) • **mac**—Displays SPA MAC information. (Not applicable to POS SPAs.) • **pluggable-optics**—Displays pluggable-optics module information. • **power-margining**—Displays power-margining device information. • **sar**—Displays SPA ATM SAR information. • **sdcc**—Displays section data communications channel device information. (Not applicable to Ethernet SPAs.) • **serdes**—Displays SPA serializer/deserializer information. • **spi4**—Displays system packet interface level 4.2 bus device information. • **temperature-sensor**—Displays temperature sensor information.
device-index	(Optional) Index of the specific device if there are multiple devices of the same type.
device-subindex	(Optional) Subindex of the specific device if there are multiple devices of the same device index.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

You can also enter a partially qualified location specifier by using the wildcard (*) character. For example, 0/1/* would display information for all modules on slot 1 in rack 0.

Use the **show hw-module subslot errors** command to display error information related to the specified internal hardware device on a SPA.

Task ID

Task ID	Operations
root-lr	read

The following example shows partial sample output for the **show hw-module subslot errors** command:

```
RP/0/RSP0/CPU0:router# show hw-module subslot 0/1/0 errors

Subslot 0/1/0 errors info:
  ------------------------
  SPA inserted: YES
  SPA type:     4xOC3 POS SPA
  SPA operational state: READY
  SPA last reset reason:   UNKNOWN
  SPA last failure reason: UNKNOWN

  Subslot 0/1/1 errors info:
  ------------------------
  SPA inserted: YES
  SPA type:     1x10GE XFP SPA
  SPA operational state: READY
  SPA last reset reason:   UNKNOWN
  SPA last failure reason: UNKNOWN

  Subslot 0/1/2 errors info:
  ------------------------
  SPA inserted: NO

  Subslot 0/1/3 errors info:
  ------------------------
  SPA inserted: NO

  Subslot 0/1/4 errors info:
  ------------------------
  SPA inserted: YES
  SPA type:     4xOC48 POS/RPR HHSPA
  SPA operational state: READY
  SPA last reset reason:   UNKNOWN
  SPA last failure reason: UNKNOWN

  Subslot 0/1/5 errors info:
  ------------------------
```

```
SPA inserted: YES
SPA type:     8xGE SPA
SPA operational state: READY
SPA last reset reason:   UNKNOWN
SPA last failure reason: UNKNOWN

 --More--
```

Table 73: show hw-module subslot errors Field Descriptions

Field	Description
Subslot */*/* errors info	SPA for which error information is being displayed. The location of the SPA is expressed in the *rack/slot/module* notation.
SPA inserted	Indication if a SPA is currently detected in the subslot.
SPA type	Description of SPA including the technology type, number of ports, height of SPA (HHSPA—single-height, FHSPA—double-height), and optics type.
SPA operational state	Current operational state of the SPA module.
SPA last reset reason	Reason for the most recent reset of this SPA.
SPA last failure reason	Reason for the last failure on this SPA.

Related Commands

Command	Description
show controllers	Displays the controller type and other information.

show hw-module subslot plim-subblock

To display SPA firmware information for a shared port adapter (SPA), use the **show hw-module subslot plim-subblock** command in

EXEC

mode.

show hw-module subslot [*node-id*] **plim-subblock**

Syntax Description

node-id	(Optional) Location for which to display the specified information. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

Use the **show hw-module subslot plim-subblock** command to display SPA firmware information, both kernel and application information, as well as heartbeat and keepalive information. The **show hw-module subslot plim-subblock** command is mainly used for debugging purposes.

Task ID

Task ID	Operations
root-lr	read

The following example shows sample output for the **show hw-module subslot plim-subblock** command:

```
RP/0/0/CPU0:router# show hw-module subslot 0/5/0 plim-subblock

  Subslot 0/5/0 Plim Subblock Info:
  -------------------------------------

  Firmware information:
    SPA v4.10.1, ifs-spa_ppc_iox.elf
    Application v3.44.0, spa_ct3_pat_apps_iox.tar.gz

  SPA keepalive information:
    Heartbeat check disabled : FALSE
    Keepalive seq 372638, seen 372637, Time since last ipc keep 1s
```

Related Commands

Command	Description
show controllers	Displays the controller type and other information.

show hw-module subslot registers

To display register information about internal hardware devices for a shared port adapter (SPA), use the **show hw-module subslot registers** command in

EXEC

mode.

show hw-module subslot [*node-id*] **registers** [*device* [*device-index* [*device-subindex*]]]

Syntax Description

node-id	(Optional) Location for which to display the specified information. The *node-id* argument is entered in the *rack/slot/module* notation.
device	(Optional) Internal hardware device for which to display the specified information. Valid devices include: • **analog-digital-converter**—Displays analog-to-digital converter information. • **c2w**—Displays Cisco-to-wire bus device information. • **fpga**—Displays SPA field-programmable gate array information. • **framer**—Displays SONET framer information. (Not applicable to Ethernet SPAs.) • **hdlc**—Displays SPA hdlc information, where applicable. • **l2-tcam**—Displays SPA Layer 2 ternary content addressable memory information. (Not applicable to POS SPAs.) • **mac**—Displays SPA MAC information. (Not applicable to POS SPAs.) • **pluggable-optics**—Displays pluggable-optics module information. • **power-margining**—Displays power-margining device information. • **sar**—Displays SPA ATM SAR information. • **sdcc**—Displays section data communications channel device information. (Not applicable to Ethernet SPAs.) • **serdes**—Displays SPA serializer/deserializer information. • **spi4**—Displays system packet interface level 4.2 bus device information. • **temperature-sensor**—Displays temperature sensor information.
device-index	(Optional) Index of the specific device if there are multiple devices of the same type.
device-subindex	(Optional) Subindex of the specific device if there are multiple devices of the same device index.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

Use the command to display the nodes on the router.

You can also enter a partially qualified location specifier by using the wildcard (*) character. For example, 0/1/* would display information for all modules on slot 1 in rack 0.

Use the **show hw-module subslot registers** command to display register information for the specified internal hardware device on the SPA.

Task ID

Task ID	Operations
root-lr	read

The following example shows sample output for the **show hw-module subslot registers** command:

```
RP/0/RSP0/CPU0:router# show hw-module subslot 0/1/cpu0 registers

 Thu Feb 19 00:38:32.908 PST

Subslot 0/1/0 registers info:
----------------------------
SPA hardware ID : 0x0
SPA SW FPGA rev.: 0x1000A

Subslot 0/1/1 registers info:
----------------------------
SPA hardware ID : 0x0
SPA SW FPGA rev.: 0x1000A

Subslot 0/1/2 registers info:
----------------------------
SPA hardware ID : 0x0
SPA SW FPGA rev.: 0x1000A

Subslot 0/1/3 registers info:
----------------------------
SPA hardware ID : 0x0
SPA SW FPGA rev.: 0x1000A

Subslot 0/1/4 registers info:
----------------------------
SPA hardware ID : 0x0
SPA SW FPGA rev.: 0x1000A

Subslot 0/1/5 registers info:
----------------------------
SPA hardware ID : 0x0
SPA SW FPGA rev.: 0x1000A
```

Table 74: show hw-module subslot registers Field Descriptions

Field	Description
SPA hardware ID	SPA hardware identifier in hexadecimal format.
SPA SW FPGA rev.	SPA software field-programmable gate array (FPGA) revision number in hexadecimal format.

Related Commands

Command	Description
show controllers	Displays the controller type and other information.

show hw-module subslot status

To display status information about internal hardware devices for a shared port adapter (SPA), use the **show hw-module subslot status** command in EXEC

mode.

show hw-module subslot [*node-id*] **status** [*device* [*device-index* [*device-subindex*]]]

Syntax Description

node-id	(Optional) Location for which to display the specified information. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.
device	(Optional) Internal hardware device for which to display the specified information. Valid devices include: • **analog-digital-converter**—Displays analog-to-digital converter information. • **c2w**—Displays Cisco-to-wire bus device information. • **fpga**—Displays SPA field-programmable gate array information. • **framer**—Displays SONET framer information. (Not applicable to Ethernet SPAs.) • **hdlc**—Displays SPA hdlc information, where applicable. • **l2-tcam**—Displays SPA Layer 2 ternary content addressable memory information. (Not applicable to POS SPAs.) • **mac**—Displays SPA MAC information. (Not applicable to POS SPAs.) • **pluggable-optics**—Displays pluggable-optics module information. • **power-margining**—Displays power-margining device information. • **sar**—Displays SPA ATM SAR information. • **sdcc**—Displays section data communications channel device information. (Not applicable to Ethernet SPAs.) • **serdes**—Displays SPA serializer/deserializer information. • **spi4**—Displays system packet interface level 4.2 bus device information. • **temperature-sensor**—Displays temperature sensor information.
device-index	(Optional) Index of the specific device if there are multiple devices of the same type.
device-subindex	(Optional) Subindex of the specific device if there are multiple devices of the same device index.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 3.9.0	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.

You can also enter a partially qualified location specifier by using the wildcard (*) character. For example, 0/1/* would display information for all modules on slot 1 in rack 0.

Use the **show hw-module subslot status** command to obtain status information about an interface on the SPA.

Task ID

Task ID	Operations
root-lr	read

The following example shows sample output for the **show hw-module subslot status** command with the **temperature-sensor** option:

```
RP/0/RSP0/CPU0:router# show hw-module subslot 0/2/CPU0 status temperature-sensor

   SPA device temperature-sensor index 0 subindex 0 info:

  DS1631 (0x0803c2e4) device status:
  temperature = 0x1c80 (28.5 degree C)

   SPA device temperature-sensor index 0 subindex 0 info:

  DS1631 (0x08063bec) device status:
  temperature = 0x1e00 (30.0 degree C)
```

Table 75: show hw-module subslot status Field Descriptions

Field	Description
DS1631 (0x0803c2e4) device status	Device for which the temperature status is displayed.
temperature = 0x1c80 (28.5 degree C)	Current temperature of the specified device, in hexadecimal format and degrees Celsius.

Related Commands

Command	Description
show controllers	Displays the controller type and other information.

show inventory

To retrieve and display information about all the Cisco products that are installed in the router, use the **show inventory** command in EXEC or administration EXEC mode.

EXEC Mode
show inventory [*node-id* | **all** | **location** {*node-id* | **all**} | **raw**]
Administration EXEC Mode
show inventory [*node-id* | **all** | **chassis** | **fans** | **location** {*node-id* | **all**} | **power-supply** | **raw**]

Syntax Description

node-id	(Optional) Location for which to display the specified information. The *node-id* argument is entered in the *rack/slot/module* notation.
all	(Optional) Displays inventory information for all the physical entities in the chassis.
location {*node-id*|**all**}	(Optional) Displays inventory information for a specific node, or for all nodes in the chassis.
raw	(Optional) Displays raw information about the chassis for diagnostic purposes.
chassis	(Optional) Displays inventory information for the entire chassis.
fans	(Optional) Displays inventory information for the fans.
power-supply	(Optional) Displays inventory information for the power supply.

Command Default

All inventory information for the entire chassis is displayed.

Command Modes

EXEC

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	Support was added for the 2-port channelized OC-12/DS0 SPA.

Usage Guidelines

If a Cisco entity is not assigned a product ID (PID), that entity is not retrieved or displayed.

Enter the **show inventory** command with the **raw** keyword to display every RFC 2737 entity installed in the router, including those without a PID, unique device identifier (UDI), or other physical identification.

Note The **raw** keyword is primarily intended for troubleshooting problems with the **show inventory** command itself.

If any of the Cisco products do not have an assigned PID, the output displays incorrect PIDs, and version ID (VID) and serial number (SN) elements may be missing.

For UDI compliance products, the PID, VID, and SN are stored in EEPROM and NVRAM. Use the **show inventory** command to display this information.

The following example shows partial sample output from the **show inventory** command with the **raw** keyword:

```
RP/0/RSP0/CPU0:router# show inventory raw

Tue Jul 28 08:49:14.080 DST
NAME: "module 0/RSP0/CPU0", DESCR: "A2K-RSP-4G-HDD="
PID: A2K-RSP-4G-HDD=    , VID: VP4, SN: FOC1230803H

NAME: "module 0/RSP0/CPU0", DESCR: "RSP Card host "
PID:                    , VID: N/A, SN:

NAME: "temperature 0/RSP0/CPU0", DESCR: "Inlet Temperature Sensor"
PID:                    , VID: N/A, SN:

NAME: "temperature 0/RSP0/CPU0", DESCR: "Hot Temperature Sensor"
PID:                    , VID: N/A, SN:

NAME: "voltage 0/RSP0/CPU0", DESCR: "Voltage Sensor - 0.75VTT"
PID:                    , VID: N/A, SN:

NAME: "voltage 0/RSP0/CPU0", DESCR: "Voltage Sensor - 0.9VTT_A"
PID:                    , VID: N/A, SN:

NAME: "voltage 0/RSP0/CPU0", DESCR: "Voltage Sensor - 0.9VTT_B"
PID:                    , VID: N/A, SN:

NAME: "voltage 0/RSP0/CPU0", DESCR: "Voltage Sensor - IBV"
PID:                    , VID: N/A, SN:

NAME: "voltage 0/RSP0/CPU0", DESCR: "Voltage Sensor - 5.0V"
PID:                    , VID: N/A, SN:

NAME: "module 0/1/CPU0", DESCR: "Cisco ASR 9000 Series SPA Interface Processor-700"
PID: A9K-SIP-700        , VID: P3A, SN: FHH132800F6

NAME: "module 0/1/0"    , DESCR: "10-port 1 GbE Shared Port Adapter V2"
PID: SPA-2XOC12C        , VID: V02, SN: JAE1239W2AI
--More--
```

Table 76: show inventory Field Descriptions, on page 1032 describes the significant fields shown in the display.

