

Interface and Hardware Component Command Reference for Cisco NCS 5500 Series, Cisco NCS 540 Series, and Cisco NCS 560 Series Routers

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Preface

This command reference describes the Cisco IOS XR Interfaces commands.

The preface for the Interface and Hardware Component Command Reference for Cisco NCS 5500 and NCS 540 and NCS 560 Series Routers contains the following sections:

- Changes to This Document, on page iii
- Obtaining Documentation and Submitting a Service Request, on page iv

Changes to This Document

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

Table 1: Changes to This Document

Date	Summary
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
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

Date	Summary
August 2020	Republished for Release 7.2.1
January 2021	Republished for Release 7.2.2
July 2021	Republished for Release 7.4.1
November 2021	Republished for Release 7.4.16
November 2021	Republished for Release 7.5.1
July 2022	Republished for Release 7.7.1
September 2022	Republished for Release 7.5.3
November 2022	Republished for Release 7.8.1
April 2023	Republished for Release 7.9.1
August 2023	Republished for Release 7.10.1
March 2024	Republished for Release 24.1.1
June 2024	Republished for Release 24.2.1
September 2024	Republished for Release 24.3.1
December 2024	Republished for Release 24.4.1
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

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at: http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html

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Ethernet Interface Commands

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

Note

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

This module provides command line interface (CLI) commands for configuring Ethernet interfaces on the Cisco NCS 5500 Series RouterCisco NCS 540 Series Router.

For detailed information about Ethernet interfaces concepts, configuration tasks, and examples, refer to the *Interface and Hardware Component Configuration Guide for Cisco NCS 5500 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 540 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 560 Series Routers*

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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 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
```

carrier-delay

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



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.

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

Syntax Description

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

Command Default

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

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.
Release 24.2.1	A default value of 200 ms was introduced for the carrier-delay up timer for NCS 5500 fixed port routers; NCS 5500 modular routers (NCS 5500 line cards; NCS 5700 line cards [Mode: Compatibility; Native].
Release 24.2.11	A default value of 200 ms was introduced for the carrier-delay up timer for NCS 5700 fixed port routers.

Usage Guidelines

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

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

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

Although the Cisco NCS 5500 and Cisco 540 Series Router accepts a value between 0 to 2147483647 milliseconds, the minimum value that is configured to the interface is 10 milliseconds, so as to avoid overloading the linecard control stack. We recommend that if your Cisco NCS 5500 and Cisco 540 Series Router has a value below 10 milliseconds, reconfigure the value to a minimum of 10 milliseconds, and if required assign a higher value.



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

Task ID

Task ID	Operations
interface	read, write

Examples

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

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

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

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

clear controller pfc statistics

To clear priority flow control statistics on an interface on a per-port or a per-traffic-class, per-port basis, use `clear controllers <interface> priority-flow-control statistics [traffic-class <0-7>]` command in XR EXEC mode.

clear controllers *interface* **priority-flow-control statistics traffic-class** *<0-7>*

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
6.6.4	This command was introduced.

Usage Guidelines

None

Example

This example shows sample output of `clear controllers <interface> priority-flow-control statistics [traffic-class <0-7>]` command:

```
RP/0/RP1/CPU0:router#clear controller hundredGigE 0/0/0/0 priority-flow-control statistics
 traffic-class 3
Mon Oct 12 12:22:48.778 UTC
RP/0/RP1/CPU0:router#show controllers hundredGigE 0/0/0/0  priority-flow-control statistics

Mon Oct 12 12:22:51.097 UTC

Priority flow control information for interface HundredGigE0/0/0/0:

Priority Flow Control:
    Total Rx PFC Frames: 0
    Total Tx PFC Frames: 882241
    Rx Data Frames Dropped: 0
    CoS  Status  Rx Frames   Tx Frames
    ---  ------  ----------  ----------
      0  off              0           0
      1  off              0           0
      2  off              0           0
      3  on               0           0
      4  on               0      882241
      5  off              0           0
      6  off              0           0
      7  off              0           0
RP/0/RP1/CPU0:router#
```

clear controllers priority-flow-control watchdog statistics

To clear priority flow control watchdog statistics on an interface on a per-port or a per-traffic-class, per-port basis, use `clear controllers <interface> priority-flow-control watchdog statistics [traffic-class <0-7>]` command in XR EXEC mode.

clear controllers *interface* **priority-flow-control watchdog statistics traffic-class** *<0-7>*

Command Modes

XR EXEC mode

Command History

Release	Modification
6.6.4	This command was introduced.

Usage Guidelines

None

Example

This example shows sample output of `clear controllers <interface> priority-flow-control watchdog statistics [traffic-class <0-7>]` command:

```
RP/0/RP1/CPU0:router#clear controller hundredGigE 0/0/0/0 priority-flow-control watchdog-stats
 ?
  traffic-class  Traffic class to be cleared

RP/0/RP1/CPU0:router#clear controller hundredGigE 0/0/0/0 priority-flow-control watchdog-stats
 traffic-class ?
  <0-7>  Traffic class
RP/0/RP1/CPU0:router#clear controller hundredGigE 0/0/0/0 priority-flow-control watchdog-stats
 traffic-class 3
Mon Oct 12 14:36:18.881 UTC
RP/0/RP1/CPU0:router#
```

interface (Ethernet)

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

Cisco NCS 5500 Series Routers
interface {**TenGigE** | **HundredGigE**} *interface-path-id*
no interface {**TenGigE** | **HundredGigE**} *interface-path-id*

Cisco NCS 540 Series Routers, Cisco NCS 560 Series Routers
interface {**GigE** | **TenGigE** | **TwentyfiveGigE** | **FortyGigE** | **HundredGigE**} *interface-path-id*
no interface {**GigE** | **TenGigE** | **TwentyfiveGigE** | **FortyGigE** | **HundredGigE**} *interface-path-id*

Syntax Description

GigE	(Cico NCS 540, Cisco NCS 560) Specifies or creates a One Gigabit Ethernet (1 Gbps) interface.
TenGigE	Specifies or creates a Ten Gigabit Ethernet (10 Gbps) interface.
TwentyfiveGigE	(Cisco NCS 540, Cisco NCS 560)) Specifies or creates a Twenty five Gigabit Ethernet (25 Gbps) interface.
FortyGigE	(Cisco NCS 540, Cisco NCS 560)) Specifies or creates a Forty Gigabit Ethernet (40 Gbps) interface.
HundredGigE	Specifies or creates a Hundred Gigabit Ethernet (100 Gbps) interface.
interface-path-id	Physical interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

None

Command History

Release	Modification
Release 6.0	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.

The supported *interface-path-id* ranges are:

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

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

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

interface range

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

interface *{type, specified-range}*

Syntax Description

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

Command Default

None

Command Modes

Interface Configuration

Global Interface Configuration

Command History

Release	Modification
Release 6.2.1	XML support was introduced.
Release 6.1.2	This command was introduced.

Usage Guidelines

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

Task ID

Task ID	Operation
interface	read, write

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

```
RP/0/RP0/CPU0:router(config)# int GigabitEthernet 0/0/0/0,2-4
RP/0/RP0/CPU0:router(config-if-range)# description Test interface range
RP/0/RP0/CPU0:router(config-if-range)# show configuration
```

Thu Jan 11 06:46:43.502 PST

Building configuration...

interface GigabitEthernet0/0/0/0

description Test Interface range

!

interface GigabitEthernet0/0/0/2

description Test Interface range

```
!
interface GigabitEthernet0/0/0/3
description Test Interface range
!
interface GigabitEthernet0/0/0/4
description Test Interface range
!
```

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.

Note This command is not supported on Cisco NCS 560-4 (RSP4).

loopback { **external** | **internal** | **line** }
no loopback

Syntax Description

external	All 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 same interface .

Command Default

Loopback mode is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

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

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

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

Examples

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

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

lldp

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

lldp { **subinterface** | **subinterfaces-tagged** }
enable

no lldp

Syntax Description

subinterface	Enables LLDP on all subinterfaces.
subinterfaces-tagged	Enables VLAN tagging for LLDP packets on all subinterfaces.

Command Default

LLDP is disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.9.1	The keyword **subinterfaces-tagged** was introduced.
Release 6.3.2	This command was introduced.

Usage Guidelines

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

Task ID

Task ID	Operation
ethernet-services	read, write

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

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

This example shows how to enable LLDP on all subinterfaces:

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

This example shows how to enable VLAN tagging for LLDP packets on all subinterfaces:

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

lldp enable (subinterface)

To enable LLDP packet transmission and reception on each subinterface, use **lldp enable** command in subinterface configuration mode. To disable LLDP for the subinterface, use the **no** form of this command.

```
lldp  enable
```

Syntax Description This command has no keywords or arguments.

Command Default LLDP is disabled.

Command Modes Subinterface Configuration mode

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines None

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to enable LLDP packet transmission and reception on subinterface GigabitEthernet 0/0/0/0.6.

```
Router(config)# interface GigabitEthernet 0/0/0/0.6
Router(config-subif)# lldp enable
Router(config-subif)# commit
```

lldp tagged (subinterface)

To enable VLAN-tagged LLDP packet transmission and reception on each subinterface, use **lldp tagged** command in subinterface configuration mode. To disable VLAN tagging for LLDP packets in the subinterface, use the **no** form of this command.

```
lldp  tagged
```

Syntax Description

This command has no keywords or arguments.

Command Default

VLAN tagging of LLDP packets is disabled.

Command Modes

Subinterface Configuration mode

Command History

Release	Modification
Release 7.9.1	This command was introduced.

Usage Guidelines

LLDP must be enabled for the subinterface before enabling VLAN tagging. See lldp enable for more details.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to enable VLAN tagging for LLDP packets on subinterface GigabitEthernet 0/0/0/0.6.

```
Router(config)# interface GigabitEthernet 0/0/0/0.6
Router(config-subif)# lldp tagged
Router(config-subif)# 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
no negotiation auto

Syntax Description

This command has no keywords or arguments.

Command Default

Link autonegotiation is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

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

Enabling the **negotiation auto** configuration is mandatory for the GLC-TE-specific ports to work properly on the NC57-48Q2D-S or NC57-48Q2D-SE-S line cards.

Task ID

Task ID	Operations
interface	read, write

Examples

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

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/2/0/0
RP/0/RP0/CPU0:router(config-if)# negotiation auto
```

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

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/2/0/0
RP/0/RP0/CPU0:router(config-if)# no negotiation auto
```

oam 48byte-cfm-maid-enable

To enable the 48-byte string-based MAID support for Offloaded Endpoints in native mode, use the **hw-module profile oam 48byte-cfm-maid-enable** command in the System Admin Config mode.

hw-module profile oam 48byte-cfm-maid-enable

Command Default

None

Command Modes

System Admin Config

Command History

Release	Modification
Release 7.5.1	This command was introduced.

Usage Guidelines

Make sure that you reload the router for this OAM profile to take effect.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to enable the 48-byte string-based MAID support for Offloaded Endpoints in native mode.

```
Router(config)#hw-module profile oam 48byte-cfm-maid-enable
In order to make the oam profile take effect, the router must be manually reloaded.
Router(config)#commit
```

priority flow control

To enable priority-flow-control feature on the selected Ethernet interface, use the `priority-flow-control on` command. To disable, use the `no` form of the command.

priority flow control mode on
no priority flow control mode on

Command Default

PFC is disabled.

Command Modes

Interface configuration

Command History

Release	Modification
6.6.3	This command was introduced.

Usage Guidelines

None

Task ID

Task ID	Operation
interface	read, write

In this example, priority flow control is enabled on a HundredGigE interface 0/0/0/0:

```
RP/0/RP0/CPU0:router(config)#configure
RP/0/RP0/CPU0:router(config)#interface HundredGigE0/0/0/0
RP/0/RP0/CPU0:router(config)#priority-flow-control mode on
```

priority-flow-control watchdog

To configure PFC watchdog, use `priority-flow-control watchdog` command in XR Config mode. To unconfigure, use the `no` form of this command.

priority-flow-control watchdog { **auto-restore-multiplier** | **interval** | **mode** | **shutdown-multiplier** }

Command Default

Watchdog is enabled by default, with system default values of:

- Auto-restore-multiplier = 10
- Interval = 100ms
- Shutdown-multiplier = 1

Command Modes

XR Config mode

Command History

Release	Modification
6.6.4	This command was introduced.

Usage Guidelines

The PFC watchdog command acts in 2 modes:

- Global configuration mode

```
priority-flow-control watchdog mode-on
priority-flow-control watchdog interval 100
priority-flow-control watchdog auto-restore-multiplier 10
priority-flow-control watchdog shutdown-multiplier 2
```

- Interface configuration mode

```
interface HundredGigE0/0/0/0
  priority-flow-control watchdog mode-on
  priority-flow-control watchdog mode off
  priority-flow-control watchdog interval 987
  priority-flow-control watchdog shutdown-multiplier 5
```

Note While configuring PFC watchdog parameters at the global or interface levels, note that:

- When global watchdog mode is disabled or off, watchdog is disabled on all interfaces.This condition is regardless of the interface level watchdog mode settings.
- When global watchdog mode is enabled or on, the interface level watchdog mode configuration settings override the global watchdog mode values.
- When you configure interface level watchdog attributes such as interval, shutdown-multiplier, and auto-restore-multiplier, they override the global watchdog attributes.