Table 76: show inventory Field Descriptions

Field	Description
NAME	Hardware for which the inventory information is displayed. If you are displaying the chassis inventory, this field shows “chassis.” If you are displaying raw inventory, or all inventory information for all nodes in the chassis, this field shows the node name in partially qualified format. For a node, the NAME is expressed in *rack*/*slot*/*module* notation.

Field	Description
DESCR	Describes the chassis or the node. Chassis descriptions provide the name of the chassis and its Gbps. Node descriptions provide the type of node and its software version.
PID	Physical model name of the chassis or node.
VID	Physical hardware revision of the chassis or node.
SN	Physical serial number for the chassis or node.

show led

To display LED information for the router, or for a specific LED location, use the **show led** command in EXEC or administration EXEC mode.

show led [**location** {*node-id* | **all**}]

Syntax Description

location {*node-id* | **all**}	(Optional) Specifies the node for which to display LED information. The *node-id* argument is expressed in the *rack/slot/module* notation. Use the **all** keyword to indicate all nodes.

Command Default

If no node is specified, information about all LEDs on the router is displayed.

Command Modes

EXEC

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

Enter the **show platform** command to see the location of all nodes installed in the router.

The following example sample output from the **show led** command with the **all** keyword:

```
RP/0/RP0/CPU0:router# show led location all

Thu Jul 30 05:26:24.896 DST
    Location         Message     Mode     Status
  ================================================
     0/RSP0/*            ACTV   DEFAULT  UNLOCKED
```

Table 77: show led location Field Descriptions

Field	Description
LOCATION	Location of the node. LOCATION is expressed in the *rack/slot/module* notation.
MESSAGE	Current message displayed by the LED.
MODE	Current operating mode of the specified node.
STATUS	Current status of the specified node.

show operational

To display all operational data provided as XML schema, use the **show operational** command in

EXEC or administration EXEC

mode.

show operational *mda-class*[*mda-class*][*mda-class/naming=value*][**descriptive**]

Syntax Description

mda-class	Name of the management data API (MDA) class to output. To specify a class name in hierarchy, all classes must be specified from the top of the class to the specific class name that you are interested in. MDA classes are case-sensitive. To view all available MDA classes, use the question mark (**?**) online help function.
descriptive	Displays more descriptive information.

Command Default

No default behavior or values

Command Modes

EXEC

Administration EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	Support was added for the 2-Port Channelized OC-12/DS0 SPA.

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.

Although the **show operational** command uses the schema database, the command displays the information in a string format like the other **show** commands. No XML related setups or knowledge is required to use the command.

Task ID

Task ID	Operations
Depends on the MDA class for which you are displaying the information	read

The following example shows sample output from the **show operational** command. Not all the output is shown.

```
RP/0/RSP0/CPU0:router# show operational BGP DefaultVRF GlobalProcessInfo descriptive
[BGP DefaultVRF GlobalProcessInfo]
InStandaloneMode: true[Standalone or Distributed mode]
RouterID: 0.0.0.0[Router ID for the local system]
ConfiguredRouterID: 0.0.0.0[Configured router ID]
LocalAS: 10[Local autonomous system #]
```

```
RestartCount: 1[No of times BGP has started]
ISRedistributeIBGPToIGPsEnabled: false[Redistribute iBGP into IGPs enabled]
IsFastExternalFalloverEnabled: true[Fast external fallover enabled]
IsBestpathMissingMEDIsWorstEnabled: false[Bestpath: Treat missing MED as worst]
.
.
.
DefaultLocalPreference: 100[Default local preference]
KeepAliveTime: 60[Default keepalive timer (seconds)]
HoldTime: 180[Default hold timer (seconds)]
GenericScanPeriod: 60[Period (in seconds) of generic scanner runs]
.
.
.
VrfIsActive: true[VRF state ]
VrfName: "default"[Name of the VRF ]
```

This example shows sample output from the **show operational** command where only the top-level MDA class is specified. Not all of the output is shown.

```
RP/0/RSP0/CPU0:router# show operational Inventory

Thu Feb 19 00:54:41.251 PST
[Inventory]
RackTable
  Rack/Number=0
    SlotTable
      Slot/Number=0
        CardTable
          Card/Number=0
            PortSlotTable
              PortSlot/Number=0
                Port
                  BasicAttributes
                    BasicInfo
                      Description: CPU_PORT_0
                      VendorType: 1.3.6.1.4.1.9.12.3.1.10
                      Name: 0/0/SP/0
                      IsFieldReplaceableUnit: false
                      CompositeClassCode: 983040
                BasicAttributes
                  BasicInfo
                    Description: CE Port Slot
                    VendorType: 1.3.6.1.4.1.9.12.3.1.5.115
                    Name: portslot 0/0/SP/0
                    IsFieldReplaceableUnit: false
                    CompositeClassCode: 0
            SensorTable
              Sensor/Number=0
                BasicAttributes
                  BasicInfo
                    Description: Temperature Sensor
                    VendorType: 1.3.6.1.4.1.9.12.3.1.8.42
                    Name: 0/0/* - host - Inlet0
                    CompositeClassCode: 720898
                    EnvironmentalMonitorPath: /admin/oper/inventory/
                     rack/0/entity/0/entity/0/entity/0/entity/0/attrib/
              Sensor/Number=1
                BasicAttributes
                  BasicInfo
                    Description: Temperature Sensor
                    VendorType: 1.3.6.1.4.1.9.12.3.1.8.42
```

```
                      Name: 0/0/* - host - Inlet1
                      CompositeClassCode: 720898
                      EnvironmentalMonitorPath: /admin/oper/inventory/
                       rack/0/entity/0/entity/0/entity/0/entity/1/attrib/
                  Sensor/Number=2
                    BasicAttributes
                      BasicInfo
                        Description: Temperature Sensor
                        VendorType: 1.3.6.1.4.1.9.12.3.1.8.42
                        Name: 0/0/* - host - Exhaust0
                        CompositeClassCode: 720898
--More--
```

show platform

To display information and status for each node in the system, use the **show platform** command in EXEC or administration EXEC mode.

show platform [*node-id*]
System admin EXEC Mode:
show platform [*location*]

Syntax Description

node-id	(Optional) Node for which to display information. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

Status and information are displayed for all nodes in the system.

Command Modes

Administration EXEC

EXEC

System Admin EXEC mode on 64-bit IOS-XR

Command History

Release	Modification
Release 3.7.2	This command was introduced.
Release 3.9.0	Support was added for the 2-Port Channelized OC-12/DS0 SPA.

Usage Guidelines

The **show platform** command provides a summary of the nodes in the system, including node type and status.

Enter the **show platform** command in administration EXEC mode to display output for the entire system. Enter the **show platform** command in EXEC mode to display output for only those nodes that belong to the SDR on which the command is executed.

For ASR-9001-S, EP1 will be displayed as, **Not allowed online**, until the required license is bought.

This example shows the sample display output for ASR9912 and ASR9922:

```
RP/0/RSP0/CPU0:router:router(admin) # show platform
Wed Jul  3 11:34:18.487 UTC
Node            Type                        State            Config State
--------------------------------------------------------------------------------
0/RP0/CPU0      ASR-9922-RP-SE(Active)      IOS XR RUN       PWR,NSHUT,MON
0/RP1/CPU0      ASR-9922-RP-TR(Standby)     IOS XR RUN       PWR,NSHUT,MON
0/FT0/SP        FAN TRAY                    READY
0/FT1/SP        FAN TRAY                    READY
0/0/CPU0        A9K-36x10GE-TR              IOS XR RUN       PWR,NSHUT,MON
0/1/CPU0        A9K-36x10GE-SE              IOS XR RUN       PWR,NSHUT,MON
0/2/CPU0        A9K-36x10GE-TR              IOS XR RUN       PWR,NSHUT,MON
0/3/CPU0        A9K-36x10GE-SE              IOS XR RUN       PWR,NSHUT,MON
0/4/CPU0        A9K-36x10GE-SE              IOS XR RUN       PWR,NSHUT,MON
0/5/CPU0        A9K-36x10GE-SE              IOS XR RUN       PWR,NSHUT,MON
0/6/CPU0        A9K-36x10GE-SE              IOS XR RUN       PWR,NSHUT,MON
0/7/CPU0        A9K-36x10GE-TR              IOS XR RUN       PWR,NSHUT,MON
0/8/CPU0        A9K-24x10GE-SE              IOS XR RUN       PWR,NSHUT,MON
0/9/CPU0        A9K-24x10GE-TR              IOS XR RUN       PWR,NSHUT,MON
```

```
0/PM0/SP        PWR-3KW-AC-V2             READY            PWR,NSHUT,MON
0/PM1/SP        PWR-3KW-AC-V2             READY            PWR,NSHUT,MON
0/PM2/SP        PWR-3KW-AC-V2             READY            PWR,NSHUT,MON
0/PM3/SP        PWR-3KW-AC-V2             READY            PWR,NSHUT,MON
0/PM4/SP        PWR-3KW-AC-V2             READY            PWR,NSHUT,MON
0/PM5/SP        PWR-3KW-AC-V2             READY            PWR,NSHUT,MON
0/FC0/SP        ASR-9912-SFC110           OK               PWR,NSHUT,MON
0/FC1/SP        ASR-9912-SFC110           OK               PWR,NSHUT,MON
0/FC2/SP        ASR-9912-SFC110           OK               PWR,NSHUT,MON
0/FC3/SP        ASR-9912-SFC110           OK               PWR,NSHUT,MON
0/FC4/SP        ASR-9912-SFC110           OK               PWR,NSHUT,MON
0/FC5/SP        ASR-9912-SFC110           OK               PWR,NSHUT,MON
0/FC6/SP        ASR-9912-SFC110           OK               PWR,NSHUT,MON
```

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

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

Thu Nov 19 21:44:49.274 UTC
Node            Type                      State            Config State
--------------------------------------------------------------------------------
0/RSP0/CPU0     A9K-RSP-4G(Active)        IOS XR RUN       PWR,NSHUT,MON
0/RSP1/CPU0     A9K-RSP-4G(Standby)       IN-RESET         PWR,NSHUT,MON
0/1/CPU0        A9K-SIP-700               IOS XR RUN       PWR,NSHUT,NMON
0/1/0           SPA-10X1GE-V2             OK               PWR,NSHUT,MON
0/1/1           SPA-1X10GE-L-V2           OK               PWR,NSHUT,MON
0/3/CPU0        A9K-40GE-B                IOS XR RUN       PWR,NSHUT,MON
0/4/CPU0        A9K-SIP-700               IOS XR RUN       PWR,NSHUT,MON
0/4/1           SPA-2XCHOC12/DS0          OK               PWR,NSHUT,MON
```

The following is sample output for the **show platform** command with the *node-id* argument:

```
RP/0/RSP0/CPU0:router# show platform 0/1/cpu0

Mon Jul 27 22:30:04.752 DST
Node            Type                      State            Config State
--------------------------------------------------------------------------------
0/1/CPU0        A9K-40GE-B                IOS XR RUN       PWR,NSHUT,MON
```

This table describes the significant fields shown in the display.

Table 78: show platform Field Descriptions

Field	Description
Node	Identifier of the node in the *rack*/*slot*/*module* notation.
Type	Type of node.
State	Current state of the specified node.
Config State	Current status of the specified node.

The following is sample output for the **show platform** command with the location argument:

Note The location argument is only applicable for IOS XR 64 Bit version on ASR 9000 Enhanced XR (eXR).

```
sysadmin-vm:0_RSP0# show platform

Thu Jun  15 06:14:46.667 UTC+00:00
Location  Card Type               HW State      SW State      Config State
------------------------------------------------------------------------------
0/0       A99-32X100GE-TR         OPERATIONAL   OPERATIONAL   NSHUT
0/RSP0    A9K-RSP5-64G            OPERATIONAL   OPERATIONAL   NSHUT
```

show power allotted

To display the power allotted to the cards in the chassis, use the **show power allotted** command in administration EXEC mode.

show power allotted {**location** *node-id* | **rack** *rack-no* | **summary**}

Syntax Description

location *node-id*	Displays the power consumption for the specified location. The node-id argument is entered in the *rack/slot/module* notation.
rack *rack-no*	Displays the power consumption for the specified rack.
summary	Displays summary information for all racks.

Command Default

None

Command Modes

Administration EXEC

Command History

Release	Modification
Release 4.3.0	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 display for modular power supplies is by card. The display for fixed power supplies is by zone and card.

Task ID

Task ID	Operation
power	read

This example shows sample output from the **show power allocated** command on a modular power supply:

```
RP/0/RSP0/CPU0:router(admin)# show power allotted location 0/0/*

Sun Nov 18 22:00:51.176 UTC
nodeid = 0x2a00000f
Node              Card Type         State             PID               Power Allotted
----------------- ----------------- ----------------- ----------------- ------------------
0/0/*             FP-140G           POWERED UP        CRS-MSC-FP140       450.0W
0/0/PL0           14-10GbE          POWERED UP        14X10GBE-WL-XF      150.0W
```

This example shows sample output from the **show power allotted** command on a fixed power supply:

```
RP/0/RSP0/CPU0:router(admin)# show power allotted rack 0
```

```
Tue Nov 20 18:51:56.404 OST
Zone              Node              Card Type         State             PID
Power Allotted
----------------- ----------------- ----------------- ----------------- -----------------
-----------------
Zone 1:
                  0/FAN-TR0         FAN TRAY          N/A               CRS-8-LCC-FAN-
    75.0W
                  0/FAN-TR1         FAN TRAY          N/A               CRS-8-LCC-FAN-
    75.0W


Zone 2:
                  0/RP0/*           UNKNOWN           N/A
   175.0W
                  0/RP1/*           RP(H)-X86v1       N/A               CRS-8-PRP-6G
   175.0W
                  0/SM0/*           UNKNOWN           N/A
   185.0W
                  0/SM1/*           FC-140G/S(H)      N/A               CRS-8-FC140/S
   185.0W
                  0/SM2/*           UNKNOWN           N/A
   185.0W
                  0/SM3/*           FC-140G/S(H)      N/A               CRS-8-FC140/S
   185.0W


Zone 3:
                  0/6/*             MSC-B             POWERED UP        CRS-MSC-B
   390.0W
                  0/6/PL0           JACKET CARD       POWERED UP
   150.0W
                  0/7/*             MSC-140G          UNPOWERED
     7.0W
                  0/FAN-TR0         FAN TRAY          N/A               CRS-8-LCC-FAN-
    75.0W
                  0/FAN-TR1         FAN TRAY          N/A               CRS-8-LCC-FAN-
    75.0W
```

show power capacity

To display the power capacity of the router, use the **show power capacity** command in administration EXEC mode.

show power capacity {**rack** *rack-no* | **summary**}

Syntax Description

rack *rack-no*	Displays the power capacity for the specified rack.
summary	Displays summary power capacity for the chassis.

Command Default

None

Command Modes

Administration EXEC

Command History

Release	Modification
Release 4.3.0	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 display for modular power supplies is by card. The display for fixed power supplies is by zone and card.

Task ID

Task ID	Operation
power	read

This example shows sample output from the **show power capacity** command on a modular power supply:

```
RP/0/RSP0/CPU0:router(admin)# show power capacity rack 0

Sun Nov 18 22:02:11.394 UTC
-------------------------------------------------------
Rack 0: Cisco CRS Series AC Power System
-------------------------------------------------------
Power Module      State                Power Capacity
----------------- ----------------- --------------------
0                  OK                1900.0W
1                  OK                1900.0W
2                  OK                1900.0W
3                  OK                1900.0W
-------------------------------------------------------
Total Rack Power Capacity:           7600.0W
```

This example shows sample output from the **show power capacity** command on a fixed power supply:

```
RP/0/RSP0/CPU0:router(admin)# show power capacity rack 0

Sun Dec  9 02:40:09.464 PST
--------------------------------------------------------------------------------
Rack 0: Cisco CRS Fixed AC Power System
--------------------------------------------------------------------------------
Zone              Power Module      State             Zone Power Capacity
----------------- ----------------- ----------------- --------------------
 Zone 1:           A[0]               OK                 1460.0W

                   B[0]               OK
 Zone 2:           A[0]               OK                 1460.0W

                   B[0]               OK
 Zone 3:           A[0]               OK                 1460.0W

                   B[0]               OK
--------------------------------------------------------------------------------
Total Rack Power Capacity:                               4380.0W
```

show power summary

To display a summary of the power information for a rack, use the **show power** command in administration EXEC mode.

show power summary rack *rack-no*

Syntax Description

rack *rack-no*	Displays summary output for the specified rack

Command Default

None

Command Modes

Administration EXEC

Command History

Release	Modification
Release 4.3.0	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 display for modular power supplies is by card. The display for fixed power supplies is by zone and card.

Task ID

Task ID	Operation
power	read

This example shows sample output from the **show power summary** command on a modular power supply.

```
RP/0/RSP0/CPU0:router(admin)# show power summary rack 0

Sun Nov 18 22:02:40.434 UTC
Location          Power Capacity    Power Allotted    Power Available
----------------- ----------------- ----------------- ------------------
Rack :  0            7600.0W           1285.0W            6315.0W
```

This example shows sample output from the **show power summary** command on a fixed power supply.

```
RP/0/RSP0/CPU0:router(admin)# show power summary rack 0

Wed Nov 14 00:29:06.354 PST
Location          Power Capacity    Power Allotted    Power Available
----------------- ----------------- ----------------- ------------------
Rack 0:

Zone 1:             1460.0W             650.0W             810.0W
Zone 2:             1460.0W            1534.0W             -74.0W
```

```
Zone 3:             1460.0W             650.0W              810.0W
```

show platform slices

To display the status of the slices for an interface, use the **show platform slices** command in the EXEC mode.

show platform slices [**location***node-id*]

Syntax Description

location	*node-id*	Interface details.

Command Default

None

Command Modes

EXEC

Command History

Release	Modification
Release 5.3.0	

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.

Use the **hw-module power saving** to power-off / on any of the slices (Slice 0 cannot be powered-off).

Task ID

Task ID	Operation
sysmgr	read

Example

This example shows how to use the **show platform slices** command:

```
RP/0/RSP0/CPU0:router # sh plat slices
show_slice nodeid 0x0

Line Card       Slice   Config          Status
0/0/CPU0        0       Power on        Completed
                1       Power on        Completed
                2       Power on        Completed
                3       Power saving    Completed
```

show plugin slot counts

To display cumulative and running counts of card inserts per slot, use the **show plugin slot counts** command in administration EXEC mode.

show plugin slot counts location {**all***node-id*}

Syntax Description

location {**all** *node-id*}	Displays plugin slot counts on the designated node or all nodes. The *node-id* argument is expressed in the *rack*/*slot*/*module* notation.

Command Default

None

Command Modes

Administration EXEC

Command History

Release	Modification
Release 3.9.1	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.

Use the **show plugin slot counts** command to display the number of insertions that have been made to the router backplane for a specific line card or RSP. This command can be used only if the BPID-02 card is installed. If the BPID-02 card is not installed, the following error message is displayed:

```
Response error: 'ENVMON' detected the 'warning' condition 'Hardware not available'
```

Task ID

Task ID	Operation
sysmgr	read

Example

This example illustrates sample output from the **show plugin slot counts** command:

```
RP/0/RSP0/CPU0:router(admin)# show plugin slot counts location all

Tue Oct  6 13:37:15.706 pst

Backplane connector slot plugin counters

             Current         Cumulative
0/0/CPU0         176                176
0/1/CPU0          11                 11
0/2/CPU0           0                  0
0/3/CPU0           0                  0
0/RSP0/CPU0        0                  0
0/RSP1/CPU0        1                  1
```

```
0/4/CPU0            9                   9
0/5/CPU0            0                   0
0/6/CPU0           12                  12
0/7/CPU0            0                   0
0/FT0/SP            4                   4
0/FT1/SP           14                  14
```

Related Commands

Command	Description
clear plugin slot counts	Clears the running counts of the backplane connector slot plugins.
show canbus	

show redundancy

To display the status of route processor redundancy, use the **show redundancy** command in EXEC mode.

show redundancy [**location** {*node-id* | **all**} | **statistics** | **summary**]

Syntax Description

location {*node-id* | **all**}	(Optional) Specifies the node for which to display LED information. The *node-id* argument is expressed in the *rack*/*slot*/*module* notation. Use the **all** keyword to indicate all nodes.
statistics	(Optional) Displays redundancy statistics information.
summary	(Optional) Displays a summary of all redundant node pairs in the router.

Command Default

Route processor redundancy information is displayed for all nodes in the system.

Command Modes

EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

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

Use the **show redundancy** command to display the redundancy status of the route switch processors (RSPs). The **show redundancy** command also displays the boot and switchover history for the RSPs. To view the nonstop routing (NSR) status of the standby RSPs in the system, use the **summary** keyword.

Task ID

Task ID	Operations
system	read
basic-services	read (for **statistics** keyword)

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

```
RP/0/RSP0/CPU0:router# show redundancy location 0/rsp0/cpu0
Thu Jul 30 05:47:12.155 DST
Node 0/RSP0/CPU0 is in ACTIVE role
Node 0/RSP0/CPU0 has no valid partner

Reload and boot info
----------------------
A9K-RSP-4G reloaded Tue Jul 14 15:21:30 2009: 2 weeks, 1 day,
14 hours, 25 minutes ago
Active node booted Tue Jul 14 15:21:30 2009: 2 weeks, 1 day,
```

```
14 hours, 25 minutes ago

Active node reload "Cause: User initiated forced reload all"
```

Table 79: show redundancy Field Descriptions

Field	Description
Node */*/* is in *XXX* role	Current role of the primary route processor, where (*/*/*) is the route processor ID in the format *rack*/*slot*/*module*, and *XXX* is the role of the route processor (active or standby). In the example, this field shows that the node with the ID 0/RP0/CPU0 is in active role.
Partner node (*/*/*) is in *XXX* role	Current role of the secondary (or partner) route processor, where (*/*/*) is the route processor ID in the *rack*/*slot*/*module* format, and *XXX* is the role of the route processor (active or standby). In the example, this field shows that the node with the ID 0/RP1/CPU0 is in standby role.
Standby node in (*/*/*) is ready	Current state of the standby node, where (*/*/*) is the standby route processor ID. In the example, the standby node is ready.
Standby node in (*/*/*) is NSR-ready	Current state of the standby node regarding nonstop routing (NSR), where (*/*/*) is the standby route processor ID. In the example, the standby node is NSR-ready.
Reload and boot info	General overview of the active and standby route processors' reload and boot history.

show version

To display the configuration of the system hardware, the software version, the names and sources of configuration files, and the boot images, use the **show version** command in appropriate configuration mode.

show version [**brief**]

Syntax Description

brief	It displays detail summary of system information and hardware details.

Command Default

No default behavior or values

Command Modes

EXEC

XR EXEC

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

Note The **brief** keyword can be used during command execution on Cisco IOS XR 32 bit routers.

The command is applicable for IOS XR 64 Bit software on ASR 9000 Enhanced XR (eXR).

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 version** command displays a variety of system information, including hardware and software version, router uptime, boot settings (configuration register), and active software.

Task ID

Task ID	Operations
basic-services	read

This example shows partial output from the **show version** command:

```
RP/0/RSP0/CPU0:router# show version

Tue Jul 28 05:14:13.670 DST

Cisco IOS XR Software, Version 3.9.0.14I
Copyright (c) 2009 by Cisco Systems, Inc.

ROM: System Bootstrap, Version 1.1(20090521:183759) [ASR9K ROMMON],

PE44_ASR-9010 uptime is 1 week, 6 days, 13 hours, 52 minutes
```

```
System image file is "bootflash:disk0/asr9k-os-mbi-3.9.0.14I/mbiasr9k-rp.vm"

cisco ASR9K Series (MPC8641D) processor with 4194304K bytes of memory.
MPC8641D processor at 1333MHz, Revision 2.2

2 Management Ethernet
12 TenGigE
40 GigabitEthernet
219k bytes of non-volatile configuration memory.
975M bytes of compact flash card.
33994M bytes of hard disk.
1605616k bytes of disk0: (Sector size 512 bytes).
1605616k bytes of disk1: (Sector size 512 bytes).