Example

```
RP/0/RP0/CPU0:router(config)#priority-flow-control watchdog ?
auto-restore-multiplier      Watchdog Auto Restore Timer
interval                     PFC WD Polling Interval
mode                         Set Priority flow control watchdog mode
shutdown-multiplier          Pause Storm Detection Timer Threshold

RP/0/RP0/CPU0:router(config)#no priority-flow-control watchdog ?
auto-restore-multiplier      Watchdog Auto Restore Timer
interval                     PFC WD Polling Interval
mode                         Set Priority flow control watchdog mode
shutdown-multiplier          Pause Storm Detection Timer Threshold

RP/0/RP0/CPU0:router# show controllers hundredGigE 0/0/0/0 priority-flow-control
watchdog-config
Mon Oct 12 14:32:47.056 UTC

Priority flow control information for interface HundredGigE0/0/0/0:

Priority flow control watchdog configuration:
(D) : Default value
U : Unconfigured
------------------------------------------------------------------------------
       Configuration Item           Global  Interface Effective
------------------------------------------------------------------------------
    PFC watchdog state           :        U        U  Enabled(D)
    Poll interval                :        U        U      100(D)
    Shutdown multiplier          :        U        U        1(D)
    Auto-restore multiplier      :        U        U       10(D)
```

report sd-ber

To enable Signal Degrade (SD) Bit Error Rate (BER) reporting, use the **report sd-ber** command in interface 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

interface configuration

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable Signal Degrade (SD) Bit Error Rate (BER) reporting.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# int hundredGigE 0/1/0/17
RP/0/RP0/CPU0:router(config-if)# report sd-ber
RP/0/RP0/CPU0:router(config-if)#
```

report sf-ber disable

To disable Signal Failure (SF) Bit Error Rate (BER) reporting, use the **report sf-ber disable** command in interface configuration mode. To enable Signal Failure (SF) Bit Error Rate (BER) reporting, use the no form of this command.

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

Interface configuration

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to disable Signal Failure (SF) Bit Error Rate (BER) reporting.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# int hundredGigE 0/1/0/17
RP/0/RP0/CPU0:router(config-if)# report sf-ber disable
RP/0/RP0/CPU0:router(config-if)#
```

set controller priority-flow-control

To manually restore a queue that has been shutdown by the PFC watchdog action, use `set controller <interface> priority-flow-control recover traffic-class [0-7]` command in XR EXEC mode. Once this command is executed, all internal watchdog state machines are reset and the queue is put back into monitoring state.

set controller *interface* **priority-flow-control recover traffic-class** *<0-7>*

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
6.6.4	This command was introduced.

Usage Guidelines

None

Example

This example shows sample output of `set controller hundredGigE 0/1/0/19 priority-flow-control recover traffic-class 3` command:

```
RP/0/RP1/CPU0:router#show controllers hundredGigE 0/1/0/19 priority-flow-control
watchdog-state

Priority flow control information for interface HundredGigE0/1/0/19:


Priority flow control watchdog state machine state:
D - Disabled
M - Monitoring
S - Waiting For Shutdown
R - Waiting to Restore
----------------------------------------------------------------
PFC Watchdog : Enabled
Watchdog SM state : Traffic Class
7 6 5 4 3 2 1 0
- - - M R - - -
RP/0/RP1/CPU0:router#

RP/0/RP1/CPU0:router#set controller hundredGigE 0/1/0/19 priority-flow-control recover
traffic-class 3

RP/0/RP1/CPU0:router#show controllers hundredGigE 0/1/0/19 priority-flow-control
watchdog-state

Priority flow control information for interface HundredGigE0/1/0/19:


Priority flow control watchdog state machine state:
D - Disabled
M - Monitoring
S - Waiting For Shutdown
```

```
R - Waiting to Restore
------------------------------------------------------------------
PFC Watchdog : Enabled
Watchdog SM state : Traffic Class
7 6 5 4 3 2 1 0
- - - M M - - -
RP/0/RP1/CPU0:router#
```

speed (Network Interface)

To configure the speed for a network (NPU) 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**}
no speed

Syntax Description

10	(Cisco NCS 540) 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 is autonegotiated and speed is set to 1000Mbps.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

This command is supported only on 1G interfaces with a 1000Base-T module (GLC-TE) inserted.

The command supports only full duplex mode.

This table describes the performance of the system for different combinations of the negotiation and speed modes. The specified **negotiation** command configured with the specified **speed** command produces the resulting system action.

Table 2: Relationship Between negotiation and speed Commands

Negotiation Command	speed Command	Resulting System Action
no negotiation	no speed	Autonegotiates for full duplex mode and speed is 1000 Mbps.
auto negotiation	speed 10	Autonegotiates for full duplex mode and speed is forced to 10 Mbps.
auto negotiation	speed 100	Autonegotiates for full duplex mode and speed is forced to 100 Mbps.
auto negotiation	speed 1000	Autonegotiates for full duplex mode and speed is forced to 1000 Mbps.
auto negotiation	no speed	Autonegotiates.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure the network interface to transmit at 1G:

```
RP/0/RP0/CPU0:router(config)# interface GigabitEthernet 0/0/0/31
RP/0/RP0/CPU0:router(config-if)# speed 1000
```

show controllers (Ethernet)

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

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

Syntax Description

{ **GigE** |**TenGigETwentyFiveGigE** | **FortyGigE** |**HundredGigE** |**FourHundredGigE**}	Specifies the type of Ethernet interface whose status and configuration information you want to display.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
all	Displays detailed information for the specified interface.
bert	Displays BERT status information for the interface.
control	Displays configuration and control information for the interface.
internal	Displays internal information for the interface.
mac	Displays mac information for the interface.
phy	Displays physical information for the interface.
regs	Displays registers information for the interface.
stats	Displays statistical information for the interface.
xgxs	Displays information about the 10 Gigabit Ethernet Extended Sublayer (XGXS).

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	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. Always 0.
  - *port*: Physical port number of the interface.
- If specifying a virtual interface, the number range varies, depending on interface type.

Note When the NC57-MPA-1FH1D-S modular port adapter is plugged into the NC57-MOD-S line card, the Forward Error Correction (FEC) is disabled for 100GE for optics.

Note The Forward Error Correction (FEC) is disabled for 25GE, and 100GE optics in the NCS57-MOS-S line card.

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

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

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

Task ID

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

Examples

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

```
RP/0/RP0/CPU0:router# show controllers hundredGigE 0/2/0/0 all


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

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

MAC address information:
    Burnt-in address: 0000.0000.0000

Autonegotiation disabled.

Operational values:
    Speed: Unknown
    Duplex: Unknown
    Flowcontrol: None
    Loopback: None (or external)
    MTU: 0
    MRU: 0

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

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

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

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

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

    Input error giant           = 0
    Input error runt            = 0
    Input error jabbers         = 0
    Input error fragments       = 0
    Input error CRC             = 0
    Input error collisions      = 0
```

```
    Input error symbol          = 0
    Input error other           = 0

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

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

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

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

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

    Output error other          = 0

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

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

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

Driver constraints:
    Min MTU: 64 bytes
    Max MTU: 9216 bytes
    Max speed: 100Gbps
    Interface type: HundredGigE
    Management interface: No
    Promiscuous mode: Yes
```

```
    Default carrier delay up (auto-neg on): 0 ms
    Default carrier delay down (auto-neg on): 0 ms
    Default carrier delay up (auto-neg off): 0 ms
    Default carrier delay down (auto-neg off): 0 ms
    Default carrier delay down (tx enable): 0 ms
    Allowed config mask: 0x1243

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

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

Not a member of a bundle interface.

Port FSM state:
    Port is enabled, link is up

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

0 Unicast MAC Addresses:

0 Multicast MAC Addresses:
```

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

```
RP/0/RP0/CPU0:router# show controllers hundredGigE 0/2/0/0 control

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

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

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

```
    BER-SF Signal Remote Failure: Configuration not supported

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

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

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

Not a member of a bundle interface.

Port FSM state:
    Port is enabled, link is up

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

0 Unicast MAC Addresses:

0 Multicast MAC Addresses:
```

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

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

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

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

MAC Registers for port: 0
 CONFIG1          (#1034): 03100a1a
 CONFIG2          (#1035): 040c2398
 CONTROL          (#1036): 00000000
 ADDRESS_LOW      (#1037): 53ffa780
 ADDRESS_HIGH     (#1038): 0000001b
 MII_MGMT_CONFIG  (#1039): 00000007
 MII_MGMT_CMD     (#1040): 00000000
```

```
 MII_MGMT_ADDRESS (#1041): 00000000
 MII_MGMT_DATA    (#1042): 40000000
 STAT_CONFIG      (#1043): 00000007
 MASK_R           (#1044): 00000000
 MASK_T           (#1045): 00000000
 COMP             (#1046): 00100d24
 MAC_CONFIG       (#1047): ffffffff
 INTERRUPT_C      (#1048): 00000000
```

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

```
RP/0/RP0/CPU0:router#  show controllers hundredGigE 0/2/0/0 stats


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

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

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

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

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

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

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

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

    Output total packets        = 0
    Output 802.1Q frames        = 0
```

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

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

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

Output error other          = 0
```

show controllers npu priority-flow-control loc

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

show controllers npu priority-flow-control loc

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
6.6.4	This command was introduced.

Usage Guidelines

None

Example

This example shows sample output of `show controllers npu priority-flow-control loc 0/0/CPU0` command:

```
RP/0/RP1/CPU0:router#show controllers npu priority-flow-control loc 0/0/CPU0
Mon Oct 12 14:35:17.531 UTC

Location:    0/0/CPU0
PFC:          Enabled
TC    Pause-threshold    Resume-Threshold     Headroom
-------------------------------------------------------
3       403200 bytes        40320 bytes        441600 bytes
4       403200 bytes        40320 bytes        441600 bytes
RP/0/RP1/CPU0:router#
```

show controllers priority-flow-control

To display status and configuration information about the priority flow control on an interface, use the `show controllers <interface> priority-flow-control` command in XR EXEC mode.

show controllers *interface* **priority-flow-control**

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
6.6.4	This command was introduced.

Usage Guidelines None

Example

This example shows sample output of `show controllers hundredGigE 0/0/0/0 priority-flow-control` command:

```
RP/0/RP1/CPU0:router#show controllers hundredGigE 0/0/0/0 priority-flow-control
Mon Oct 12 12:20:53.520 UTC

Priority flow control information for interface HundredGigE0/0/0/0:

Priority Flow Control:
    Total Rx PFC Frames: 0
    Total Tx PFC Frames: 1764273
    Rx Data Frames Dropped: 0
    CoS  Status  Rx Frames   Tx Frames
    ---  ------  ----------  ----------
      0  off              0           0
      1  off              0           0
      2  off              0           0
      3  on               0      882032
      4  on               0      882241
      5  off              0           0
      6  off              0           0
      7  off              0           0


Priority flow control watchdog configuration:
(D) : Default value
U : Unconfigured
------------------------------------------------------------------------------
       Configuration Item           Global  Interface Effective
------------------------------------------------------------------------------
    PFC watchdog state           :        U        U  Enabled(D)
    Poll interval                :        U        U      100(D)
    Shutdown multiplier          :        U        U        1(D)
    Auto-restore multiplier      :        U        U       10(D)
```

```
Priority flow control watchdog statistics:
SAR: Auto restore and shutdown
-------------------------------------------------------------------------------------------------
Traffic Class            :       0        1        2        3        4        5        6
      7
-------------------------------------------------------------------------------------------------
Watchdog Events          :       0        0        0        0        0        0        0
      0
Shutdown Events          :       0        0        0        0        0        0        0
      0
Auto Restore Events      :       0        0        0        0        0        0        0
      0
SAR Events               :       0        0        0        0        0        0        0
      0
SAR Instantaneous Events :       0        0        0        0        0        0        0
      0
Total Dropped Packets    :       0        0        0        0        0        0        0
      0
Dropped Packets          :       0        0        0        0        0        0        0
      0


Priority flow control watchdog state machine state:
D - Disabled
M - Monitoring
S - Waiting For Shutdown
R - Waiting to Restore
-----------------------------------------------------------------
PFC Watchdog      : Enabled
Watchdog SM state :  Traffic Class
                     7 6 5 4 3 2 1 0
                     - - - D D - - -
RP/0/RP1/CPU0:router#
```

show controllers priority-flow-control statistics

To display statistics about the priority flow control on an interface, use the `show controllers <interface> priority-flow-control statistics` command in XR EXEC mode.

show controllers *interface* **priority-flow-control statistics**

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
6.6.4	This command was introduced.

Usage Guidelines None

Example

This example shows sample output of `show controllers hundredGigE 0/0/0/0 priority-flow-control statistics` command:

```
RP/0/RP1/CPU0:router#show controllers hundredGigE 0/0/0/0 priority-flow-control statistics

Mon Oct 12 12:22:39.362 UTC

Priority flow control information for interface HundredGigE0/0/0/0:

Priority Flow Control:
    Total Rx PFC Frames: 0
    Total Tx PFC Frames: 1764273
    Rx Data Frames Dropped: 0
    CoS  Status  Rx Frames   Tx Frames
    ---  ------  ----------  ----------
      0  off              0           0
      1  off              0           0
      2  off              0           0
      3  on               0      882032
      4  on               0      882241
      5  off              0           0
      6  off              0           0
      7  off              0           0
```

show controllers npu priority-flow-control vsq-usage

To display statistics about the occupancy and threshold buffer values and PFC configuration parameters on an interface, use the **show controllers npu priority-flow-control vsq-usage** command in XR EXEC mode.

show controllers npu priority-flow-control vsq-usage interface *interface* **location** *lc*

Syntax Description

interface *interface*—Physical interface
location *lc*—line card location

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.5.4	This command was introduced.

Usage Guidelines

None

Example

This example shows sample output of the **show controllers npu priority-flow-control vsq-usage** command:

```
Router#show controllers npu priority-flow-control vsq-usage interface hundredGigE 0/0/1/0
location 0/0/CPU0


Location             : 0/0/CPU0
Intf Handle(Hex)     : a8
Core                 : 0
Npu_id               : 0
pp_port              : 21

VSQ Threshold Information:
==========================

TC   Pause-threshold     Resume-threshold    Headroom    pg_vsq_id
     Bytes               Bytes               Bytes
-------------------------------------------------------------------
3    405504              40192               442368      12
4    405504              40192               442368      13

VSQ Occupancy Information:
==========================

TC      pg_vsq_id      Headroom       Shared         Headroom       Shared
                       BDs            Pool BDs       Bytes          Pool Bytes
-------------------------------------------------------------------------------
3       12             0              0              0              0
4       13             0              0              0              0
```

```
Available Buffers:
==================
OCB     : On chip buffer
MNMC    : Mini multicast buffer
FMC     : Full multicast buffer

core    OCB            OCB            MNMC           MNMC           FMC            FMC

        Buffers        Percent        Buffers        Percent        Buffers        Percent
-------------------------------------------------------------------------------------------
0       32768          100            786432         100            98304          100

1       32768          100            1310720        100            98304          100


Ingress Reject Reason:
======================
Packet Reject Bitmap (Core 0):
Reg_val0 :   0
Reg_val1 :   0

Packet Reject Bitmap (Core 1):
Reg_val0 :   0
Reg_val1 :   0

core    Bit_Pos   Reason
-----------------------------------
        None
        None

Location             : 0/0/CPU0
Intf Handle(Hex)     : 48
Core                 : 0
Npu_id               : 0
pp_port              : 9

VSQ Threshold Information:
==========================

TC   Pause-threshold     Resume-threshold    Headroom    pg_vsq_id
     Bytes               Bytes               Bytes
-------------------------------------------------------------------
3    405504              40192               442368      20
4    405504              40192               442368      21

VSQ Occupancy Information:
==========================

TC      pg_vsq_id      Headroom       Shared         Headroom       Shared
                       BDs            Pool BDs       Bytes          Pool Bytes
-------------------------------------------------------------------------------
3       20             0              0              0              0
4       21             0              0              0              0

Available Buffers:
==================
OCB     : On chip buffer
MNMC    : Mini multicast buffer
FMC     : Full multicast buffer

core    OCB            OCB            MNMC           MNMC           FMC            FMC

        Buffers        Percent        Buffers        Percent        Buffers        Percent
```

```
-------------------------------------------------------------------------------------------
0       32768          100            786432         100            98304          100

1       32768          100            1310720        100            98304          100


Ingress Reject Reason:
======================
Packet Reject Bitmap (Core 0):
Reg_val0 :   0
Reg_val1 :   0

Packet Reject Bitmap (Core 1):
Reg_val0 :   0
Reg_val1 :   0

core    Bit_Pos   Reason
-----------------------------------
        None
        None
```

show controllers priority-flow-control watchdog statistics

To display statistics about watchdog for priority flow control on an interface, use `show controllers priority-flow-control watchdog statistics` command in XR EXEC mode.

show controllers *interface* **priority-flow-control watchdog statistics**

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History

Release	Modification
6.6.4	This command was introduced.

Usage Guidelines None

Example

This example shows sample output of `show controllers hundredGigE 0/0/0/0 priority-flow-control watchdog-stats` command:

```
RP/0/RP1/CPU0:router# show controllers hundredGigE 0/0/0/0 priority-flow-control
watchdog-stats
Mon Oct 12 14:33:09.321 UTC

Priority flow control information for interface HundredGigE0/0/0/0:

Priority flow control watchdog statistics:
SAR: Auto restore and shutdown
-----------------------------------------------------------------------------------------------
Traffic Class            :       0        1        2        3        4        5        6
      7
-----------------------------------------------------------------------------------------------
Watchdog Events          :       0        0        0        0        0        0        0
      0
Shutdown Events          :       0        0        0        0        0        0        0
      0
Auto Restore Events      :       0        0        0        0        0        0        0
      0
SAR Events               :       0        0        0        0        0        0        0
      0
SAR Instantaneous Events :       0        0        0        0        0        0        0
      0
Total Dropped Packets    :       0        0        0        0        0        0        0
      0
Dropped Packets          :       0        0        0        0        0        0        0
      0
RP/0/RP1/CPU0:router#
```

show ethernet oam summary

To display the summary of all the active OAM sessions across all the interfaces, use the **show ethernet oam summary** command in XR EXEC mode.

The summary output hides the fields for which the field count is zero (0).

show ethernet oam summary

Command Default

This command displays the summary of all the active OAM sessions for all the interfaces.

Command History

Release	Modification
Release 5.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display the summary for all the active OAM sessions across all the interfaces.

```
Router#show ethernet oam summary
Wed Apr 29 09:32:19.874 PDT
Link OAM System Summary
=======================
Profiles:                               1
Interfaces:                             4
  Interface states
    Port down:                          4
    Passive wait:                       0
    Active send:                        0
    Operational:                        0
     Loopback mode:                     0
  Miswired connections:                 1
Events:                                 0
  Local:                                0
    Symbol period:                      0
    Frame:                              0
    Frame period:                       0
    Frame seconds:                      0
  Remote:                               0
    Symbol period:                      0
    Frame:                              0
    Frame period:                       0
    Frame seconds:                      0

Event Logs
================================================================================
Local Action Taken:
    N/A    - No action needed         EFD    - Interface brought down using EFD
    None   - No action taken          Err.D  - Interface error-disabled
```

```
    Logged - System logged

Interface           Time                       Type           Loc'n  Action
------------------- -------------------------- -------------- ------ ------
Gi0/0/0/0           Wed Apr 29 08:56:54 PDT   Dying gasp     Local  Err.D
Gi0/0/0/0           Wed Apr 29 08:56:54 PDT   Link fault     Remote Err.D
Gi0/0/0/1           Wed Apr 29 08:56:51 PDT   Dying gasp     Local  Err.D
Gi0/0/0/1           Wed Apr 29 08:56:51 PDT   Link fault     Remote Err.D
Gi0/0/0/2           Wed Apr 29 08:56:50 PDT   Dying gasp     Local  Err.D
Gi0/0/0/2           Wed Apr 29 08:56:50 PDT   Dying gasp     Remote Err.D
Gi0/0/0/3           Wed Apr 29 08:56:46 PDT   Dying gasp     Local  Err.D
Gi0/0/0/3           Wed Apr 29 08:56:46 PDT   Link fault     Remote Err.D
```

show lldp entry

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

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

Syntax Description

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

Syntax Description

This command has no keywords or arguments.

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	read

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

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

------------------------------------------------
Local Interface: 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
```

signal sf-ber remote-fault

To enable remote fault signalling when Signal Failure (SF) Bit Error Rate (BER) is triggered, use the **signal sf-ber remote-fault** command in interface configuration mode. Once the SF BER is triggered, the transmission from the interface is shut down. To disable remote fault signalling when Signal Failure (SF) Bit Error Rate (BER) is triggered, use the no form of this command.

signal sf-ber remote fault

Syntax Description

This command has no keywords or arguments.

Command Default

Remote signalling for Signal Failure (SF) Bit Error Rate (BER) is disabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable remote fault signalling.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# int hundredGigE 0/1/0/17
RP/0/RP0/CPU0:router(config-if)# signal sf-ber remote-fault
RP/0/RP0/CPU0:router(config-if)#
```

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 interface 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 8 to 12, meaning 10-8 to 10-12.

Command Default

The default is 10, meaning (10-10).

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure sd-ber threshold:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# int hundredGigE 0/1/0/17
RP/0/RP0/CPU0:router(config-if)# threshold sd-ber 9
RP/0/RP0/CPU0:router(config-if)#
```

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 interface 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 8 to 12, meaning 10-8 to 10-12.

Command Default

The default is 8, meaning (10-8).

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.3.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure the threshold of the Signal Failure (SF) Bit Error Rate (BER):

```
RP/0/RP0/CPU0:router # configure
RP/0/RP0/CPU0:router(config)# int hundredGigE 0/1/0/17
RP/0/RP0/CPU0:router(config-if)# threshold sf-ber 9
RP/0/RP0/CPU0:router(config-if)#
```



Controller Commands

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

Note

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

This module provides command line interface (CLI) commands for configuring controllers on the Cisco NCS 5500 Series Router.

For detailed information about optics and DSP controller concepts, configuration tasks, and examples, refer to the *Interface and Hardware Component Configuration Guide for Cisco NCS 5500 Series Routers.*

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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 7.10.1	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
```

bert

To enable or disable a bit error rate tester (BERT) test pattern for a E1 channel, enable this command in controller configuration mode.

prbs mode source-sink pattern PN15 direction { **line** | **system** }

Syntax Description

line	Specifies the direction as line.
system	Specifies the direction as system.

Command Default

No **bert** test is performed.

Command Modes

Controller configuration.

Command History

Release	Modification
7.5.1	This command was introduced. Applicable only to N540-28Z4C-SYS-A/D, N540X-16Z4G8Q2C-A/D, N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D, N540X-6Z18G-SYS-A/D and N540X-8Z16G-SYS-A/D variants.

Examples

```
controller E1 0/0/0/7
prbs mode source-sink pattern PN15 direction line
vlan 100 ecid 1
!


show command o/p
RP/0/RP0/CPU0:PE1# show controller e1 0/0/0/7
Tue Nov 16 10:16:24.548 UTC

Controller State : Down

Transport Admin State : In Service

Framing : Unframed

Linecoding : High Density Bipolar Order 3

Loopback : None

Clock : Adaptive Clock Recovery (ACR)

Clock State: Locked

vlan id : 100
ecid : 1

Alarm Status :
-------------
Detected Alarms : RAI
-------------
-------------
```

```
Root Alarm Status :
-------------
Detected Alarms :
-------------
-------------


CEM stats :
Ingress Pkts : 84811698
Ingress Drop Pkts : 0
Egress Pkts : 84811698
Egress Drop Pkts : 0
Input Error : 0
Output Error : 0
Pkt Missing : 0
Pkt Reordered : 0
Missorder Drops : 0
Jitter Buffer Underrun : 0
Pkts Malformed : 0
JitterBuffer Overrun : 0
PRBS Details :
PRBS Mode : Source-Sink

Test Pattern : PN15(2^15)

Sync Status : Not Sync

Direction : Line

Sync Detected : 0
Bit Recieved((since last sync) : 0
PRBS Duration : 14 (Seconds)
Timeunits since last-syn : 0 (Seconds)
```

clear controller pm

To clear performance monitoring counters, use the **clear controller pm** command.

clear controller {**optics** | **coherentDSP**}*r /s /i /p* **pm** [**30-sec** | **15-min** | **24-hour** **clear**]

Syntax Description

r /s /i /p	Rack/Slot/Instance/Port of the optics or coherent DSP controller.
30-sec | **15-min** | **24-hour**	Specifies the interval.
clear	Clears all PM data for all intervals or the specified interval.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 6.2.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

This example shows how to clear all PM data in 15 minute current interval:

```
RP/0/RP0/CPU0:router# clear controller optics 0/5/0/1 pm 15-min
```

This example shows how to clear all PM data for all intervals:

```
RP/0/RP0/CPU0:router# clear controller optics 0/5/0/1 pm clear
```

clear counters controller

To clear performance monitoring counters, use the **clear counters controller** command.

clear counters controller coherentDSP *r /s /i /p* **pm** [**30-sec** | **15-min** | **24-hour** **clear**]

Syntax Description

r /s /i /p	Rack/Slot/Instance/Port of the optics or coherent DSP controller.
30-sec | **15-min** | **24-hour**	Specifies the interval.
clear	Clears all PM data for all intervals or the specified interval.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 6.2.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

This example shows how to clear all counters in 15 minute current interval:

```
RP/0/RP0/CPU0:router# clear counters controller optics 0/5/0/1 pm 15-min
```

This example shows how to clear all counters for all intervals:

```
RP/0/RP0/CPU0:router# clear counters controller optics 0/5/0/1 pm clear
```

clock source

To configure the clock source of a DS1 link, enter the **clock source** command in interface configuration mode. To restore the default **line** setting, use the **no** form of this command.

clock source { **line** | **internal** | **recovered** }

no clock source

Syntax Description

line	Specifies that the E1 link uses the recovered clock from the line. This is the default.
internal	Specifies that the E1 link uses the internal clock from the interface.
recovered	Specifies the clock recovery mode.

Command Default

The default value is **line**.

Command Modes

Interface configuration.

Command History

Release	Modification
7.5.1	This command was introduced. Applicable only to N540-28Z4C-SYS-A/D, N540X-16Z4G8Q2C-A/D, N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D, N540X-6Z18G-SYS-A/D and N540X-8Z16G-SYS-A/D variants.

Usage Guidelines

This command sets clocking for individual E1 links.

Examples

```
Router#show running-config controller e1 0/0/0/7
Tue Nov 16 10:20:56.913 UTC
controller E1 0/0/0/7
vlan 100 ecid 1
clock source recovered acr
!