Configuration register on node 0/RSP0/CPU0 is 0x102
Boot device on node 0/RSP0/CPU0 is disk0:
Package active on node 0/RSP0/CPU0:
asr9k-scfclient, V 3.9.0.14I, Cisco Systems, at disk0:asr9k-scfclient-3.9.0.14I
    Built on Mon Jul 13 08:28:45 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.14I/asr9k/workspace for c4.2.1-p0

asr9k-adv-video, V 3.9.0.14I, Cisco Systems, at disk0:asr9k-adv-video-3.9.0.14I
    Built on Mon Jul 13 10:13:23 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.14I/asr9k/workspace for c4.2.1-p0

asr9k-fpd, V 3.9.0.14I, Cisco Systems, at disk0:asr9k-fpd-3.9.0.14I
    Built on Mon Jul 13 08:44:47 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.14I/asr9k/workspace for c4.2.1-p0

asr9k-diags, V 3.9.0.14I, Cisco Systems, at disk0:asr9k-diags-3.9.0.14I
    Built on Mon Jul 13 08:28:48 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.14I/asr9k/workspace for c4.2.1-p0

asr9k-k9sec, V 3.9.0.14I, Cisco Systems, at disk0:asr9k-k9sec-3.9.0.14I
    Built on Mon Jul 13 08:43:40 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.14I/asr9k/workspace for c4.2.1-p0

asr9k-mgbl, V 3.9.0.14I, Cisco Systems, at disk0:asr9k-mgbl-3.9.0.14I
    Built on Mon Jul 13 10:11:41 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.14I/asr9k/workspace for c4.2.1-p0

asr9k-mcast, V 3.9.0.14I, Cisco Systems, at disk0:asr9k-mcast-3.9.0.14I
    Built on Mon Jul 13 08:40:57 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.14I/asr9k/workspace for c4.2.1-p0

 --More--
```

Table 80: show version Field Descriptions

Field	Description
Cisco IOS XR Software, Version #	Cisco IOS XR software version number currently running on the router.
ROM	System bootstrap version number currently running on the router.
router uptime	Number of uninterrupted days, hours, minutes, and seconds the system has been up and running.
System image file is	Location and name of the system image file currently running on the router.

Field	Description
Packet over SONET/SDH network interface(s)	Number of Packet-over-SONET/SDH interfaces available on the current router.
SONET/SDH Port controller(s)	Number of SONET or SDH[12] interfaces available on the current router.
Ethernet/IEEE 802.3 interface(s)	Number of Ethernet or IEEE 802.3 interfaces available on the current router.
GigabitEthernet/IEEE interface(s)	Number of Gigabit Ethernet or IEEE 802.3 interfaces available on the current router.
bytes of non-volatile configuration memory	Available volatile configuration memory, in bytes.
bytes of ATA PCMCIA card at disk 0	ATA PCMCIA[13] available on the card in disk 0, in bytes.
Package active on node 0/1/SP	Details about the current software package that is running on the SP node in slot 1.

[12] SDH = Synchronous Digital Hierarchy
[13] ATA PCMCIA = AT Attachment Personal Computer Memory Card Industry Association

This example shows partial output from the **show version** command for for IOS XR 64 Bit version:

```
RP/0/RSP0/CPU0:ASR-9906-C-LS#show version

Wed Mar 29 11:45:24.914 UTC
Cisco IOS XR Software, Version 7.5.2
Copyright (c) 2013-2022 by Cisco Systems, Inc.

Build Information:
 Built By     : ingunawa
 Built On     : Tue Apr 26 18:26:36 PDT 2022
 Built Host   : iox-ucs-055
 Workspace    : /auto/srcarchive14/prod/7.5.2/asr9k-x64/ws
 Version      : 7.5.2
 Location     : /opt/cisco/XR/packages/
 Label        : 7.5.2

cisco ASR9K () processor
System uptime is 5 weeks 5 days 16 hours 13 minutes
```

upgrade hw-module fpd

To manually upgrade the current field-programmable device (FPD) image package on a module, use the **upgrade hw-module fpd** command in Admin EXEC mode.

upgrade hw-module fpd {**all** | **fabldr***fpga-type* | **rommon**} [**force**] **location** [*node-id* | **all**]

Syntax Description

all	Upgrades all FPD images on the selected module.
fabldr	Upgrades the fabric-downloader FPD image on the module.
fpga-type	Upgrades a specific field-programmable gate array (FPGA) image on the module. Use the **show fpd package** command to view all available FPGA images available for a specific module.
rommon	Upgrades the ROMMON image on the module.
force	(Optional) Forces the update of the indicated FPD image package on a shared port adapter (SPA) that meets the minimum version requirements. Without this option, the manual upgrade upgrades only incompatible FPD images.
location {*node-id* |**all**}	Specifies the node for which to upgrade the FPD image. The *node-id* argument is expressed in the *rack*/*slot*/*subslot* notation. Use the **all** keyword to indicate all nodes.

Command Default

None

Command Modes

Admin EXEC mode

Command History

Release	Modification
Release 3.7.2	This command was introduced.

Usage Guidelines

Note The use of the force option when doing a fpd upgrade is not recommended except under explicit direction from Cisco engineering or TAC.

Note It is recommended to upgrade all FPGAs on a given node using the **upgrade hw-module fpd all location** {**all** | *node-id*} command. Do not upgrade the FPGA on a node using the **upgrade hw-module fpd** <*individual-fpd*> **location** {**all** | *node-id*} as it may cause errors in booting the card.

During the upgrade procedure, the module must be offline (shut down but powered).

Naming notation for the *node-id* argument is *rack*/*slot*/*subslot*; a slash between values is required as part of the notation.

- *rack* —Chassis number of the rack.
- *slot* —Physical slot number of the SPA interface processor (SIP).
- *subslot* —Subslot number of the SPA.

For more information about the syntax for the router, use the question mark (?) online help function.

When you start the FPD upgrade procedure or log into a router that is running the FPD upgrade procedure, the following message is displayed to the screen on TTY, console and AUX ports:

```
FPD upgrade in progress on some hardware, reload/configuration change on those
is not recommended as it might cause HW programming failure and result in RMA
of the hardware.
```

If you enter administration mode while the FPD upgrade procedure is running, the following message is displayed to the screen on TTY, console and AUX ports:

```
FPD upgrade in progress on some hardware, reload/configuration change on those
is not recommended as it might cause HW programming failure and result in RMA
of the hardware. Do you want to continue? [Confirm (y/n)]
```

If you enter global configuration mode while the FPD upgrade procedure is running, the following message is displayed to the screen on TTY, console and AUX ports:

```
FPD upgrade in progress on some hardware, configuration change on those is not
recommended as it might cause HW programming failure and result in RMA of the
hardware. Do you want to continue? [Confirm (y/n)]
```

When the FPD upgrade global timer expires, the following warning message displayed to the screen.

```
FPD upgrade has exceeded the maximum time window, the process will terminate now.
Please check the status of the hardware and reissue the upgrade command if required.
```

The following example shows how to upgrade the default FPGA on a SPA:

```
RP/0/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# upgrade hw-module fpd fpga location 0/1/4

% RELOAD REMINDER:
  - The upgrade operation of the target module will not interrupt its normal
    operation. However, for the changes to take effect, the target module
    will need to be manually reloaded after the upgrade operation. This can
    be accomplished with the use of "hw-module <target> reload" command.
  - If automatic reload operation is desired after the upgrade, please use
    the "reload" option at the end of the upgrade command.
  - The output of "show hw-module fpd location" command will not display
```

```
    correct version information after the upgrade if the target module is
    not reloaded.
Continue? [confirm] y

SP/0/1/SP:Dec 22 05:41:17.920 : upgrade_daemon[125]: programming...with file
/net/node0_RP1_CPU0/asr9k-lc-3.3.83/fpd/ucode/fpga_gladiator_sw0.6.xsvf
SP/0/1/SP:Dec 22 05:41:28.900 : upgrade_daemon[125]: ...programming...
SP/0/1/SP:Dec 22 05:41:28.906 : upgrade_daemon[125]: ...it will take a while...
SP/0/1/SP:Dec 22 05:41:29.004 : upgrade_daemon[125]: ...it will take a while...
SP/0/1/SP:Dec 22 05:43:03.432 : upgrade_daemon[125]: ...programming...
SP/0/1/SP:Dec 22 05:43:03.438 : upgrade_daemon[125]: ...it will take a while...
Successfully upgraded spa fpga instance 4 on location 0/1/4.
```

show environment all

To display detailed listing of all environmental monitor parameters such as power supplies, temperature readings, voltage readings, and blower speeds, use the **show environment all** command in the System Admin EXEC mode.

show environment all

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

System Admin EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

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 environment all** command provides a comprehensive overview of the router's environmental health, enabling users to monitor and troubleshoot potential issues related to the operating conditions of hardware components.

Task ID

Task ID	Operations
system	read

The following example shows sample output from the **show environment all** command:

```
sysadmin-vm:0_RSP0#show environment all

Wed Mar  29 11:50:19.779 UTC+00:00
================================================================================
Location  TEMPERATURE                Value   Crit Major Minor Minor Major  Crit
          Sensor                   (deg C)   (Lo) (Lo)   (Lo)   (Hi)   (Hi)   (Hi)
--------------------------------------------------------------------------------
0/1
          DIE_NP0                      59    -10    -5     0   105   115   130
          DIE_NP0_HBM0                 48    -10    -5     0    95   105   120
          DIE_NP0_HBM1                 50    -10    -5     0    95   105   120
          DIE_NP1                      56    -10    -5     0   105   115   130
          DIE_NP1_HBM0                 47    -10    -5     0    95   105   120
          DIE_NP1_HBM1                 46    -10    -5     0    95   105   120
          DIE_NP2                      57    -10    -5     0   105   115   130
          MB Power Brick 1             52    -45   -40    -5   110   135   150
================================================================================
```

```
Location  VOLTAGE                    Value   Crit Minor Minor  Crit
          Sensor                     (mV)    (Lo) (Lo)  (Hi)   (Hi)
--------------------------------------------------------------------------------
0/1
          VP1P0_VCCP                  1086    450   480  1280  1300
          VP1P0_VCCRAM                1107    740   760  1240  1260
          VP1P0_VNN                    886    580   600  1280  1300
          VP1P2_DDR_VDDQ              1212    960  1101  1290  1440
          VP1P05_CPU                  1049    945   971  1129  1155
          VP3P3_CPU                   3299   2970  3052  3548  3630
          VP0P9_LSD3_LDO_PLLVDD        900    810   833   968   990
          VP0P6_VTT                    606    540   555   645   660
          Hot Swap VS                55393  48600 51300 58320 59400
================================================================================
Location  CURRENT                    Value
          Sensor                     (mA)
--------------------------------------------------------------------------------
0/1
        Hot Swap CS                 7655

================================================================================
   Location     Card Type            Power       Power       Status
                                     Allocated   Used
                                     Watts       Watts
================================================================================
   0/1          A9K-16X100GE-TR       700          423       ON
================================================================================
Location  TEMPERATURE                Value   Crit Major Minor Minor Major  Crit
          Sensor                    (deg C)  (Lo) (Lo)  (Lo)  (Hi)  (Hi)   (Hi)
--------------------------------------------------------------------------------
0/2
          DIE_NP0                      48    -10    -5     0   113   122   137
          DIE_NP1                      43    -10    -5     0   113   122   137
          DIE_FabArbiter               49    -10    -5     0   108   122   137
          DIE_FIA0                     48    -10    -5     0   113   122   137
          DIE_FIA1                     44    -10    -5     0   113   122   137
          DIE_FabSwitch                48    -10    -5     0   113   122   137
          mb_air_inlet                 32    -10    -5     0    60    65    75
          mb_outlet                    46    -10    -5     0    85    95   105
          mb_hotspot0                  35    -10    -5     0    90    93    95
          mb_hotspot1                  33    -10    -5     0    90    93    95
          mb_hotspot2                  35    -10    -5     0    90    93    95
          DIE_Lewis                    52    -10    -5     0   113   122   137
          DIE_CPU                      37    -10    -5     0    80    89   104
          Inlet                        32    -10    -5     0    60    65    75
          Hotspot                      46    -10    -5     0    90    93    95
================================================================================
Location  VOLTAGE                    Value   Crit Minor Minor  Crit
          Sensor                     (mV)    (Lo) (Lo)  (Hi)   (Hi)
--------------------------------------------------------------------------------
0/2
          VP0P9_SM15_VDD               876    765   800  1015  1035
          VP1P0_SM15_AVDD             1001    960   970  1030  1040
          VP1P0_SM15_PLVDD            1000    960   970  1030  1040
          VP1P8_SAC_VDDR              1804   1728  1746  1854  1869
          VP1P2_SAC_VDDT              1200   1152  1164  1236  1248
          VP_1_2_V_LF_IPU             1200   1070  1080  1320  1330
          Hot Swap VS_0              55310  48600 51300 58320 59400
================================================================================
Location  CURRENT                    Value
          Sensor                     (mA)
--------------------------------------------------------------------------------
0/2
        Hot Swap CS_0               6050
```

```
==============================================================================
   Location     Card Type            Power       Power       Status
                                     Allocated   Used
                                     Watts       Watts
==============================================================================
   0/2          A9K-48X10GE-1G-TR      470         335       ON
==============================================================================
Location  TEMPERATURE                Value   Crit Major Minor Minor Major  Crit
          Sensor                    (deg C)   (Lo) (Lo)  (Lo)  (Hi)  (Hi)   (Hi)
------------------------------------------------------------------------------
0/RSP0
          DIE_FabArbiter0              46    -10    -5     0   115   125   140
          DIE_FabSwitch0               60    -10    -5     0   115   125   140
          DIE_CPU                      45    -10    -5     0    90    95   110
          DIE_PCH                      45    -10    -5     0    87   100   115
          DIE_DIMM0                    39    -10    -5     0    80    85   100
          DIE_DIMM2                    39    -10    -5     0    80    85   100
          DIE_DIMM3                    39    -10    -5     0    80    85   100
          DIE_DIMM4                    38    -10    -5     0    80    85   100
          DIE_DIMM5                    38    -10    -5     0    80    85   100
          SKYBLT0_Inlet                44    -10    -5     0    80    85   100
          SKYBLT1_Inlet                42    -10    -5     0    80    85   100
          High_Power                   51    -10    -5     0    80    85   100
          AIR_Outlet                   45    -10    -5     0    80    85   100
          Inlet                        35    -10    -5     0    70    85   100
          Hotspot                      50    -10    -5     0    90    93    95
          DIE_Aldrin                   57    -10    -5     0    95   105   115
==============================================================================
Location  VOLTAGE                    Value   Crit Minor Minor  Crit
          Sensor                      (mV)    (Lo) (Lo)  (Hi)   (Hi)
------------------------------------------------------------------------------
0/RSP0
          VP5P0                       4999   4500  4625  5375  5500
          VP7P0                       7000   6300  6475  7525  7700
          VP3P3_CAN                   3299   2970  3053  3548  3630
          VP1P8                       1799   1620  1665  1935  1980
          VP2P5                       2499   2250  2313  2688  2750

          VP0P6_IPU_DDR4_VTT           598    540   555   645   660
          Hot Swap VS                55225  48600 51300 58320 59400
==============================================================================
Location  CURRENT                    Value
          Sensor                     (mA)
------------------------------------------------------------------------------
0/RSP0
        Hot Swap CS                 4500

==============================================================================
   Location     Card Type            Power       Power       Status
                                     Allocated   Used
                                     Watts       Watts
==============================================================================
   0/RSP0       A9K-RSP5-SE            480         248       ON
==============================================================================
Location  TEMPERATURE                Value   Crit Major Minor Minor Major  Crit
          Sensor                    (deg C)   (Lo) (Lo)  (Lo)  (Hi)  (Hi)   (Hi)
------------------------------------------------------------------------------
0/FC0
          SKB0_HOTSPOT                 47    -10    -5     0    80    83    85
          Inlet                        32    -10    -5     0    60    65    80
          DIE_FabSwitch0               60    -10    -5     0   115   125   140
==============================================================================
Location  VOLTAGE                    Value   Crit Minor Minor  Crit
```

```
          Sensor                       (mV)     (Lo)  (Lo)   (Hi)    (Hi)
--------------------------------------------------------------------------------
0/FC0
          P1_5V                         1499    1350  1388   1613    1650
          P2_5V                         2499    2250  2313   2688    2750
          VP0P6_VTT_DDR                  598     540   555    645     660
          P1V1_AVDDH_SKB0               1100     990  1018   1183    1210
          P0_9V_SKB0_PLL_AVDD            900     810   833    968     990
          P3_3V                         3300    2970  3053   3548    3630
          P7V                           6999    6300  6474   7610    7700
          P5V                           5000    4500  4625   5375    5500
          P1_2V                         1200    1080  1110   1290    1320
          P0_85V                         849     765   786    914     935
          P0_9V                          900     810   833    968     990
          Hot Swap VS                  55811   48600 51300  58320   59400
          P1_5V_SKB                     1500    1350  1388   1613    1650
================================================================================
Location  CURRENT                      Value
          Sensor                       (mA)
--------------------------------------------------------------------------------
0/FC0
        Hot Swap CS                    770

================================================================================
   Location     Card Type            Power       Power       Status
                                     Allocated   Used
                                     Watts       Watts
================================================================================
   0/FC0        A99-SFC3-T            108          43       ON
================================================================================
Location  TEMPERATURE                  Value   Crit Major Minor Minor Major  Crit
          Sensor                     (deg C)   (Lo) (Lo)  (Lo)  (Hi)  (Hi)   (Hi)
--------------------------------------------------------------------------------
0/FC2
          SKB0_HOTSPOT                  47    -10    -5     0    80    83    85
          Inlet                         32    -10    -5     0    60    65    80
          DIE_FabSwitch0                62    -10    -5     0   115   125   140
================================================================================
Location  VOLTAGE                      Value   Crit Minor Minor  Crit
          Sensor                       (mV)    (Lo) (Lo)  (Hi)   (Hi)
--------------------------------------------------------------------------------
0/FC2
          P1_5V                         1500    1350  1388   1613    1650
          P2_5V                         2500    2250  2313   2688    2750
          VP0P6_VTT_DDR                  598     540   555    645     660
          P1V1_AVDDH_SKB0               1099     990  1018   1183    1210
          P0_9V_SKB0_PLL_AVDD            899     810   833    968     990
          P3_3V                         3300    2970  3053   3548    3630
          P7V                           7000    6300  6474   7610    7700
          P0_9V_SKB0_AVDD_PHASE_B        900     810   833    967     990
          P2_5V_SKB                     2500    2250  2313   2688    2750
          Hot Swap VS                  55393   48600 51300  58320   59400
          P1_5V_SKB                     1500    1350  1388   1613    1650
================================================================================
Location  CURRENT                      Value
          Sensor                       (mA)
--------------------------------------------------------------------------------
0/FC2
        Hot Swap CS                    815

================================================================================
   Location     Card Type            Power       Power       Status
                                     Allocated   Used
                                     Watts       Watts
```

```
==============================================================================
   0/FC2        A99-SFC3-T             108          45       ON
==============================================================================
Location  TEMPERATURE                Value   Crit Major Minor Minor Major  Crit
          Sensor                   (deg C)   (Lo) (Lo)  (Lo)  (Hi)  (Hi)   (Hi)
------------------------------------------------------------------------------
0/FC4
          SKB0_HOTSPOT                47    -10    -5     0    80    83    85
          Inlet                       33    -10    -5     0    60    65    80
          DIE_FabSwitch0              62    -10    -5     0   115   125   140
==============================================================================
Location  VOLTAGE                    Value   Crit Minor Minor  Crit
          Sensor                     (mV)    (Lo) (Lo)  (Hi)   (Hi)
------------------------------------------------------------------------------
0/FC4
          P1_5V                      1500   1350  1388  1613  1650
          P2_5V                      2500   2250  2313  2688  2750
          VP0P6_VTT_DDR               597    540   555   645   660
          P1V1_AVDDH_SKB0            1099    990  1018  1183  1210
          P0_9V_SKB0_PLL_AVDD         899    810   833   968   990
          P2_5V_SKB                  2500   2250  2313  2688  2750
          Hot Swap VS               55310  48600 51300 58320 59400
          P1_5V_SKB                  1500   1350  1388  1613  1650
==============================================================================
Location  CURRENT                    Value
          Sensor                     (mA)
------------------------------------------------------------------------------
0/FC4
        Hot Swap CS                  780

==============
```

show environment altitude

To display information about the altitude values of the device environment, use the **show environment altitude** command in System Admin EXEC mode.

show environment altitude

Syntax Description

altitude	Chassis location altitude in meters. Values can range from 0 to 4000.

Command Default

None

Command Modes

System Admin EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

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 environment altitude** command display information about the altitude values of the device environment. It provides details such as the location, altitude value in meters, and the source of the altitude information.

Task ID

Task ID	Operations
system	read

The following example shows sample output from the **show environment altitude** command:

```
sysadmin-vm:0_RSP0# show environment altitude

Wed Mar  29 11:49:29.210 UTC+00:00
================================================================================
   Location      Altitude Value (Meters)     Source
--------------------------------------------------------------------------------
   0             82                          sensor
sysadmin-vm:0_RSP0#
```

show environment fans

To display the current fan speed (in RPM) for different fan modules in the system, use the **show environment fans** command in System Admin EXEC mode.

show environment fans

Syntax Description

fans	Displays information about the fans.

Command Default

None

Command Modes

System Admin EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

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.

It provides information about the fan speeds for each fan module installed in the system. The fan speeds are measured in RPM and can help monitor the performance and health of the fans.

Task ID

Task ID	Operations
system	read

The following example shows sample output from the **show environment fans** command:

```
sysadmin-vm:0_RSP0#show environment fan

Wed Mar  29 11:49:00.404 UTC+00:00
=============================================================================================
                        Fan speed (rpm)
Location     FRU Type           FAN_0   FAN_1   FAN_2   FAN_3   FAN_4   FAN_5   FAN_6
---------------------------------------------------------------------------------------------
0/FT0        ASR-9906-FAN        9019    8967    9086    8949    9014    8986    9048
0/FT1        ASR-9906-FAN        9062    9002    9044    8963    8973    9053    9049

0/PT0-PM0    PWR-6KW-AC-V3       6172    5828    6237    5871
0/PT0-PM1    PWR-6KW-AC-V3       6237    5849    6323    5935
0/PT0-PM2    PWR-6KW-AC-V3       6301    5849    6301    5828
sysadmin-vm:0_RSP0#
```

Table 81: show environment fans Field Descriptions

Field	Description
Location	It displays the physical location of the fan modules or power modules.
FRU Type	It indicates the Field Replaceable Unit (FRU) type, which in this case represents the fan or power module.
Fan speed (rpm)	It displays the current speed of each fan module in revolutions per minute (rpm). The numbers represent the rotational speed of the individual fans within each module.

show environment power-supply

To display information about the power status and usage of the device's components, use the **show environment power-supply** command in the System Admin EXEC mode.

show environment power-supply

Syntax Description

power-supply	Displays power supply voltage and current information.

Command Default

None

Command Modes

System Admin EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

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 environment power-supply** command provides essential information related to power consumption and allocation. It offers details about the power capacity, requirements, and usage at various levels within the router.

Task ID

Task ID	Operations
system	read

The following example shows sample output from the **show environment power-supply** command:

```
sysadmin-vm:0_RSP0#show environment power

Wed Mar  29 11:49:40.876 UTC+00:00
================================================================================
CHASSIS LEVEL POWER INFO: 0
================================================================================
   Total output power capacity (N + 1)             :   12000W +    6000W
   Total output power required                     :    3160W
   Total power input                               :    2243W
   Total power output                              :    1619W

Power Shelf 0:
================================================================================
   Power       Supply      --------Input-------   ----Output----       Status
   Module      Type        Volts A/B   Amps A/B   Volts     Amps
================================================================================
   0/PT0-PM0   6kW-AC    211.4/215.5   1.7/2.1     55.4     10.7    OK
```

```
   0/PT0-PM1   6kW-AC    212.9/214.7   1.4/1.8     55.6      8.6    OK
   0/PT0-PM2   6kW-AC    213.2/213.2   1.8/1.7     55.4      9.9    OK

Total of Power Shelf 0:      2243W/  ( 4.9/ 5.6)A    1619W/ 29.2A

==============================================================================
   Location     Card Type            Power       Power       Status
                                     Allocated   Used
                                     Watts       Watts
==============================================================================
   0/0                -                10           -       RESERVED
   0/1          A9K-16X100GE-TR       700         423       ON
   0/2          A9K-48X10GE-1G-TR     470         335       ON
   0/3                -                10           -       RESERVED
   0/RSP0       A9K-RSP5-SE           480         249       ON
   0/RSP1             -               350           -       RESERVED
   0/FC0        A99-SFC3-T            108          43       ON
   0/FC1              -               108           -       RESERVED
   0/FC2        A99-SFC3-T            108          45       ON
   0/FC3              -               108           -       RESERVED
   0/FC4        A99-SFC3-T            108          43       ON
   0/FT0        ASR-9906-FAN          300           -       ON
   0/FT1        ASR-9906-FAN          300           -       ON
sysadmin-vm:0_RSP0#
```

show environment temperatures

To display temperature readings for various components and sensors within the device, use the **show environment temperatures** command in System Admin EXEC mode.

show environment temperatures

Syntax Description

temperatures	Displays system temperature information.

Command Default

None

Command Modes

System Admin EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

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 environment temperatures** command shows the current temperature readings for different modules, cards, and sensors on the router. It provides information such as the location, temperature value, and temperature status (normal, warning, or critical) for each component.

Task ID

Task ID	Operations
system	read

The following example shows sample output from the **show environment temperatures** command:

```
sysadmin-vm:0_RSP0#show environment temperatures
Wed Mar  29 11:48:42.586 UTC+00:00
================================================================================
Location  TEMPERATURE                 Value   Crit Major Minor Minor Major  Crit
          Sensor                   (deg C)   (Lo) (Lo)   (Lo)   (Hi)   (Hi)   (Hi)
--------------------------------------------------------------------------------
0/1
          DIE_NP0                       58    -10    -5     0   105   115   130
          DIE_NP0_HBM0                  48    -10    -5     0    95   105   120
          DIE_NP0_HBM1                  50    -10    -5     0    95   105   120
          DIE_NP1                       56    -10    -5     0   105   115   130
          DIE_NP1_HBM0                  47    -10    -5     0    95   105   120
          DIE_NP1_HBM1                  46    -10    -5     0    95   105   120
          DIE_NP2                       56    -10    -5     0   105   115   130
          DIE_NP2_HBM0                  46    -10    -5     0    95   105   120
          DIE_NP2_HBM1                  45    -10    -5     0    95   105   120
          DIE_NP3                       53    -10    -5     0   105   115   130
```