RP/0/RP0/CPU0:PE1#show controller e1 0/0/0/7
Tue Nov 16 10:21:05.238 UTC

Controller State : Up

Transport Admin State : In Service

Framing : Unframed

Linecoding : High Density Bipolar Order 3

Loopback : None

Clock : Adaptive Clock Recovery (ACR)

Clock State: Locked

vlan id : 100
ecid : 1
```

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

-------------

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

-------------


CEM stats :
Ingress Pkts : 85092697
Ingress Drop Pkts : 0
Egress Pkts : 85092697
Egress Drop Pkts : 0
Input Error : 0
Output Error : 0
Pkt Missing : 0
Pkt Reordered : 0
Missorder Drops : 0
Jitter Buffer Underrun : 0
Pkts Malformed : 0
JitterBuffer Overrun : 0RP/0/RP0/CPU0:PE1#
```

clock source recovered

To associate the clock recovered ID, use the **clock source recovered** command in interface configuration mode.

clock source recovered { **acr** | **dcr** }

Syntax Description

acr	Specifies the adaptive clock recovery.
dcr	Specifies the differential clock recovery.

Command Modes

Interface configuration.

Command History

Release	Modification
7.5.1	This command was introduced. Applicable only to N540-28Z4C-SYS-A/D, N540X-16Z4G8Q2C-A/D, N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D, N540X-6Z18G-SYS-A/D and N540X-8Z16G-SYS-A/D variants.

Examples

```
RP/0/RP0/CPU0:PE1#show running-config controller e1 0/0/0/7
Tue Nov 16 10:20:56.913 UTC
controller E1 0/0/0/7
vlan 100 ecid 1
clock source recovered acr
!

RP/0/RP0/CPU0:PE1#show controller e1 0/0/0/7
Tue Nov 16 10:21:05.238 UTC

Controller State : Up

Transport Admin State : In Service

Framing : Unframed

Linecoding : High Density Bipolar Order 3

Loopback : None

Clock : Adaptive Clock Recovery (ACR)

Clock State: Locked

vlan id : 100
ecid : 1

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

-------------

Root Alarm Status :
-------------
```

```
Detected Alarms :
-------------None

-------------


CEM stats :
Ingress Pkts : 85092697
Ingress Drop Pkts : 0
Egress Pkts : 85092697
Egress Drop Pkts : 0
Input Error : 0
Output Error : 0
Pkt Missing : 0
Pkt Reordered : 0
Missorder Drops : 0
Jitter Buffer Underrun : 0
Pkts Malformed : 0
```

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*] [**loopback internal**] [**perf-mon** {**enable** | **disable**}] [**pm** {**30-sec** | **15-min** | **24-hour**} {**fec** | **otn**} {**report** | **threshold**}*value*] [**secondary-admin-state** *maintenance*] [[**no**] **shutdown**]

Syntax Description

r/s/i/p	Rack/Slot/Instance/Port of the coherent DSP controller.
description *description*	Description of the optics controller.
loopback internal	Configures the internal loopback mode on the controller.
perf-mon {**enable** | **disable**}	Enables or disables performance monitoring.
pm {**30-sec** | **15-min** | **24-hour**}	Configures performance monitoring parameters for 30 second, 15 minute, or 24 hour intervals.
fec	Configures FEC PM data.
otn	Configures OTN PM data.
report	Configures TCA reporting status.
threshold	Configures threshold on coherent DSP parameters.
value	Value of the reporting or threshold parameters.
secondary-admin-state *maintenance*	Configures the administrative state of the controller indicating that the controller is under maintenance.
[**no**] **shutdown**	Disables or enables the coherent DSP controller.

Command Default

No default behavior or values

Command Modes

Coherent DSP controller

Command History

Release	Modification
Release 6.2.2	This command was introduced.

Usage Guidelines

The coherent DSP controller doesn't support Q factor, Q margin, and post FEC BER reporting. Therefore, no threshold crossing alert (TCA) is raised for these parameters.

Task ID

Task ID	Operation

Examples

This example shows how to place the DSP controllers in maintenance mode:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller coherentDSP 0/5/0/1 secondary-admin-state maintenance
```

controller coherentDSP (400G DCO)

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 (Fibre Channel)

To configure the Fibre Channel controller, use the **controller** command in the global configuration mode. To return to the default behavior, use the **no** form of this command.

controller *type r/s/i/p* [**tts**]
no controller *type r/s/i/p* [**tts**]

Syntax Description

type	Fibre Channel controller type. The options are OneGigFibreChanCtrlr, TwoGigFibreChanCtrlr, FourGigFibreChanCtrlr, EightGigFibreChanCtrlr, SixteenGigFibreChanCtrlr, and ThirtyTwoGigFibreChanCtrlr.
r/s/i/p	Rack/Slot/Instance/Port of the Fibre Channel controller.
tts	(Optional) Specifies that the Transmitter Training Signal (TTS) function be enabled to use the auto-negotiation functionality. TTS is only applicable for 32G Fibre Channel ports.

Command Default

No default behavior or values

Command Modes

Global configuration

Command History

Release	Modification
Release 7.10.1	The **tts** keyword was added for the *ThirtyTwoGigFibreChanCtrlr* Fibre Channel controller configuration mode.
Release 7.7.1	This command was introduced.

Usage Guidelines

- The TTS keyword is only available for the *ThirtyTwoGigFibreChanCtrlr* Fibre Channel controller type.
- You must configure this feature only on the PLE MPA1 even ports, that is, 0, 2, 4, 6, and so on.

Examples

This example shows how to enable the FC controller interface and configure the TTS function.

```
Router(config)# controller Optics0/0/1/6
Router(config-Optics)# port-mode FC framing cem-packetize rate FC32
Router(config-Optics)# exit
Router(config)# controller ThirtyTwoGigFibreChanCtrlr 0/1/1/0
Router(config-ThirtyTwoGigFibreChanCtrlr)# tts
Router(config-ThirtyTwoGigFibreChanCtrlr)# commit
```

controller optics

To configure the optics controller, use the **controller optics** command in the optics controller configuration mode. To return to the default behavior, use the **no** form of this command.

controller optics *r / s / i / p* [**dgd-high-threshold** *dgd-value* | **lbc-high-threshold** *lbc_value* | **osnr-low-threshold** *osnr_value* | **description** *description* | **ext-description** *description* | **rx-high-threshold** *rx-high* | **rx-low-threshold** *rx-low* | **tx-high-threshold** *tx-high* | **tx-low-threshold** *tx-low* | [**no**] **shutdown** | **transmit-power** *transmit-power* | **perf-mon** { **enable** | **disable** } | **host** { **auto-squelch** } { **disable** } | **pm** { **30-sec** | **15-min** | **24-hour** } **optics** { **report** | **threshold** } *value* | { **mode etm** | **no mode etm** } { **speed** *value* }
no controller optics *r/s/i/p*

Syntax Description

r/s/i/p	Rack/Slot/Instance/Port of the optics controller.
dgd-high-threshold *dgd-value*	Configures the maximum acceptable Differential Group Delay (DGD) value. The HIGH_DGD alarm is raised if DGD exceeds this value. The range is 0 to 18000 (in the units of 0.01 ps).
lbc-high-threshold *lbc_value*	Configures the high laser bias current threshold. The range is 0 to 100%
osnr-low-threshold *osnr_value*	Configures the minimum acceptable Optical Signal to Noise ratio (OSNR) value. The LOW_OSNR alarm is raised if OSNR goes below this value. The range is 0 to 4000 (in the units of 0.01 db).
description *description*	Description of the optics controller.
ext-description *description*	Ext-description of the optics controller.
rx-high-threshold *rx-high*	Configures high receive power threshold. The range is -400 to 300 (in the units of 0.1 dBm).
rx-low-threshold *rx-low*	Configures low receive power threshold. The range is -400 to 300 (in the units of 0.1 dBm).
tx-high-threshold *tx-high*	Configures high transmit power threshold. The range is -400 to 300 dBm (in the units of 0.1 dBm).
tx-low-threshold*tx-low*	Configures low transmit power threshold. The range is -400 to 300 dBm (in the units of 0.1 dBm).
[**no**] **shutdown**	Disables or enables the optics controller.
transmit-power *transmit-power*	Configures the transmit power. The range is -190 to 15 dBm (in the units of 0.1 dBm).
perf-mon {**enable** | **disable**}	Enables or disables performance monitoring.
pm {**30-sec** | **15-min** | **24-hour** }	Configures performance monitoring parameters for 30 second, 15 minute, or 24 hour intervals.

host { **auto-squelch** } { **disable** }	Disable squelch for host.
optics	Configures the optics PM data.
report	Configures TCA reporting status.
threshold	Configures threshold on optics parameters.
value	Value of the reporting or threshold parameters.
{ **mode etm** | **no mode etm** }	Enables or disables the egress traffic management mode.
speed *value*	Configures the network interface speed.

Command Default

No default behavior or values

Command Modes

Optics controller

Command History

Release	Modification
Release 6.2.2	This command was introduced.
Release 7.4.1	The **etm mode** option for egress traffic management was introduced.
Release 7.11.1	The following keyword was introduced: • **host auto-squelch disable**

Usage Guidelines

You must shut down the optics controller before you perform any of the following tasks:

- Configure the controller
- Restore a saved configuration
- Upgrade the DSP processor or CFP2 optics module Field Programmable Device (FPD)

Note When you bring up the local optics controller, you might briefly see transient loss of signal (LOS) alarms on the console. This behavior might be observed during the initial tuning of the channel.

```
PKT_INFRA-FM-2-FAULT_CRITICAL : ALARM_CRITICAL :LOS-P :DECLARE :CoherentDSP0/3/0/1:
PKT_INFRA-FM-2-FAULT_CRITICAL : ALARM_CRITICAL :LOS-P :CLEAR :CoherentDSP0/3/0/1:
```

During the laser-on process, you might briefly see transient loss of line (LOL) alarms on the console. This alarm is cleared when the laser-on process is complete.

```
PKT_INFRA-FM-3-FAULT_MAJOR : ALARM_MAJOR :CTP2 RX LOL :DECLARE ::
PKT_INFRA-FM-3-FAULT_MAJOR : ALARM_MAJOR :CTP2 RX LOL :CLEAR ::
```

The laser-on process can take up to 120 seconds to complete.

Examples

This example shows how to configure the optics controller and set the high power threshold at the transmit and receive side.

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(router)# controller optics 0/5/0/1
RP/0/RP0/CPU0:router(config-optics)# rx-high-threshold 200
RP/0/RP0/CPU0:router(config-optics)# tx-high-threshold 300
```

Examples

This example shows how to configure the network interface speed on the router.