```
              DIE_NP3_HBM0                  41    -10    -5     0    95   105   120
              DIE_NP3_HBM1                  42    -10    -5     0    95   105   120
              DIE_FabArbiter                48    -10    -5     0   115   125   140
              DIE_FabSwitch0                56    -10    -5     0   115   125   140
              Hotspot                       47    -15   -10    -5    85    90    95
              Hotspot0                      45    -15   -10    -5    85    90    95
              Hotspot1                      48    -15   -10    -5    85    90    95
              MB AIR_Outlet                 34    -15   -10    -5    85    95   110
              DIE_Aldrin                    50    -10    -5     0    95   105   115
              DIE_CPU                       42    -10    -5     0    80    89   104
              Inlet                         37    -15   -10    -5    65    75    90
              DTS_CORE                      39    -10    -5     0    93    98   113
              DIE_DIMM0                     41    -10    -5     0    85    95   110
              DIE_DIMM1                     41    -10    -5     0    85    95   110
              DIE_RT0                       47    -10    -5     0    95   105   120
              DIE_RT1                       48    -10    -5     0    95   105   120
              DIE_RT2                       45    -10    -5     0    95   105   120
              DIE_RT3                       46    -10    -5     0    95   105   120
              DIE_RT4                       45    -10    -5     0    95   105   120
              DIE_RT5                       46    -10    -5     0    95   105   120
              DIE_RT6                       45    -10    -5     0    95   105   120
              DIE_RT7                       45    -10    -5     0    95   105   120
              MB Power Brick 1              52    -45   -40    -5   110   135   150
0/2
              DIE_NP0                       49    -10    -5     0   113   122   137
              DIE_NP1                       43    -10    -5     0   113   122   137
              DIE_FabArbiter                49    -10    -5     0   108   122   137
              DIE_FIA0                      48    -10    -5     0   113   122   137
              DIE_FIA1                      44    -10    -5     0   113   122   137
              DIE_FabSwitch                 48    -10    -5     0   113   122   137
              mb_air_inlet                  32    -10    -5     0    60    65    75
              mb_outlet                     46    -10    -5     0    85    95   105
              mb_hotspot0                   35    -10    -5     0    90    93    95
              mb_hotspot1                   33    -10    -5     0    90    93    95
              mb_hotspot2                   35    -10    -5     0    90    93    95
              DIE_Lewis                     53    -10    -5     0   113   122   137
              DIE_CPU                       37    -10    -5     0    80    89   104
              Inlet                         32    -10    -5     0    60    65    75
              Hotspot                       46    -10    -5     0    90    93    95
0/RSP0
              DIE_FabArbiter0               46    -10    -5     0   115   125   140
              DIE_FabSwitch0                60    -10    -5     0   115   125   140
              DIE_CPU                       45    -10    -5     0    90    95   110
              DIE_PCH                       46    -10    -5     0    87   100   115
              DIE_DIMM0                     39    -10    -5     0    80    85   100
              DIE_DIMM2                     39    -10    -5     0    80    85   100
              DIE_DIMM3                     39    -10    -5     0    80    85   100
              DIE_DIMM4                     38    -10    -5     0    80    85   100
              DIE_DIMM5                     38    -10    -5     0    80    85   100
              SKYBLT0_Inlet                 44    -10    -5     0    80    85   100
              SKYBLT1_Inlet                 42    -10    -5     0    80    85   100
              High_Power                    51    -10    -5     0    80    85   100
              AIR_Outlet                    45    -10    -5     0    80    85   100
              Inlet                         35    -10    -5     0    70    85   100
              Hotspot                       50    -10    -5     0    90    93    95
              DIE_Aldrin                    56    -10    -5     0    95   105   115
0/FC0
              SKB0_HOTSPOT                  47    -10    -5     0    80    83    85
              Inlet                         32    -10    -5     0    60    65    80
              DIE_FabSwitch0                60    -10    -5     0   115   125   140
0/FC2
              SKB0_HOTSPOT                  47    -10    -5     0    80    83    85
              Inlet                         32    -10    -5     0    60    65    80
              DIE_FabSwitch0                62    -10    -5     0   115   125   140
```

```
0/FC4
          SKB0_HOTSPOT                  47    -10     -5      0    80     83     85
          Inlet                         33    -10     -5      0    60     65     80
          DIE_FabSwitch0                62    -10     -5      0   115    125    140
0/FT0
          Inlet                         34    -10     -5      0   105    115    120
          Hotspot                       33    -10     -5      0   105    115    120
0/FT1
          Inlet                         34    -10     -5      0   105    115    120
          Hotspot                       36    -10     -5      0   105    115    120
0/PT0-PM0
          PM0-Inlet Temperature         30    -10     -5      0    61     65     70
          PM0-Outlet Temperature        53    -10     -5      0    80     92    105
          PM0-Heat Sink Temperature     78    -10     -5      0   105    112    120
0/PT0-PM1
          PM1-Inlet Temperature         31    -10     -5      0    61     65     70
          PM1-Outlet Temperature        57    -10     -5      0    80     92    105
          PM1-Heat Sink Temperature     81    -10     -5      0   105    112    120
0/PT0-PM2
          PM2-Inlet Temperature         31    -10     -5      0    61     65     70
          PM2-Outlet Temperature        55    -10     -5      0    80     92    105
          PM2-Heat Sink Temperature     79    -10     -5      0   105    112    120
sysadmin-vm:0_RSP0#
```

Table 82: show environment temperatures Field Descriptions

Field	Description
Location	It displays the location of the component or sensor.
Sensor	It displays the specific sensor or component being measured.
Temperature	It displays the current temperature reading in degrees Celsius (deg C).
Minor Hi/Major Hi/Crit Hi	It specifies the upper temperature thresholds for minor, major, and critical alarms.
Crit Lo/Major Lo/Minor Lo	It specifies the lower temperature thresholds for critical, major, and minor alarms.
Value (Lo/Hi)	It indicates the lower and upper temperature thresholds for normal operation. If the temperature exceeds these thresholds, it may trigger warning or critical alerts.

show environment voltages

To display the voltage readings of various components in the router, such as power supplies, modules, or cards, Use the **show environment voltages** command in the System Admin EXEC mode.

show environment voltages

Syntax Description

voltages	Displays system voltage information.

Command Default

None

Command Modes

System Admin EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

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 environment voltages** command provides information about the voltage readings of various components in the router, such as power supplies, modules, or cards. It is useful for monitoring the health and stability of the hardware components.

Task ID

Task ID	Operations
system	read

The following example shows sample output from the **show environment voltages** command:

```
sysadmin-vm:0_RSP0# show environment voltages

Wed Mar  29 11:49:10.193 UTC+00:00
================================================================================
Location  VOLTAGE                    Value   Crit Minor Minor  Crit
          Sensor                     (mV)    (Lo) (Lo)  (Hi)   (Hi)
--------------------------------------------------------------------------------
0/1
          VP1P0_VCCP                 1062    450   480  1280  1300
          VP1P0_VCCRAM               1107    740   760  1240  1260
          VP1P0_VNN                   886    580   600  1280  1300
          VP1P2_DDR_VDDQ             1212    960  1101  1290  1440
          VP1P05_CPU                 1049    945   971  1129  1155
          VP3P3_CPU                  3299   2970  3052  3548  3630
          VP1P8_CPU                  1799   1620  1665  1935  1980
          VP3P3_RTC                  3300   2970  3052  3548  3630
```

```
VP0P85_IPU_MGT                849    765   786   914   935
VP1P24_VCCREF                1239   1116  1147  1333  1364
VP0P9_PHY07_VDD               900    810   833   968   990
VP1P0_FPGA                   1000    900   925  1075  1100
VP1P0_PHY03_AVDD             1000    900   925  1075  1100
VP7P0                        6998   6300  6475  7525  7700
VP5P0                        5000   4500  4625  5375  5500
VP1P0_PHY47_AVDD             1000    900   925  1075  1100
VP0P8_SKB0_VDD                774    632   648   860   880
VP0P9_SKB0_AVDD               900    810   833   968   990
VP1P5_SKB0_VDDH              1496   1350  1387  1613  1650
VP2P5_SKB0_VDDH              2499   2250  2313  2688  2750
VP0P9_SKB0_PLLAVDD            900    810   833   968   990
VP1P1_SKB0_AVDDH             1100    990  1017  1182  1210
VP0P85_TOR_VDDA               850    765   786   914   935
VP0P9_SKB0_PLLVDD             900    810   833   968   990
VP1P1_TOR                    1100    990  1017  1182  1210
VP3P3_CAN                    3299   2970  3052  3548  3630
VP1P5                        1500   1350  1387  1613  1650
VP0P85_IPU_CORE               849    765   786   914   935
VP1P2                        1199   1080  1110  1290  1320
VP1P2_IPU_DDR4               1199    960  1110  1290  1440
VP1P8_IPU_MGT                1799   1620  1665  1935  1980
VP3P3                        3299   2970  3052  3548  3630
VP1P8                        1800   1620  1665  1935  1980
VP1P8_XGE                    1799   1620  1665  1935  1980
VP3P3_QP_VDD                 3300   3015  3099  3601  3685
VP0P9_PEX                     900    810   833   968   990
VP1P0_XGE                     983    720   750  1250  1280
VP2P5                        2499   2250  2313  2688  2750
VP3P3_SUPR                   3300   2970  3052  3548  3630
VP1P0_XGE_SD_AVDD            1000    900   925  1075  1100
VP0P85_TOR_AVS_VDD            929    697   723   977  1003
VP0P75_LSD0_CORE              745    647   670   862   885
VP0P9_LSD0_AVDD               900    810   833   968   990
VP1P5_LSD0_VDDH              1500   1350  1387  1613  1650
VP2P5_LSD0_VPP               2500   2250  2313  2688  2750
VP1P2_LSD0_VDD               1200   1080  1110  1290  1320
VP1P1_LSD0_AVDDH             1100    990  1017  1182  1210
VP0P9_LSD0_LDO_PLLVDD         900    810   833   968   990
VP0P75_LSD1_CORE              745    647   670   862   885
VP0P9_LSD1_AVDD               900    810   833   968   990
VP1P5_LSD1_VDDH              1500   1350  1387  1613  1650
VP2P5_LSD1_VPP               2500   2250  2313  2688  2750
VP1P2_LSD1_VDD               1199   1080  1110  1290  1320
VP1P1_LSD1_AVDDH             1099    990  1017  1182  1210
VP0P9_LSD1_LDO_PLLVDD         900    810   833   968   990
VP0P6_IPU_DDR4_VTT            599    540   555   645   660
VP0P75_LSD2_CORE              744    647   670   862   885
VP0P9_LSD2_AVDD               899    810   833   968   990
VP1P5_LSD2_VDDH              1500   1350  1387  1613  1650
VP2P5_LSD2_VPP               2500   2250  2313  2688  2750
VP1P2_LSD2_VDD               1199   1080  1110  1290  1320
VP1P1_LSD2_AVDDH             1099    990  1017  1182  1210
VP0P9_LSD2_LDO_PLLVDD         900    810   833   968   990
VP0P75_LSD3_CORE              744    647   670   862   885
VP0P9_LSD3_AVDD               900    810   833   968   990
VP1P5_LSD3_VDDH              1500   1350  1387  1613  1650
VP2P5_LSD3_VPP               2500   2250  2313  2688  2750
VP1P2_LSD3_VDD               1199   1080  1110  1290  1320
VP1P1_LSD3_AVDDH             1100    990  1017  1182  1210
VP0P9_LSD3_LDO_PLLVDD         900    810   833   968   990
VP0P6_VTT                     606    540   555   645   660
Hot Swap VS                 55393  48600 51300 58320 59400
```

show inventory (Cisco IOS XR 64-bit)

To retrieve and display information about all the Cisco products that are installed in the router, use the **showinventory** command in EXEC or System Admin EXEC mode.

EXEC Mode
show inventory [*node-id* | **all** | **location** { *node-id* | **all** } | **raw**]

System Admin EXEC Mode
show inventory [**all** | **chassis** | **fan** | **location** { *node-id* } | **power** | **raw**]

Syntax Description

node-id	(Optional) Location for which to display the specified information. The *node-id* argument is entered in the *rack/slot/module* notation.
all	(Optional) Displays inventory information for all the physical entities in the chassis.
location	(Optional) Displays inventory information for a specific node or for all nodes in the chassis.
raw	(Optional) Displays raw information about the chassis for diagnostic purposes.
chassis	(Optional) Displays inventory information for the entire chassis.
fans	(Optional) Displays inventory information for the fans.
power	(Optional) Displays inventory information for the power supply.

Command Default

All inventory information for the entire chassis is displayed.

Command Modes

EXEC

System Admin EXEC mode

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

If a Cisco entity is not assigned a product ID (PID), that entity is not retrieved or displayed.

Enter the **show inventory** command with the **raw** keyword to display every RFC 2737 entity installed in the router, including those without a PID, unique device identifier (UDI), or other physical identification.



Note The **raw** keyword is primarily intended for troubleshooting problems with the **show inventory** command itself.

If any of the Cisco products do not have an assigned PID, the output displays incorrect PIDs, and version ID (VID) and serial number (SN) elements may be missing.

For UDI compliance products, the PID, VID, and SN are stored in EEPROM and NVRAM. Use the **show inventory** command to display this information.

Task ID

Task ID	Operations
sysmgr	read

The following example shows partial sample output from the **show inventory** command in EXEC mode:

```
RP/0/RSP0/CPU0:ASR-9906-C-LS#show inventory

Wed Mar 29 11:46:26.707 UTC
NAME: "0/RSP0", DESCR: "ASR 9000 Route Switch Processor 5 for Service Edge 40G"
PID: A9K-RSP5-SE       , VID: V01, SN: FOC2246NLGP

NAME: "0/1", DESCR: "ASR 9000 16-port 100GE TR linecard"
PID: A9K-16X100GE-TR   , VID: V01, SN: FOC2249PA5Z

NAME: "HundredGigE0/1/0/14", DESCR: "100GE-SR4-S QSFP Module"
PID: QSFP-100G-SR4-S   , VID: V02, SN: AVF2212S1FV

NAME: "HundredGigE0/1/0/15", DESCR: "100GE-SR4-S QSFP Module"
PID: QSFP-100G-SR4-S   , VID: V03, SN: INL23120234

NAME: "0/2", DESCR: "48X10G/1G Packet Transport Optimized LC"
PID: A9K-48X10GE-1G-TR , VID: V01, SN: FOC2106NT5R

NAME: "TenGigE0/2/0/7", DESCR: "10GBASE-SR SFP Module, Enterprise-Class"
PID: SFP-10G-SR-S      , VID: V01, SN: AVD2206D0YL

NAME: "TenGigE0/2/0/9", DESCR: "10GBASE-SR SFP Module, Enterprise-Class"
PID: SFP-10G-SR-S      , VID: V01, SN: AVD1912DJMD

NAME: "TenGigE0/2/0/10", DESCR: "10GBASE-SR SFP+ Module for MMF"
PID: SFP-10G-SR        , VID: V03, SN: AVD233691HD

NAME: "TenGigE0/2/0/11", DESCR: "10GBASE-LR SFP+ Module for SMF"
PID: SFP-10G-LR        , VID: V02, SN: SPC182007JY

NAME: "TenGigE0/2/0/12", DESCR: "10GBASE-SR SFP Module, Enterprise-Class"
PID: SFP-10G-SR-S      , VID: V01, SN: ACW223506YD

NAME: "TenGigE0/2/0/13", DESCR: "10GBASE-LR SFP Module, Enterprise-Class"
PID: SFP-10G-LR-S      , VID: V01, SN: AVD2002T02B

NAME: "TenGigE0/2/0/14", DESCR: "10GBASE-LR SFP+ Module for SMF"
PID: SFP-10G-LR        , VID: V02, SN: ACW24151C0F

NAME: "TenGigE0/2/0/15", DESCR: "10GBASE-LR SFP+ Module for SMF"
PID: SFP-10G-LR        , VID: V02, SN: AVD1951R1NG

NAME: "TenGigE0/2/0/17", DESCR: "10GBASE-LR SFP Module, Enterprise-Class"
PID: SFP-10G-LR-S      , VID: V01, SN: AVD2303K0FU

NAME: "TenGigE0/2/0/18", DESCR: "10GBASE-LR SFP Module, Enterprise-Class"
PID: SFP-10G-LR-S      , VID: V01, SN: FNS223007XW

NAME: "TenGigE0/2/0/20", DESCR: "10GBASE-SR SFP+ Module for MMF"
PID: SFP-10G-SR        , VID: V03, SN: AVD1905A4SP
```

```
NAME: "TenGigE0/2/0/21", DESCR: "10GBASE-SR SFP+ Module for MMF"
PID: SFP-10G-SR        , VID: V02, SN: AGD14063DAL

NAME: "TenGigE0/2/0/22", DESCR: "10GBASE-SR SFP+ Module for MMF"
PID: SFP-10G-SR        , VID: V03, SN: FNS172421U9

NAME: "TenGigE0/2/0/38", DESCR: "10GBASE-SR SFP+ Module for MMF"
PID: SFP-10G-SR        , VID: V03, SN: OPM22320KUR

NAME: "0/FC0", DESCR: "ASR 9906 Switch Fabric Card 3"
PID: A99-SFC3-T        , VID: V01, SN: FOC2242N2MJ

NAME: "0/FC2", DESCR: "ASR 9906 Switch Fabric Card 3"
PID: A99-SFC3-T        , VID: V01, SN: FOC2245N5W6

NAME: "0/FC4", DESCR: "ASR 9906 Switch Fabric Card 3"
PID: A99-SFC3-T        , VID: V01, SN: FOC2245N5UD

NAME: "Rack 0", DESCR: "ASR 9906 4 Line Card Slot Chassis"
PID: ASR-9906          , VID: V01, SN: FOX2434P3J4

NAME: "0/FT0", DESCR: "ASR 9906 Fan Tray"
PID: ASR-9906-FAN      , VID: V01, SN: FOC2323NBSM

NAME: "0/FT1", DESCR: "ASR 9906 Fan Tray"
PID: ASR-9906-FAN      , VID: V01, SN: FOC2323NBSF

NAME: "0/PT0", DESCR: "Simulated Power Tray IDPROM"
PID: A9K-AC-PEM-V3     , VID: V03, SN: FOT1981P81A

NAME: "0/PT0-PM0", DESCR: "6kW AC Power Module"
PID: PWR-6KW-AC-V3     , VID: V02, SN: DTM2013002M

NAME: "0/PT0-PM1", DESCR: "6kW AC Power Module"
PID: PWR-6KW-AC-V3     , VID: V02, SN: DTM19270369

NAME: "0/PT0-PM2", DESCR: "6kW AC Power Module"
PID: PWR-6KW-AC-V3     , VID: V02, SN: DTM1927035H
```

The following example shows partial sample output from the **show inventory** command in System Admin EXEC mode:

```
sysadmin-vm:0_RSP0#show inventory

Wed Mar  29 11:46:49.238 UTC+00:00

 Name: Rack 0               Descr: ASR 9906 4 Line Card Slot Chassis

 PID: ASR-9906              VID: V01                  SN: FOX2434P3J4

 Name: 0/1                  Descr: ASR 9000 16-port 100GE TR linecard

 PID: A9K-16X100GE-TR       VID: V01                  SN: FOC2249PA5Z

 Name: 0/2                  Descr: 48X10G/1G Packet Transport Optimized LC

 PID: A9K-48X10GE-1G-TR     VID: V01                  SN: FOC2106NT5R

 Name: 0/RSP0               Descr: ASR 9000 Route Switch Processor 5 for Service Edge 40G

 PID: A9K-RSP5-SE           VID: V01                  SN: FOC2246NLGP

 Name: 0/FC0                Descr: ASR 9906 Switch Fabric Card 3
```

```
PID: A99-SFC3-T            VID: V01                  SN: FOC2242N2MJ

Name: 0/FC2                Descr: ASR 9906 Switch Fabric Card 3

PID: A99-SFC3-T            VID: V01                  SN: FOC2245N5W6

Name: 0/FC4                Descr: ASR 9906 Switch Fabric Card 3

PID: A99-SFC3-T            VID: V01                  SN: FOC2245N5UD

Name: 0/FT0                Descr: ASR 9906 Fan Tray

PID: ASR-9906-FAN          VID: V01                  SN: FOC2323NBSM

Name: 0/FT1                Descr: ASR 9906 Fan Tray

PID: ASR-9906-FAN          VID: V01                  SN: FOC2323NBSF

Name: 0/PT0                Descr: Simulated Power Tray IDPROM

PID: A9K-AC-PEM-V3         VID: V03                  SN: FOT1981P81A

Name: 0/PT0-PM0            Descr: 6kW AC Power Module

PID: PWR-6KW-AC-V3         VID: V02                  SN: DTM2013002M

Name: 0/PT0-PM1            Descr: 6kW AC Power Module

PID: PWR-6KW-AC-V3         VID: V02                  SN: DTM19270369

Name: 0/PT0-PM2            Descr: 6kW AC Power Module

PID: PWR-6KW-AC-V3         VID: V02                  SN: DTM1927035H
```

show platform vm

To display information on virtual machines running on each line card, use the **show platform vm** command in EXEC mode.

show platform vm [*node-id*]

Syntax Description

node-id	(Optional) Node for which to display information. The *node-id* argument is entered in the *rack / slot/ module* notation.

Command Default

Status and information are displayed for all nodes in the system.

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

The **show platform vm** command presents information about the virtual machines (VMs) operating on the platform, including their IDs, names, statuses, and resource allocations. To display VM information for a specific node, it is crucial to specify the appropriate node identifier.

Task ID

This example shows XR virtual machines running on each line card:

```
RP/0/RSP0/CPU0:ios#show platform  vm
Mon Jun 19 09:44:17.060 UTC
Node name       Node type       Partner name    SW status       IP address
--------------- --------------- --------------- --------------- ---------------
0/0/CPU0        LC (ACTIVE)     NONE            FINAL Band      192.0.0.3
0/1/CPU0        LC (ACTIVE)     NONE            FINAL Band      192.0.12.3
0/RSP0/CPU0     RP (ACTIVE)     NONE            FINAL Band      192.0.4.4
```

show vm

To display the health status of the virtual machines (VMs) running on the router, use the **show vm** command in the System Admin EXEC mode.

show vm

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

System Admin EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

The **show vm** command displays the health status of the virtual machines (VMs) running on the router. By executing this command, you can assess the overall health and performance of the VM environment on the ASR9000 series router.

Task ID

Task ID	Operations
system	read

This example shows sample output from the **show vm** command in system admin command.

```
sysadmin-vm:0_RSP0# show vm
Wed Jul  19 09:39:59.133 UTC+00:00

Location: 0/0
Id                Status        IP Address       HB Sent/Recv
-------------------------------------------------------------
sysadmin          running       192.0.0.1        NA/NA
default-sdr       running       192.0.0.3        423/423

Location: 0/RSP0
Id                Status        IP Address       HB Sent/Recv
-------------------------------------------------------------
sysadmin          running       192.0.4.1        NA/NA
default-sdr       running       192.0.4.4        422/422
```

show fpd package (Cisco IOS XR 64-bit)

To display which shared port adapters (SPA) and SPA interface processors (SIPs) are supported with your current Cisco IOS XR software release, which field-programmable device (FPD) image you need for each SPA and SIP, and what the minimum hardware requirements are for the SPA and SIP modules, use the **show fpd package** command in System Admin EXEC mode.

show fpd package

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

System Admin EXEC

EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

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.

If there are multiple FPD images for your card, use the **show fpd package** command to determine which FPD image to use if you only want to upgrade a specific FPD type.

Task ID

Task ID	Operations
sysmgr	read, write

The following example shows sample output from the **show fpd package** command:

```
sysadmin-vm:0_RSP0#show fpd package
Wed Mar  29 11:47:15.651 UTC+00:00

================================= ==================================================
                                          Field Programmable Device Package
                                  ==================================================
                                                 Req     SW        Min Req     Min Req
Card Type            FPD Description           Reload  Ver       SW Ver    Board Ver
==================== ========================= ====== ======= ========== =========
A99-10X400GE-X-CM    Aldrin-FPGA                YES     1.05       1.05      0.0
                     Beachcomber-0              YES     0.01       0.01      0.0
                     Beachcomber-1              YES     0.01       0.01      0.0
                     CBC                        NO     62.05      62.05      0.0
                     IPU-DDR4                   YES     1.06       1.06      0.0
```

```
                    Primary-BIOS               YES    25.30       25.30      0.0
                    Sunstreaker                YES     0.14        0.14      0.0
                    TAMFW-Sunstreaker          YES     2.65        2.65      0.0
                    Trailbreaker-0             YES     0.23        0.23      0.0
                    Trailbreaker-1             YES     0.23        0.23      0.0
--------------------------------------------------------------------------------
A99-10X400GE-X-SE   Aldrin-FPGA                YES     1.05        1.05      0.0
                    Beachcomber-0              YES     0.01        0.01      0.0
                    Beachcomber-1              YES     0.01        0.01      0.0
                    CBC                        NO     62.05       62.05      0.0
                    IPU-DDR4                   YES     1.06        1.06      0.0
                    Primary-BIOS               YES    25.30       25.30      0.0
                    Sunstreaker                YES     0.14        0.14      0.0
                    TAMFW-Sunstreaker          YES     2.65        2.65      0.0
                    Trailbreaker-0             YES     0.23        0.23      0.0
                    Trailbreaker-1             YES     0.23        0.23      0.0
--------------------------------------------------------------------------------
```

The following example shows sample output from the **show fpd package** command in EXEC mode:

```
RP/0/RSP0/CPU0:ASR-9906-C-LS#show fpd package
Wed Mar 29 11:47:44.918 UTC

================================ ============================================
                                        Field Programmable Device Package
                                 ============================================
                                           Req     SW      Min Req   Min Req
Card Type           FPD Description        Reload  Ver     SW Ver  Board Ver
================== ========================== ====== ======= ======== =========
--------------------------------------------------------------------------------
A99-10X400GE-X-CM   Aldrin-FPGA(A)            YES     1.05      1.05      0.0
                    Beachcomber-0(A)           YES     0.01      0.01      0.0
                    Beachcomber-1(A)           YES     0.01      0.01      0.0
                    CBC(A)                     NO     62.05     62.05      0.0
                    IPU-DDR4(A)                YES     1.06      1.06      0.0
                    Primary-BIOS(A)            YES    25.30     25.30      0.0
                    QDD_0_3                    NO     61.22     61.22      0.0
                    QDD_0_5                    NO     61.22     61.22      0.0
                    QDD_0_6                    NO     61.22     61.22      0.0
                    QDD_0_7                    NO     61.22     61.22      0.0
                    QDD_0_9                    NO     61.22     61.22      0.0
                    Sunstreaker(A)             YES     0.14      0.14      0.0
                    TAMFW-Sunstreaker(A)       YES     2.65      2.65      0.0
                    TimingIC-A                 YES     7.216     7.216     0.0
                    TimingIC-B-0               YES     7.216     7.216     0.0
                    TimingIC-B-1               YES     7.216     7.216     0.0
                    Trailbreaker-0(A)          YES     0.23      0.23      0.0
                    Trailbreaker-1(A)          YES     0.23      0.23      0.0
--------------------------------------------------------------------------------
A99-10X400GE-X-SE   Aldrin-FPGA(A)            YES     1.05      1.05      0.0
                    Beachcomber-0(A)           YES     0.01      0.01      0.0
                    Beachcomber-1(A)           YES     0.01      0.01      0.0
                    CBC(A)                     NO     62.05     62.05      0.0
                    IPU-DDR4(A)                YES     1.06      1.06      0.0
                    Primary-BIOS(A)            YES    25.30     25.30      0.0
                    QDD_0_3                    NO     61.22     61.22      0.0
                    QDD_0_5                    NO     61.22     61.22      0.0
                    QDD_0_6                    NO     61.22     61.22      0.0
                    QDD_0_7                    NO     61.22     61.22      0.0
                    QDD_0_9                    NO     61.22     61.22      0.0
                    Sunstreaker(A)             YES     0.14      0.14      0.0
                    TAMFW-Sunstreaker(A)       YES     2.65      2.65      0.0
                    TimingIC-A                 YES     7.216     7.216     0.0
                    TimingIC-B-0               YES     7.216     7.216     0.0
                    TimingIC-B-1               YES     7.216     7.216     0.0
```

```
Trailbreaker-0(A)          YES      0.23       0.23       0.0
Trailbreaker-1(A)          YES      0.23       0.23       0.0
```

This table describes the significant fields shown in the display:

Table 83: show fpd package Field Descriptions

Field	Description
Card Type	Module part number.
FPD Description	Description of all FPD images available for the line card.
Type	Hardware type. Possible types can be: • spa—Shared port adapter • lc—Line card
Subtype	FPD subtype. These values are used in the **upgrade hw-module fpd** command to indicate a specific FPD image type to upgrade.
SW Version	FPD software version recommended for the associated module running the current.
Min Req SW Vers	Minimum required FPD image software version to operate the card. Version 0.0 indicates that a minimum required image was not programmed into the card.
Min Req HW Vers	Minimum required hardware version for the associated FPD image. A minimum hardware requirement of version 0.0 indicates that all hardware can support this FPD image version.

show hw-module fpd (Cisco IOS XR 64-bit)

To display field-programmable device (FPD) compatibility for all modules, use the **show hw-module fpd** command in the EXEC mode.

show hw-module fpd location { *node-id* | **all** }

Syntax Description

location	Specifies the location of the module.
node-id	The *node-id* argument is expressed in the *rack/slot/module* notation.
all	Use the **all** keyword to indicate all nodes.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

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
sysmgr	read

The following example shows how to display FPD compatibility for all modules in the router:

```
RP/0/RSP0/CPU0:ASR-9906-C-LS#show hw-module fpd

Wed Mar 29 11:43:53.912 UTC

Auto-upgrade:Enabled
                                                                          FPD Versions
                                                                          ==============
Location   Card type              HWver FPD device       ATR Status    Running   Programd
-------------------------------------------------------------------------------------------
0/RSP0     A9K-RSP5-SE            1.0   Aldrin-0-FPGA        CURRENT     1.06      1.06
0/RSP0     A9K-RSP5-SE            1.0   Beta-FPGA            CURRENT     0.07      0.07
0/RSP0     A9K-RSP5-SE            1.0   CBC                  CURRENT    53.10     53.10
0/RSP0     A9K-RSP5-SE            1.0   IPU-DDR4             CURRENT     0.20      0.20
0/RSP0     A9K-RSP5-SE            1.0   Orion-FPGA           CURRENT     0.23      0.23
0/RSP0     A9K-RSP5-SE            1.0   Primary-BIOS         CURRENT    31.36     31.36
0/RSP0     A9K-RSP5-SE            1.0   SSDa-MICRON          N/A         7.05      7.05
0/RSP0     A9K-RSP5-SE            1.0   SSDb-MICRON          N/A         7.05      7.05
0/RSP0     A9K-RSP5-SE            1.0   Zenith-FPGA          CURRENT     0.10      0.10
```

```
0/FT0       ASR-9906-FAN          1.0   CBC                 CURRENT     56.01      56.01
0/FT0       ASR-9906-FAN          1.0   PSOC                CURRENT      2.06       2.06
0/FT1       ASR-9906-FAN          1.0   CBC                 CURRENT     56.01      56.01
0/FT1       ASR-9906-FAN          1.0   PSOC                CURRENT      2.06       2.06
0/1         A9K-16X100GE-TR       1.0   Aldrin-FPGA         CURRENT      1.05       1.05
0/1         A9K-16X100GE-TR       1.0   CBC                 CURRENT     48.09      48.09
0/1         A9K-16X100GE-TR       1.0   Grapple-0           CURRENT      0.15       0.15
0/1         A9K-16X100GE-TR       1.0   IPU-DDR4            CURRENT      1.09       1.09
0/1         A9K-16X100GE-TR       1.0   Mixmaster-0         CURRENT      0.13       0.13
0/1         A9K-16X100GE-TR       1.0   Primary-BIOS        CURRENT     21.43      21.43
0/1         A9K-16X100GE-TR       1.0   Scamper             CURRENT      0.23       0.23
0/1         A9K-16X100GE-TR       1.0   Skylynx-0           CURRENT      0.12       0.12
0/1         A9K-16X100GE-TR       1.0   SSDa-MICRON         N/A          7.05       7.05
0/2         A9K-48X10GE-1G-TR     1.0   CBC                 CURRENT     47.03      47.03
0/2         A9K-48X10GE-1G-TR     1.0   IPU-FPGA            RLOAD REQ    1.89       1.90
0/2         A9K-48X10GE-1G-TR     1.0   IPU-FSBL            CURRENT      1.113      1.113
0/2         A9K-48X10GE-1G-TR     1.0   IPU-Linux           CURRENT      1.113      1.113
0/2         A9K-48X10GE-1G-TR     1.0   Leadfoot-0          CURRENT      1.00       1.00
0/2         A9K-48X10GE-1G-TR     1.0   Leadfoot-1          CURRENT      1.00       1.00
0/2         A9K-48X10GE-1G-TR     1.0   Lewis               CURRENT      1.11       1.11
0/2         A9K-48X10GE-1G-TR     1.0   Primary-BIOS        CURRENT     18.33      18.33
0/2         A9K-48X10GE-1G-TR     1.0   SSDa-SMART          N/A          7.05       7.05
0/BPID0     ASR-9906              1.0   CBC                 CURRENT      7.105      7.105
0/FC0       A99-SFC3-T            1.0   CBC                 CURRENT     44.02      44.02
0/FC0       A99-SFC3-T            1.0   IPU-DDR4            CURRENT      0.25       0.25
0/FC2       A99-SFC3-T            1.0   CBC                 CURRENT     44.02      44.02
0/FC2       A99-SFC3-T            1.0   IPU-DDR4            CURRENT      0.25       0.25
0/FC4       A99-SFC3-T            1.0   CBC                 CURRENT     44.02      44.02
0/FC4       A99-SFC3-T            1.0   IPU-DDR4            CURRENT      0.25       0.25
0/PT0       PWR-6KW-AC-V3         2.0   PM0-DT-Pri0MCU      CURRENT      4.02       4.02
0/PT0       PWR-6KW-AC-V3         2.0   PM0-DT-Pri1MCU      CURRENT      4.02       4.02
0/PT0       PWR-6KW-AC-V3         2.0   PM0-DT-Sec054vMCU   CURRENT      4.03       4.03
0/PT0       PWR-6KW-AC-V3         2.0   PM0-DT-Sec154vMCU   CURRENT      4.03       4.03
0/PT0       PWR-6KW-AC-V3         2.0   PM0-DT-Sec5vMCU     CURRENT      4.04       4.04
0/PT0       PWR-6KW-AC-V3         2.0   PM1-DT-Pri0MCU      CURRENT      4.02       4.02
0/PT0       PWR-6KW-AC-V3         2.0   PM1-DT-Pri1MCU      CURRENT      4.02       4.02
0/PT0       PWR-6KW-AC-V3         2.0   PM1-DT-Sec054vMCU   CURRENT      4.03       4.03
0/PT0       PWR-6KW-AC-V3         2.0   PM1-DT-Sec154vMCU   CURRENT      4.03       4.03
0/PT0       PWR-6KW-AC-V3         2.0   PM1-DT-Sec5vMCU     CURRENT      4.04       4.04
0/PT0       PWR-6KW-AC-V3         2.0   PM2-DT-Pri0MCU      CURRENT      4.02       4.02
0/PT0       PWR-6KW-AC-V3         2.0   PM2-DT-Pri1MCU      CURRENT      4.02       4.02
0/PT0       PWR-6KW-AC-V3         2.0   PM2-DT-Sec054vMCU   CURRENT      4.03       4.03
0/PT0       PWR-6KW-AC-V3         2.0   PM2-DT-Sec154vMCU   CURRENT      4.03       4.03
0/PT0       PWR-6KW-AC-V3         2.0   PM2-DT-Sec5vMCU     CURRENT      4.04       4.04
```

The following example shows the output of **show hw-module location 0/2 fpd Primary-BIOS** command:

```
RP/0/RSP0/CPU0:ASR-9906-C-LS#show hw-module location 0/2 fpd Primary-BIOS

Wed Mar 29 11:44:29.780 UTC

Auto-upgrade:Enabled

                                                                    FPD Versions
                                                                    ==============
Location   Card type              HWver FPD device       ATR Status    Running   Programd
-------------------------------------------------------------------------------------------
0/2        A9K-48X10GE-1G-TR     1.0   Primary-BIOS         CURRENT    18.33     18.33
```

upgrade hw-module location

To upgrade the field-programmable devices (FPDs) on all modules in the specified location, use the **upgrade hw-module location** command in the appropriate mode.

upgrade hw-module location { **all** | **fpd** *all* [*force*] }

Syntax Description

all	Upgrades all FPD images on the selected module.
fpd	It specifies the FPDs on the hardware location of the module.
all	It specifies all location.
force	(Optional) Forces the update of the indicated FPD image package on a shared port adapter (SPA) that meets the minimum version requirements. Without this option, the manual upgrade upgrades only incompatible FPD images.

Command Default

None

Command Modes

EXEC

System admin

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

This command is supported on Cisco IOS XR 64-bit software.

Note The use of the force option when doing a fpd upgrade is not recommended except under explicit direction from Cisco engineering or TAC.

During the upgrade procedure, the module must be offline (shut down but powered).

Naming notation for the node-id argument is rack/ slot/ subslot ; a slash between values is required as part of the notation.

rack —Chassis number of the rack.

slot —Physical slot number of the SPA interface processor (SIP).

subslot —Subslot number of the SPA.

For more information about the syntax for the router, use the question mark (?) online help function.

When you start the FPD upgrade procedure or log into a router that is running the FPD upgrade procedure, the following message is displayed to the screen on TTY, console, and AUX ports:

FPD upgrade in progress on some hardware, reload/configuration change on those is not recommended as it might cause HW programming failure and result in RMA of the hardware.

If you enter administration mode while the FPD upgrade procedure is running, the following message is displayed to the screen on TTY, console, and AUX ports:

Task ID

Task ID	Operations
sysmgr	read, write

The following example shows sample output from the **upgrade hw-module location** command:

```
RP/0/RSP0/CPU0:ios#upgrade hw-module location all fpd all force

Wed Jun 21 07:56:26.767 UTC
RP/0/RSP0/CPU0: Jun 21 07:56:26.966 UTC: fpd-serv[138]: %INFRA-FPD_SERVER-3-UPGRADE_ERROR
: Upgrade command has not be committed yet, please wait ...
upgrade command issued (use "show hw-module fpd" to check upgrade status)
```