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(router)# interface GigabitEthernet 0/0/0/1
RP/0/RP0/CPU0:router(config-if)# speed 100
```

controller optics (400G DCO)

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

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

Syntax Description

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

cd-low-threshold *cd-low*	(Only for trunk optics controllers) Minimum acceptable chromatic dispersion value. The CD alarm is raised if the chromatic dispersion goes below this value. This is an alarm threshold parameter. For QDD-400G-ZR-S optical module, the range is -2400 to 0. For QDD-400G-ZRP-S optical module, the range is -160000 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 +160000 ps/nm.
dgd-high-threshold *dgd-value*	(Only for trunk optics controllers) Configures the maximum acceptable Differential Group Delay (DGD) value. The DGD alarm is raised if DGD exceeds this value. This is an alarm threshold parameter. The range is 0 to 18000 (in the units of 0.01 ps).
dwdm-carrier *channel-grid*	Configures the DWDM carrier channel. Options are: • 100MHz-grid • 50GHz-grid
lbc-high-threshold *lbc-value*	Configures the high laser bias current threshold. This is an alarm threshold parameter. The range is 0 to 100%
modulation *modulation-type*	Configures the modulation type. Options are: • 16Qam • 8Qam • Qpsk
osnr-low-threshold *osnr-value*	(Only for trunk optics controllers) Configures the minimum acceptable Optical Signal-to-Noise ratio (OSNR) value. The OSNR alarm is raised if OSNR goes below this value. This is an alarm threshold parameter. The range is 0 to 4000 (in units of 0.01db).
description *description*	Description of the optics controller.
[no] transceiver disable	Enables or disables the transceiver module. The transceiver is enabled by default.
fec *fec-mode*	Configures Forward Error Correction (FEC) modes.
sec-admin-state	Configures the administrative state of the controller. The values are maintenance or normal.
shutdown	Disables the configuration of the controller.

pm { **30-sec** | **15-min** | **24-hour** } { **optics** } { **report** | **threshold** } *pm-parameter value*	Configures performance monitoring parameters for 30-second, 15-minute, and 24-hour intervals. The **report** keyword configures threshold crossing alerts (TCA) reporting status for the PM parameters. The **threshold** keyword configures threshold values for the PM parameters. The PM parameters that can be configured are: • cd (chromatic dispersion) • dgd (differential group delay) • low-freq-off (low signal frequency offset) • opr (optical power RX) • osnr (optical signal-to-noise ratio) • pcr (polarization change rate) • pdl (polarization dependent loss) • rx-sig (receiving signal power) • snr (signal-to-noise ratio) • sopmd (second order polarization mode dispersion)
transmit-power *transmit-power*	(Only for trunk optics controllers) Configures the transmit power. The range is -190 to 50 dBm (in the units of 0.1 dBm).
perf-mon { **enable** | **disable** }	Enables or disables performance monitoring.
host fec-threshold excess-degrade raise *threshold-value*	Configures the raise threshold value for FEC excessive degrade (FED) alarm on the host-side of the optical module. Range is 1 to 2046000000000000000.
media fec-threshold excess-degrade raise *threshold-value*	Configures the raise threshold value for FED alarm on the media-side of the optical module. Range is 1 to 2046000000000000000.
host fec-threshold excess-degrade clear *threshold-value*	Configures the clear threshold value for FED alarm on the host-side of the optical module. Range is 1 to 2046000000000000000.
media fec-threshold excess-degrade clear *threshold-value*	Configures the clear threshold value for FED alarm on the media-side of the optical module. Range is 1 to 2046000000000000000.

host fec-threshold detected-degrade raise *threshold-value*	Configures the raise threshold value for FEC detected-degrade (FDD) alarm on the host-side of the optical module. Range is 1 to 2046000000000000000.
media fec-threshold detected-degrade raise *threshold-value*	Configures the raise threshold value for FDD alarm on the media-side of the optical module. Range is 1 to 2046000000000000000.
host fec-threshold detected-degrade clear *threshold-value*	Configures the clear threshold value for FDD alarm on the host-side of the optical module. Range is 1 to 2046000000000000000.
media fec-threshold detected-degrade clear *threshold-value*	Configures the clear threshold value for FDD alarm on the media-side of the optical module. Range is 1 to 2046000000000000000.
media link-down prefec-degrade	Enables link-down and prefec degrade mode when the BER counter crosses the threshold value.
appsel simple code *id*	Enables application selection Code on a module, where id specifies the application id.

Command Default

Table 3: QDD-400G-ZR-S and QDD-400G-ZRP-S Default Traffic Configuration Values

	QDD-400G-ZR-S	QDD-400G-ZRP-S
Client Speed	400G (400GAUI-8)	400G (400GAUI-8)
Trunk Speed	400G	400G
Frequency	193.10THz	193.10THz
FEC	cFEC	oFEC
Modulation	16QAM	16QAM
DAC-Rate	1x1	1x1.25
Chromatic Dispersion (CD)	+/-2400	+/-26000
Transmitted (Tx) Power	-10.00 dBm	-10.00 dBm

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

Table 4: Default Raise and Clear Threshold Value for FDD and FED Alarms

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

Command History

Release	Modification
Release 7.3.2	This command was introduced.
Release 24.3.1	The following keywords were introduced: • **host fec-threshold excess-degrade raise** • **media fec-threshold excess-degrade raise** • **host fec-threshold excess-degrade clear** • **media fec-threshold excess-degrade clear** • **host fec-threshold detected-degrade raise** • **media fec-threshold detected-degrade raise** • **host fec-threshold detected-degrade clear** • **media fec-threshold detected-degrade clear**
Release 24.3.1	The **media link-down prefec-degrade** keyword was introduced.
Release 25.2.1	A new keyword, **appsel simple code** *id* , was added as an option.

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.

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

Table 5: Supported Ports and Command for Configuring Muxponder Mode

Fixed-Port Routers	**Ports**	**Command**
N540-24Q8L2DD-SYS	400G ports (port 0 and 1)	**breakout**
NCS-57B1-6D24H-S	400G ports (ports 24-29)	**breakout** *muxponder mode*
NCS-57B1-5D24H-SE	400G ports (ports 24-28)	**breakout** *muxponder mode*
Line Cards	**Ports**	**Command**
NC57-24DD	400G even-numbered ports (port 0, port 2, port 4, and so on)	**breakout** *muxponder mode*

NC57-18DD-SE	400G ports (port 18 through port 23)	**breakout** *muxponder mode*
	remaining 400G even-numbered ports (port 0, port 2, and so on)	**hw-module port-range**
NC57-36H6D-S	400G even-numbered (ports 24-35) ports	**hw-module port-range**

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 configure FDD clear and raise alarm threshold on the host side of the optics controller:

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

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

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

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 7.10.1	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
```

hw-module port-range

To configure the muxponder mode, use the **hw-module port-range** command in the global configuration mode.

hw-module port-range *start-port end-port* **[instance** *mpa-instance* **] location** *node-id* **mode** *mode-type*

Syntax Description

start-port end-port	Specify the port range - start and end port. Start port must be an even port and the end port must be an odd port. The port range must be provided in the format as shown in these examples: **port-range 0 1** **port-range 2 3**
instance *mpa-instance*	Specify the MPA-instance.
location *node-id*	Specify the node location.
mode *mode-type*	Configures the mode-type for this controller. Mode-type options available are: • 4x100 • 3x100 • 2x100-PAM4 • 1x100 • 50 To configure 2x100 muxponder mode, use only the 2x100-PAM4 option.

Command Default

None.

Command Modes

Global Configuration

Command History

Release	Modification
Release 7.3.2	This command was introduced.

Usage Guidelines

Table 6: Supported Ports and Command for Configuring Mode Type

Fixed-Port Routers	**Ports**	**Command**
NCS-57B1-6D24H-S	400G ports (ports 24-29)	**breakout**
NCS-57B1-5D24H-SE	400G ports (ports 24-28)	**breakout**
Line Cards	**Ports**	**Command**

NC57-24DD	400G even-numbered ports (port 0, port 2, port 4, and so on)	**breakout**
NC57-18DD-SE	400G ports (port 18 through port 23)	**breakout**
	remaining 400G even-numbered ports (port 0, port 2, and so on)	**hw-module port-range**
NC57-36H6D-S	400G even-numbered (ports 24-35) ports	**hw-module port-range**
Modular Port Adapter	**Ports**	**Command**
NCS57-MPA-12L-S	50G even-numbered ports (port 4, 6, 8, and 10)	**hw-module port-range**

Example

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

```
Router#configure
Router(config)#hw-module port-range 2 3 location 0/0/CPU0 mode 4x100
Router(config)#commit
```

hw-module quad

To configure the quad port in the specified mode, use the **hw-module quad** command in the XR Config mode. Use the **no** form of the command to revert to the default 25Gbps quad mode.

hw-module quad *quad-number* **location** *node-id* **mode** *port-speed*

Syntax Description

quad-number	Specifies the number of quads (0,1,2,…n). Each quad has a default speed of 25Gbps. You can modify the default 25Gbps mode to one of the following modes: • 1Gbps mode • 10Gbps mode • 50Gbps mode 50Gbps mode is supported only on the following NC57 line cards: • NC-57-48Q2D-S • NC-57-48Q2D-SE-S
location	Specifies the node location.
node-id	Specifies the location of the node. Example: *0/0/CPU0*.
mode	Specifies the mode speed.
port-speed	Specifies the speed of the quad mode. Valid options are: • 1Gbps • 10Gbps • 25Gbps (default) • 50Gbps 50Gbps mode is supported only on the following line cards: • NC-57-48Q2D-S • NC-57-48Q2D-SE-S

Command Default

25Gbps is the default mode configured on the quad.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.3.2	This command was introduced.

Release	Modification
Release 24.2.1	A new variable, *50g*, was added to the **mode** keyword of the command for NC-57-48Q2D-S and NC-57-48Q2D-SE-S line cards.

Usage Guidelines

Guidelines for 1Gbps or 10Gbps Port Speed

Note These guidelines do not apply to the NC-57-48Q2D-S and NC-57-48Q2D-SE-S line cards.

- Port speeds of 1Gbps and 10Gbps are incompatible with a 25Gbps port speed within the same quad. They cannot be configured to operate simultaneously.
- 10Gbps mode supports both 1Gbps and 10Gbps port speed.

Guidelines for 50Gbps Port Speed

Note These guidelines apply only to the NC-57-48Q2D-S and NC-57-48Q2D-SE-S line cards.

- Starting with Cisco IOS XR Software Release 24.2.1, port speed of 50Gbps is also supported. This port speed is supported only on the NC-57-48Q2D-S and NC-57-48Q2D-SE-S line cards.
- Port speeds of 1Gbps, 10Gbps, and 25Gbps are incompatible with a 50Gbps port speed within the same quad. They cannot be configured to operate simultaneously.
- 25Gbps mode supports 1Gbps, 10Gbps, and 25Gbps port speed.

Example

This example shows how to configure 10Gbps quad ports.

```
Router#configure
Router(config)#hw-module quad 1 location 0/0/CPU0 mode 10g
Router(config)#commit
```

This example shows how to revert to the default 25Gbps quad ports from 10Gbps mode.

```
Router#configure
Router(config)#no hw-module quad 1 location 0/0/CPU0 mode 10g
Router(config)#commit
```

This example shows how to configure 50Gbps quad ports for the NC-57-48Q2D-S and NC-57-48Q2D-SE-S line cards.

```
Router#configure
Router(config)#hw-module quad 1 location 0/0/CPU0 mode 50g
Router(config)#commit
```

This example shows how to revert to the default 25Gbps quad ports from 50Gbps mode configured on the NC-57-48Q2D-S and NC-57-48Q2D-SE-S line cards.

```
Router#configure
Router(config)#no hw-module quad 1 location 0/0/CPU0 mode 50g
Router(config)#commit
```

dwdm-carrier

To configure the wavelength, use the **dwdm-carrier** command in optics controller configuration mode.

dwdm-carrier 100MHz-grid frequency *frequency*
dwdm-carrier 50Ghz-grid [**frequency** *frequency* | *channel-number*]

Syntax Description

100MHz-grid frequency	Configures the wavelength in 100MHz (0.1GHz) grid spacing in accordance with ITU definition.
50Ghz-grid	Configures the wavelength in 50GHz grid spacing in accordance with ITU definition.
frequency *frequency*	Specifies the frequency for the optics controller. In 50GHz grid spacing, enter the 5-digit frequency value in the range of 19115 to 19610. For example, enter 19580 to specify 195.8 THz. In 100MHz grid spacing, enter the 7-digit frequency value in the range of 1911500 to 1961000. For example, enter 1913501 to specify 191.3501 THz.
channel-number	ITU channel number. The range is 1 to 100 for conventional band (C-band).

Command Default

No wavelength is configured.

Command Modes

Optics controller

Command History

Release	Modification
Release 6.2.2	This command was introduced.

Usage Guidelines

You must shut down the controller before you configure the controller or restore a saved configuration.

Use the show **controllers optics** *r /s /i /p* **dwdm-carrrier-map** command to display the wavelength and channel mapping for trunk optics controllers.

Examples

The following example shows how to configure the frequency in 50GHz grid spacing.

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(router)# controller optics 0/5/0/1
RP/0/RP0/CPU0:router(config-optics)# dwdm-carrier 50GHz-grid frequency 1960625
```

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 7.10.1	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 7.10.1	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 7.10.1	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 7.10.1	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
```

framing

To specify the type of framing used by E1 channels, use the **framing unframed** command in controller configuration mode.

framing unframed

Syntax Description

unframed	Specifies the unframed packets.

Command Default

The default value is **unframed**.

Command Modes

Controller configuration.

Command History

Release	Modification
7.5.1	This command was introduced. Applicable only to N540-28Z4C-SYS-A/D, N540X-16Z4G8Q2C-A/D, N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D, N540X-6Z18G-SYS-A/D and N540X-8Z16G-SYS-A/D variants.

Examples

```
Router#show running-config controlle e1 0/0/0/11
Tue Nov 16 12:15:31.824 UTC
controller E1 0/0/0/11
vlan 100 ecid 1
clock source recovered acr
!

RP/0/RP0/CPU0:PE2#show controller e1 0/0/0/11
Tue Nov 16 12:15:45.369 UTC

Controller State : Up

Transport Admin State : In Service

Framing : Unframed

Linecoding : High Density Bipolar Order 3

Loopback : None

Clock : Adaptive Clock Recovery (ACR)

Clock State: Locked

vlan id : 100
ecid : 1

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

-------------

Root Alarm Status :
-------------
```

```
Detected Alarms :
-------------None

-------------


CEM stats :
Ingress Pkts : 104952484
Ingress Drop Pkts : 0
Egress Pkts : 104952484
Egress Drop Pkts : 0
Input Error : 0
Output Error : 0
Pkt Missing : 0
Pkt Reordered : 0
Missorder Drops : 0
Jitter Buffer Underrun : 0
Pkts Malformed : 0
JitterBuffer Overrun : 0RP/0/RP0/CPU0:PE2#
```

linecode

To specify the type of line coding used by E1 channels, use the **linecode** command in controller configuration mode.

linecode { **hdb3** | **ami** }

Syntax Description

hdb3	Specifies the hdb3 linecode type.
ami	Specifies the ami linecode type.

Command Modes

Controller configuration.

Command History

Release	Modification
7.5.1	This command was introduced. Applicable only to N540-28Z4C-SYS-A/D, N540X-16Z4G8Q2C-A/D, N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D, N540X-6Z18G-SYS-A/D and N540X-8Z16G-SYS-A/D variants.

Examples

```
Router#linecoding ami
```

loopback

To configure loopback E1 controller, use the **loopback** command in controller configuration mode.

loopback { **local** | **network** [**line**] }

Syntax Description

local	Places the interface into local loopback mode and creates a loopback wherein information received from the locally-attached customer premises equipment (CPE) is transmitted back to the locally-attached CPE.
network	Creates a loopback wherein data received over the network from the remote CPE is transmitted back to the remote CPE. • line: Creates a full physical layer loopback of all bits, including data and framing bits.

Command Default

No **loopback** is configured.

Command Modes

Controller configuration.

Command History

Release	Modification
7.5.1	This command was introduced. Applicable only to N540-28Z4C-SYS-A/D, N540X-16Z4G8Q2C-A/D, N540-12Z20G-SYS-A/D, N540X-12Z16G-SYS-A/D, N540X-6Z18G-SYS-A/D and N540X-8Z16G-SYS-A/D variants.

Examples

```
Router#show running-config controller e1 0/0/0/11
Tue Nov 16 18:37:58.238 UTC
controller E1 0/0/0/11
vlan 100 ecid 1
loopback network line
sec-admin-state maintenance


RP/0/RP0/CPU0:PE2#show controllers e1 0/0/0/11
Tue Nov 16 18:40:40.801 UTC

Controller State : Up

Transport Admin State : Maintenance

Framing : Unframed

Linecoding : High Density Bipolar Order 3

Loopback : Line side loopback

Clock : Internal

vlan id : 100
ecid : 1

Alarm Status :
-------------
```

```
Detected Alarms :
-------------None

-------------

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

-------------


CEM stats :
Ingress Pkts : 128048371
Ingress Drop Pkts : 0
Egress Pkts : 128048370
Egress Drop Pkts : 0
Input Error : 0
Output Error : 0
Pkt Missing : 0
Pkt Reordered : 0
Missorder Drops : 0
Jitter Buffer Underrun : 0
Pkts Malformed : 0
```

PRBS

To enable PRBS (Pseudo Random Binary Sequence) mode for PLE client controllers, enable this command in PLE client controller configuration mode.

prbs mode *mode-type* **pattern** *pattern-type* [**direction** *direction-type* | **error-inject** *type* | **framing** *framing-type*]

Syntax Description

mode *mode-type*	Configures the specified PRBS (Pseudo Random Binary Sequence) mode. The available options are: • source • source-sink
pattern *pattern-type*	Configures the pattern for PRBS mode. The available options are: • pn7 • pn9 • pn15 • pn23 • pn31 • user-defined
direction *direction-type*	Configures the PRBS direction. The supported directions are: • line - Configures the PRBS in line side. • System - Configures the PRBS in system side.
error-inject *type*	Configures error injection in the PRBS pattern. Supported error injection type is: • continuous

framing *framing-type*	Configure PRBS framing type. Supported framing types are: • framed - Enables framed PRBS • unframed - Enables unframed PRBS **Note** The default framing configurations: • otu2 and otu2e - Unframed • odu2 and odu2e - framed

Command Modes

Controller configuration.

Command History

Release	Modification
7.7.1	This command was introduced.

Usage Guidelines

This command is supported only on NC55-OIP-02 MPA.

Note

- Error inject is disabled by default.
- Default PRBS direction is line side.
- PRBS with framing type as framed is supported with odu2, odu2e, SONET and SDH controllers. The supported patterns are PN23, PN31 and user-defined.

Table 7: PRBS Pattern Support Matrix

Pattern	Direction	Supported controllers
PN7	• Line	• SONET controllers • SDH controllers • FC controllers • OTN controllers • Ethernet controllers
PN9		
PN15		
PN23	• Line • System	
PN31		
User-defined		

Table 8: PRBS framing support matrix

Controller Type	Supported PRBS Framing
SONET controllers	• Framed PRBS • Unframed PRBS
SDH controllers	• Framed PRBS • Unframed PRBS
FC controllers	• Unframed PRBS
OTN controllers	• Framed PRBS • Unframed PRBS
Ethernet controllers	• Unframed PRBS

Before configuring PRBS, the secondary admin state should be set to maintenance mode.

```
RP/0/RP0/CPU0:router(config-otu2)#?
secondary-admin-state  Configure the secondary admin state of the controller

RP/0/RP0/CPU0:router(config-otu2)#secondary-admin-state ?

maintenance  Maintenance, Admin-state under maintenance
normal       Normal, Admin-state in normal
RP/0/RP0/CPU0:router(config-otu2)#secondary-admin-state maintenance
RP/0/RP0/CPU0:router(config-otu2)#commit
```

Examples

This example shows PRBS configuration and show command output for otu2 controller on NC55-OIP-02 MPA.

```
RP/0/RP0/CPU0:router#prbs mode source-sink pattern pn15 direction line error-inject continuous
RP/0/RP0/CPU0:router#commit

show command o/p
RP/0/RP0/CPU0:router#show controller otu2 0/0/2/4 prbs-details
Mon Jul 18 08:11:44.281 UTC

----------------------PRBS details------------------
PRBS Test  : Enable
PRBS Mode  : Source-Sink
PRBS Pattern  : PN31
PRBS Direction  : Line
PRBS Error-Inject : None
PRBS Status  : Unlocked

--------------------------------------------------
```

loopback (PLE)

To configure loopback for PLE controller, use the **loopback** command in PLE client controller configuration mode.

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

Syntax Description

internal	Configures internal loopback mode.
line	Creates a full physical layer loopback of all bits, including data and framing bits.

Command Default

No **loopback** is configured.

Command Modes

Controller configuration.

Command History

Release	Modification
7.7.1	This command was introduced.

Usage Guidelines

This command is supported only on NC55-OIP-02 MPA.

Before configuring loopback, the secondary admin state should be set to maintenance mode.

```
RP/0/RP0/CPU0:router(config-EightGigFibreChanCtrlr)#?
secondary-admin-state  Configure the secondary admin state of the controller

RP/0/RP0/CPU0:router(config-EightGigFibreChanCtrlr)#secondary-admin-state ?

maintenance  Maintenance, Admin-state under maintenance
normal       Normal, Admin-state in normal
RP/0/RP0/CPU0:router(config-EightGigFibreChanCtrlr)#secondary-admin-state maintenance
RP/0/RP0/CPU0:router(config-EightGigFibreChanCtrlr)#commit
```

This example shows loopback configuration and show command output for 8G Fibre channel controller on NC55-OIP-02 MPA.

Examples

```
RP/0/RP0/CPU0:router(config)#controller eightGigFibreChanCtrlr 0/0/2/1
RP/0/RP0/CPU0:ios(config-EightGigFibreChanCtrlr)#loopback line
RP/0/RP0/CPU0:ios(config-EightGigFibreChanCtrlr)#commit



RP/0/RP0/CPU0:router#show controller EightGigFibreChanCtrlr0/0/2/1
Fri Jul 22 05:35:14.069 UTC

Operational data for Fibre Channel controller EightGigFibreChanCtrlr0/0/2/1

State:
        Admin State           : Up
        Operational state     : Down
        LED state             : Red On
        Secondary admin state : Normal
        Laser Squelch         : Disabled
```

```
Performance Monitoring is enabled

Operational values:
        Speed                    : 8 Gbps
        Loopback                 : Line
        BER monitoring:
                Signal Degrade   : 1e-0
                Signal Fail      : 1e-0
        Hold-off Time            : 0 ms
        Forward Error Correction : Not Configured
```

extended-loopback (PLE)

To configure extended loopback for PLE controller, use the **extended-loopback** command in PLE client controller configuration mode.

extended-loopback level *type* { **internal** | **line** }

Syntax Description

level *type*	Configures the extended loopback level. The supported level types are 1 and 2.
internal	Configures internal loopback mode.
line	Creates a full physical layer loopback of all bits, including data and framing bits.

Command Default

No **extended-loopback** is configured.

Command Modes

Controller configuration.

Command History

Release	Modification
7.7.1	This command was introduced.

Usage Guidelines

This command is supported only on NC55-OIP-02 MPA with Ethernet, SONET and SDH client controllers.

Before configuring extended loopback, the secondary admin state should be set to maintenance mode.

```
RP/0/RP0/CPU0:router(config-eth-ctrlr)#?
secondary-admin-state  Configure the secondary admin state of the controller

RP/0/RP0/CPU0:router(config-eth-ctrlr)#secondary-admin-state ?

maintenance  Maintenance, Admin-state under maintenance
normal       Normal, Admin-state in normal
RP/0/RP0/CPU0:router(config-eth-ctrlr)#secondary-admin-state maintenance
RP/0/RP0/CPU0:router(config-eth-ctrlr)#commit
```

This example shows extended loopback configuration and show command output for 10GbE Ethernet controller on NC55-OIP-02 MPA.

Examples

```
RP/0/RP0/CPU0:router(config)#controller TenGigECtrlr 0/0/2/2
RP/0/RP0/CPU0:router(config-eth-ctrlr)#extended-loopback level ?
  <1-3>
RP/0/RP0/CPU0:router(config-eth-ctrlr)#extended-loopback level 1 ?
  internal  Enable internal loopback
  line      Enable line loopback
RP/0/RP0/CPU0:router(config-eth-ctrlr)#extended-loopback level 1 line ?
  <cr>
RP/0/RP0/CPU0:router(config-eth-ctrlr)#extended-loopback level 1 line

RP/0/RP0/CPU0:router#show controller tenGigEctrlr 0/0/2/2
Mon Jul 25 11:09:44.533 UTC
Operational data for interface TenGigECtrlr0/0/2/2:
```

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

Phy:
    Media type: Not known
    Alarms:
        Current:
            Loss of Signal
            PCS Loss of Block Lock
            Loss of Frequency Sync Data
        Previous:
            Loss of Signal
            PCS Loss of Block Lock
            Loss of Frequency Sync Data

Autonegotiation disabled.

Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    Extended Loopback: Level 1: Line
    Inter-packet gap: standard (12)
    BER monitoring:
        Not supported
```

pm

To configure the performance monitoring parameters of the optics and coherent DSP controllers, use the **pm** command in the optics controller or Coherent DSP controller or PLE controller configuration mode.

pm *time-period* { **optics** | **prbs** | **fec** | **otn** } { **report** | **threshold** } *value*

Syntax Description

pm *time-period*	Configures performance monitoring parameters. The available options are: • 30-sec • 15-min • 24-hour
optics	Configures performance monitoring parameters for the optics controller.
prbs	Configures performance monitoring parameters for the PRBS controller.
fec	Configures performance monitoring parameters for the FEC controller.
otn	Configures performance monitoring parameters for the OTN controller.
report	Configures TCA reporting status.
threshold	Configures threshold on optics or coherent DSP parameters.
value	Value of the reporting or threshold parameters.

Command Default

No default behavior or values

Command Modes

Optics controller

Coherent DSP controller

Command History

Release	Modification
Release 6.2.2	This command was introduced.
Release 7.7.1	The **prbs** keyword was added.

Usage Guidelines

You must shut down the controller before you configure the controller or restore a saved configuration.

Note The **prbs** keyword is supported only with NC55-OIP-02 MPA.

The following table describes the optics PM parameters:

Parameter	Description
cd	Chromatic dispersion TCA reporting status or threshold
dgd	Differential group delay TCA reporting status or threshold
lbc	lbc TCA reporting status or threshold
lbc-pc	lbc percentage TCA reporting status or threshold
opr	opr TCA reporting status or threshold
opt	opt TCA reporting status or threshold
osnr	Optical Signal to Noise Ratio TCA reporting status or threshold
pcr	Polarization Change Rate TCA reporting status or threshold
pdl	Polarization Dependent Loss TCA reporting status or threshold
pn	Phase Noise TCA reporting status or threshold
sopmd	Second Order Polarization Mode Dispersion TCA reporting status or threshold

The following table describes the OTN PM parameters.

Parameter	Description
ES-NE	Error seconds in the near end
ESR-NE	Error seconds ratio in the near end
SES-NE	Severely error seconds in the near end
SESR-NE	Severely error seconds ratio in the near end
UAS-NE	Unavailable seconds in the near end
BBE-NE	Background block errors in the near end
BBER-NE	Background block errors ratio in the near end
FC-NE	Failure counts in the near end
ES-FE	Error seconds in the far end
ESR-FE	Error seconds ratio in the far end
SES-FE	Severely error seconds in the far end

Parameter	Description
SESR-FE	Severely error seconds ratio in the far end
UAS-FE	Unavailable seconds in the far end
BBE-FE	Background block errors in the far end
BBER-FE	Background block errors ratio in the far end
FC-FE	Failure counts in the far end

The following table describes the FEC PM parameters.

Parameter	Description
ec-bits	Number of bit errors that are corrected by the system
uc-words	Number of words that are not corrected by the system

Examples

This example shows how to set the maximum TCA reporting status for the chromatic dispersion.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller optics 0/5/0/1 pm 15-min optics report cd max-tca
 enable
```

This example shows how to set the maximum threshold for the chromatic dispersion.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller optics 0/5/0/1 pm 15-min optics threshold cd max
```

This example shows how to set the maximum error seconds in the far end.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller coherentDSP 0/5/0/1 pm 15-min otn threshold es-fe
 500
```

This example shows PRBS performance monitoring information for otu2 controller on NC55-OIP-02 MPA.

```
RP/0/RP0/CPU0:router#show controller otu2 0/0/2/4 pm current 15-min prbs

RP/0/RP0/CPU0:router#show controller otu2 0/0/2/4 pm current 15-min prbs
Mon Jul 18 09:30:06.603 UTC

 PRBS in the current interval [09:30:00 - 09:30:06 Mon Jul 18 2022]

 PRBS current bucket type : Valid

 EBC          : 0           Threshold : 0         TCA(enable)  : NO
 FOUND-COUNT  : 0           Threshold : 0         TCA(enable)  : NO
 LOST-COUNT   : 0           Threshold : 0         TCA(enable)  : NO

 FOUND-AT-TS  : NULL
 LOST-AT-TS   : NULL
```

```
CONFIG-PTRN  : PRBS_PATTERN_PN31
STATUS       : UNLOCKED
```

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 otu2e/odu2e configuration mode. To disable TCA reporting, use the **no** form of this command.

pm { **30-sec** | **15-min** | **24-hour** } **otn report** *otn-parameter* **enable**

Syntax Description

30-sec	Configures TCA generation for 30-second intervals.
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

OTU2e/ODU2e configuration

Command History

Release	Modification
Release 7.5.1	This command was introduced.

Usage Guidelines

To display performance measurement information for the OTN layer, use the **show controller otu2e/odu2e pm otn** command.

Task ID

Task ID	Operations
otu2e, odu2e	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/RP0/CPU0:router(config)# controller odu2e 0/0/0/0
RP/0/RP0/CPU0:router(config-odu2e)# pm 30-sec otn pathmonitor report esr-fe enable
```

pm otn threshold

To configure performance monitoring thresholds on the optical transport network (OTN) layer, use the **pm otn threshold** command in otu2e or odu2e configuration mode. To disable TCA reporting, use the **no** form of this command.

pm { **30-sec** | **15-min** | **24-hour** } **otn threshold** *otn-paramter* **enable**

Syntax Description

30-sec	Configures performance monitoring thresholds for 30-second intervals.
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

OTU2e/ODU2e configuration

Command History

Release	Modification
Release 7.5.1	This command was introduced.

Usage Guidelines

To display performance measurement information for the OTN layer, use the **show controller otd2e pm** or **otn or show controller odu2e otn** command.

Task ID

Task ID	Operations
otu2e, odu2e	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/RP0/CPU0:router(config)# controller odu2e 0/0/0/0
RP/0/RP0/CPU0:router(config-odu2e)# pm 15-min otn pathmonitor threshold esr-ne 50000
```

port-mode speed

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

port-mode speed { **100G** | **150G** | **200G** } **mod** { **16qam** | **8qam** |**qpsk** } **fec** { **15sdfec** | **15sdfecde** | **25sdfec** | **otu7staircase** } **diff** { **enable** | **disable** }

Syntax Description

100G | **150G** | **200G**	Specifies 100 Gbps (DWDM QPSK), 150Gbps (DWDM 8 QAM), or 200Gbps (DWDM 16 QAM) WDM signals.
mod { **16qam** | **8qam** |**qpsk** }	Configures the port speed modulation.
fec {**15sdfec** | **15sdfecde** | **25percent** | **otu7staircase** }	Specifies 15% Forward Error Correction (FEC) or 25% FEC of overhead gain.
diff {**disable** | **enable**}	Specifies differential or non-differential line-encoding mode.

Command Default

No default behavior or values

Command Modes

Optics controller

Command History

Release	Modification
Release 6.2.2	This command was introduced.
Release 6.5.1	Support for QPSK, 16 QAM and 8 QAM modulation was introduced.
Release 7.2.1	Support for 1-port 100G/200G CFP2 DCO (N560-IMA1W) Interface Module for Cisco NCS 560 routers.

Usage Guidelines

You must shut down the controller before you configure the controller or restore a saved configuration.

Note When you bring up the local optics controller, you might briefly see transient loss of signal (LOS) alarms on the console. This behavior might be observed during the initial tuning of the channel.

```
PKT_INFRA-FM-2-FAULT_CRITICAL : ALARM_CRITICAL :LOS-P :DECLARE :CoherentDSP0/3/0/1:
PKT_INFRA-FM-2-FAULT_CRITICAL : ALARM_CRITICAL :LOS-P :CLEAR :CoherentDSP0/3/0/1:
```

During the laser-on process, you might briefly see transient loss of line (LOL) alarms on the console. This alarm is cleared when the laser-on process is complete.

```
PKT_INFRA-FM-3-FAULT_MAJOR : ALARM_MAJOR :CTP2 RX LOL :DECLARE ::
PKT_INFRA-FM-3-FAULT_MAJOR : ALARM_MAJOR :CTP2 RX LOL :CLEAR ::
```

After you configure the port-mode speed for the NC55-6X200-DWDM-S, you can configure the following interfaces:

- 100G – Each optics controller configuration creates a single 100GE port:
  - **interface HundredGE** *r*/s/*i*/*p*/**0** (where*p* = CTP2 port 0-5)

    0/3/0/0/0

    0/3/0/1/0

    0/3/0/2/0

    0/3/0/3/0

    0/3/0/4/0

    0/3/0/5/0

- 200G – Each optics controller configuration creates two 100GE ports:
  - **interface HundredGigE** *r*/*s*/*i*/*p*/**0,** *r*/*s*/*i*/*p*/**1** (where*p* = CTP2 port 0-5

    0/3/0/0/0, 0/3/0/0/1

    0/3/0/1/0, 0/3/0/1/1

    0/3/0/2/0, 0/3/0/2/1

    0/3/0/3/0, 0/3/0/3/1

    0/3/0/4/0, 0/3/0/4/1

    0/3/0/5/0, 0/3/0/5/1

- 150G (coupled) – Coupled optics controller configuration creates three 100GE port:
  - **interface HundredGigE** *r*/*s*/*i*/*p*/**0,** *r*/*s*/*i*/*p*/**1,** *r*/*s*/*i*/*p*+1/**0** (where*p* = CTP2 port: 0, 2, 4 [port *p* and *p* +1 are coupled])

    0/3/0/0/0, 0/3/0/0/1, 0/3/0/1/0

    0/3/0/2/0, 0/3/0/2/1, 0/3/0/3/0

    0/3/0/4/0, 0/3/0/4/1, 0/3/0/5/0

Note The line card has three Digital Signal Processors (DSPs), one for each pair of ports:

- Ports 0 and 1 – DSP0
- Ports 2 and 3 – DSP1
- Ports 4 and 5 – DSP2

When you configure the port-mode speed for 150Gbps (8 QAM), the port pairs belonging to a DSP are coupled.

After you configure the port-mode for the N560-IMA1W, you can configure the following interfaces:

- **HundredGigE (HuGig) Ports***R*/*S*/*I*/*P*/*i* (where *i* = subport)

  The HuGig ports are created and mapped based on the port-mode configuration of the **controller optics** (*R*/*S*/*I*/*P*)

  - **100G/QPSK**

    The controller optics configuration creates a single HuGig port. This is the default configuration where controller optics 0/0/0/0 creates HundredGigE0/0/0/0/0.

  - **200G/16QAM** or **200G/8QAM**

    In this mode, each controller optics configuration creates two HuGig ports. For example, controller optics 0/0/0/0 creates HundredGigE0/0/0/0/0 and HundredGigE0/0/0/0/1.

To change the port-mode speed, you must remove the existing port mode speed configuration by entering the **no port-mode** command. You can then change the port mode speed.



Note Starting Cisco IOS XR Release 6.3.3, you do not need to use the **shutdown/no shutdown** and **commit** commands in the below configuration.

Examples

This example shows how to configure the port mode speed to 200Gbps.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller optics 0/3/0/0
RP/0/RP0/CPU0:router(config-Optics)# shutdown
RP/0/RP0/CPU0:router(config-Optics)# commit
RP/0/RP0/CPU0:router(config-Optics)# port-mode speed 200G mod qpsk fec 15percent diff enable
RP/0/RP0/CPU0:router(config-Optics)# commit
RP/0/RP0/CPU0:router(config-Optics)# no shutdown
RP/0/RP0/CPU0:router(config-Optics)# commit
RP/0/RP0/CPU0:router(config-Optics)# exit
RP/0/RP0/CPU0:router(config)#
```

This example shows how to change the port mode speed from 200G to 100Gbps.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller optics 0/3/0/0
RP/0/RP0/CPU0:router(config-Optics)# shutdown
RP/0/RP0/CPU0:router(config-Optics)# commit
RP/0/RP0/CPU0:router(config-Optics)# no port-mode
RP/0/RP0/CPU0:router(config-Optics)# commit
RP/0/RP0/CPU0:router(config-Optics)# port-mode speed 100G mod qpsk fec 15percent diff enable
RP/0/RP0/CPU0:router(config-Optics)# commit
RP/0/RP0/CPU0:router(config-Optics)# no shutdown
RP/0/RP0/CPU0:router(config-Optics)# commit
RP/0/RP0/CPU0:router(config-Optics)# exit
RP/0/RP0/CPU0:router(config)#
```

port-mode

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

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

Syntax Description

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

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

Command Default

None

Command Modes

Optics controller

Command History

Release	Modification
Release 7.7.1	This command was introduced.

Usage Guidelines

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

Examples

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

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller optics 0/0/2/4
RP/0/RP0/CPU0:router(config-Optics)# port-mode Ethernet framing cem-packetize rate 10GE
RP/0/RP0/CPU0:router(config-Optics)# exit
RP/0/RP0/CPU0:router(config)#
```

Examples

This example shows how to change the Ethernet port mode to Fibre Channel port mode and enable FC1 rate.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# controller optics 0/0/2/4
RP/0/RP0/CPU0:router(config-Optics)# no port-mode Ethernet framing cem-packetize rate 10GE
RP/0/RP0/CPU0:router(config-Optics)# port-mode FC framing cem-packetize rate FC1
RP/0/RP0/CPU0:router(config-Optics)# exit
RP/0/RP0/CPU0:router(config)#
```

port-mode sonet framing WIS

To enable the WAN-PHY mode, use the **port-mode sonet framing WIS** command in the optics controller configuration mode.

port-mode sonet framing WIS

Syntax Description

sonet framing WIS	Specifies WAN Interface Sublayer (WIS) framing type

Command Default

No default behavior or values

Command Modes

Optics controller

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

This command is supported on NC55-MPA-12T-S card and on SFP-10G-LR-X optics.

Example

This sample configuration shows how to enable WAN-PHY on the interface 0/0/1/10:

```
RP/0/RP0/CPU0:ios# controller Optics 0/0/1/10
RP/0/RP0/CPU0:ios# port-mode sonet framing WIS
```

port-mode sdh framing WIS

To enable the SDH mode, use the **port-mode sdh framing WIS** command in the optics controller configuration mode:

port-mode sdh framing WIS

Syntax Description

framing WIS	Specifies WAN Interface Sublayer (WIS) framing type

Command Default

No default behavior or values

Command Modes

Optics controller

Command History

Release	Modification
Release 7.2.2	This command was introduced.

Usage Guidelines

This command is supported on NC55-MPA-12T-S card and on SFP-10G-LR-X optics.

In SDH mode, WIS transports 10GE frames in a STM-64 payload.

Example

This sample configuration shows how to enable SDH mode on the interface 0/0/2/1:

```
RP/0/RP0/CPU0:ios# controller Optics 0/0/2/1
RP/0/RP0/CPU0:ios# port-mode sdh framing WIS
```

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 7.10.1	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 coherent driver

To display Coherent driver and port state, use the **show coherent driver** command in XR EXEC mode.

show coherent driver {**internal** | **summary** | **detail port** *port* | **timestats**} **location** *node-id*

Syntax Description

internal	Displays Coherent driver internal and port status.
summary	Displays a summary of Coherent driver status.
detail port *port*	Displays detailed Coherent driver and port status.
timestats	Displays Coherent driver timing-related status.
location *node-id*	Specifies the node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.2.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Examples

```
RP/0/RP0/CPU0:router# show coherent driver summary location 0/3/CPU0
Wed Apr 20 15:19:53.292 UTC
PORT ADMIN-STATE    PLUGGABLE TRAFFIC TYPE             FREQUENCY(100MHz) LASER STATE
=============================================================================================

 0   UP             CFP2      100G_QPSK_FEC15_DIFF     1937000           ON
 1   UP             CFP2      100G_QPSK_FEC15_DIFF     1937000           ON
 2   UP             CFP2      100G_QPSK_FEC15_DIFF     1937000           ON
 3   UP             CFP2      100G_QPSK_FEC15_DIFF     1937000           ON
 4   UP             CFP2      100G_QPSK_FEC15_DIFF     1937000           ON
 5   UP             CFP2      100G_QPSK_FEC15_DIFF     1937000           ON


RP/0/RP0/CPU0:router# show coherent driver timestats location 0/3/CPU0
Thu Mar 16 01:09:52.269 UTC
=============================================================================================

                Driver operation stats
=============================================================================================
Driver Started at               :        [15-02-2017  16:04:30.832]
Driver Operational at           :        [15-02-2017  16:05:02.228]
Device created                  :        [15-02-2017  16:04:56.626]
Optics controllers created at   :        [15-02-2017  16:04:59.489]
```

```
Dsp controllers created at      :        [15-02-2017  16:05:02.228]
Eth interfaces created at       :        [15-02-2017  16:05:02.228]
Optics ea bulk create stats     :        Completed [15-02-2017  16:05:44.194]
Optics ea bulk config stats     :        Completed [15-02-2017  16:05:44.194]
Dsp ea bulk create stats        :        Completed [15-02-2017  16:05:44.194]
Dsp ea bulk config stats        :        Completed [15-02-2017  16:05:44.194]
```

show coherent lib

To display coherent library state information, use the **show coherent lib** command in XR EXEC mode.

Note This command can be executed only on the active RP.

show coherent lib summary location *location*

Syntax Description

summary	Displays the summary of all ports
location *location*	Specifies the active RP location. The *location* argument is entered in the *rack/slot/module* notation.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.2.1	The command was introduced on the Cisco NCS 560 routers.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

```
RP/0/RP0/CPU0:ios# show coherent lib summary location 0/RP0/CPU0

PORT      ADMIN-STATE    PLUGGABLE TRAFFIC TYPE                      FREQUENCY(100MHz)
LASER STATE
=============================================================================================
0/0/0/0   UP             CFP2      200G_8QAM_SDFEC_15_NODIFF         1913000           ON

0/1/0/0   UP             CFP2      200G_8QAM_SDFEC_15_NODIFF         1927000           ON

0/2/0/0   UP             CFP2      100G_QPSK_SDFEC_15_NODIFF         1937000           ON

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

show coherent mappingdevices

To display configured optics and Coherent DSP controllers mapped to Coherent line card, use the **show coherent mappingdevices** command in XR EXEC mode.

show coherent mappingdevices location *node-id*

Syntax Description

location *node-id*	Specifies the node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.2.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

```
RP/0/RP0/CPU0:router# show coherent mappingdevices location 0/3/CPU0

Wed Apr 20 15:26:01.866 UTC
 Coherent Node Information
 Coherent node device mapping info
device_address  Interface handle  Interface Name
0xff0000ff      0x1800010         Optics0_3_0_0
0xff0201ff      0x1800018         Optics0_3_0_5
0xff0200ff      0x1800020         Optics0_3_0_4
0xff0101ff      0x1800028         Optics0_3_0_3
0xff0100ff      0x1800030         Optics0_3_0_2
0xff0001ff      0x1800038         Optics0_3_0_1

0xff0000ff      0x1800070         CoherentDSP0_3_0_0
0xff0201ff      0x1800078         CoherentDSP0_3_0_5
0xff0200ff      0x1800080         CoherentDSP0_3_0_4
0xff0101ff      0x1800088         CoherentDSP0_3_0_3
0xff0100ff      0x1800090         CoherentDSP0_3_0_2
0xff0001ff      0x1800098         CoherentDSP0_3_0_1
```

show coherent pm

To display current optical performance values, use the **show coherent pm** command in XR EXEC mode.

show coherent pm optics *interface* **location** *location*

Syntax Description

optics *interface*	Specifies the optics controller. The *interface* argument is entered in the *rack/slot/instance/port* notation.
location *node-id*	Specifies the node. The *node-id* argument is entered in the *rack/slot/module* notation.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.2.2	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

```
RP/0/RP0/CPU0:router# show coherent pm Optics 0/3/0/0 location 0/3/CPU0
Mon Dec  5 11:41:58.806 UTC
Coherent Node Performance Statistics for Interface Optics0_3_0_0
Performance Statistics for the Interface Optics0_3_0_0
--------------------------------------------------
CD Current: -9 ps/nm
CD Average: -7 ps/nm
CD Minimum: -13 ps/nm
CD Maximum: -2 ps/nm

TX Power:        -0.240000 dBm
RX Power:        0.210000 dBm
RX Signal Power: 0.020000 dBm

DGD Current: 2 ps
DGD Average: 1 ps
DGD Minimum: 1 ps
DGD Maximum: 2 ps

OSNR Current: 26.800000 dB
OSNR Average: 26.800000 dB
OSNR Minimum: 26.800000 dB
OSNR Maximum: 26.800000 dB

TX Laser Bias 8 %
RX Laser Bias 8 %
```

```
CTP2 Temperature 44.500000 C
```

show controllers

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

show controllers *controller-type r/s/i/p* [**dwdm-carrier-map**] | [**pm** *type time-period* { **optics** *linenumber* | **otn** | **fec** }] | [**stats**] | [**summary**]

Syntax Description

controller-type	Type of the controller. The possible values are: **coherentDSP** or **optics**
r/s/i/p	Specifies the Rack/Slot/Instance/Port number of the controller.
dwdm-carrier-map	Displays the wavelength and channel mapping.
pm *type*	Displays performance monitoring parameters for the controller The available options are: • current • history
time-period	Specifies the performance monitoring intervals. The available options are: • 30-sec • 15-min • 24-hour
optics *linenumber*	Display the PM data for Optics controller. The *linenumber* range is 1 to 12.
otn	Displays OTN PM data for CoherentDSP controller.
fec	Displays FEC PM data for CoherentDSP controller.
stats	Displays the cumulative statistics of the controller port.
summary	Displays brief information in a tabular format. This parameter cannot be used with the stats parameter.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.2.2	This command was introduced.

Release	Modification
Release 7.2.1	The command was updated to display the WAN PHY information.

Example

```
RP/0/RP0/CPU0:ios# show controllers optics 0/0/0/0

 Controller State: Up

 Transport Admin State: In Service

 Laser State: On

 LED State: Green

 Optics Status

         Optics Type:  CFP2 DWDM
         DWDM carrier Info: C BAND, MSA ITU Channel=69, Frequency=192.70THz,
         Wavelength=1555.747nm

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


         LOS/LOL/Fault Status:
         Alarm Statistics:

         -------------
         HIGH-RX-PWR = 1            LOW-RX-PWR = 671
         HIGH-TX-PWR = 0            LOW-TX-PWR = 312
         HIGH-LBC = 0               HIGH-DGD = 0
         OOR-CD = 0                 OSNR = 0
         WVL-OOL = 0                MEA  = 0
         IMPROPER-REM = 0
         TX-POWER-PROV-MISMATCH = 0
         Laser Bias Current = 0.0 %
         Actual TX Power = -1.49 dBm
         RX Power = -2.85 dBm

         Performance Monitoring: Enable

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

         Parameter                High Alarm  Low Alarm  High Warning  Low Warning
         -----------------------  ----------  ---------  ------------  -----------
         Rx Power Threshold(dBm)         1.5      -30.0           0.0          0.0
         Tx Power Threshold(dBm)         3.5      -10.0           0.0          0.0
         LBC Threshold(mA)               N/A        N/A          0.00         0.00

         LBC High Threshold = 98 %
         Configured Tx Power = -1.50 dBm
         Configured OSNR lower Threshold = 0.00 dB
         Configured DGD Higher Threshold = 180.00 ps
         Chromatic Dispersion 0 ps/nm
         Configured CD-MIN -10000 ps/nm  CD-MAX 16000 ps/nm
         Optical Signal to Noise Ratio = 17.60 dB
```

```
        Polarization Dependent Loss = 0.00 dB
        Differential Group Delay = 2.00 ps

 Transceiver Vendor Details

        Form Factor             : CFP2
        Name                    : CISCO-ACACIA
        Part Number             : AC200-D13-192
        Rev Number              : 16928
        Serial Number           : ACZ2317000S
        PID                     : CFP2-WDM-DS-1HL
        VID                     : V01
        Date Code(yy/mm/dd)     : 19/04/12
```

```
RP/0/RP0/CPU0:router# show controllers optics 0/3/0/0 pm current 15-min optics 1
Mon Dec  5 11:43:53.877 UTC
Optics in the current interval [11:30:00 - 11:43:53 Mon Dec 5 2016]
Optics current bucket type : Valid
             MIN       AVG       MAX     Threshold  TCA     Threshold  TCA
                                           (min)    (enable)    (max)    (enable)
LBC[% ]    : 7.0       7.9       8.0       0.0       NO         0.0       NO
OPT[dBm]   : -0.25     -0.24     -0.23      0.00      NO         0.00      NO
OPR[dBm]   : -0.02     0.04      0.10       0.00      NO         0.00      NO
CD[ps/nm]  : -13       -7        0          -1        NO         -1        NO
DGD[ps ]   : 1.00      1.66      3.00       0.00      NO         0.00      NO
SOPMD[ps^2]: 0.00      0.00      0.00       0.00      NO         0.00      NO
OSNR[dB]   : 26.60     26.75     26.90      0.00      NO         0.00      NO
PDL[dB]    : 0.00      0.00      0.00       0.00      NO         0.00      NO
PCR[rad/s] : 0.00      0.00      0.00       0.00      NO         0.00      NO
```

```
RP/0/RP0/CPU0:ios# show controllers coherentDSP 0/0/0/0

Port                                          : CoherentDSP 0/0/0/0
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

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

Bit Error Rate Information
PREFEC  BER                                   : 1.6E-04
POSTFEC BER                                   : 0.0E+00

OTU TTI Received

FEC mode                                      : STANDARD
RP/0/RP0/CPU0:ios#
```

```
RP/0/RP0/CPU0:router# show controllers coherentDSP 0/3/0/3 pm current 15-min otn
Wed Mar 15 15:09:16.820 UTC
```

```
g709 OTN in the current interval [15:00:00 - 15:09:16 Wed Mar 15 2017]
OTN current bucket type : Valid
    ES-NE   : 0         Threshold : 500      TCA(enable)  : YES
    ESR-NE  : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    SES-NE  : 0         Threshold : 500      TCA(enable)  : YES
    SESR-NE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    UAS-NE  : 0         Threshold : 500      TCA(enable)  : YES
    BBE-NE  : 0         Threshold : 10000    TCA(enable)  : YES
    BBER-NE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    FC-NE   : 0         Threshold : 10       TCA(enable)  : YES
    ES-FE   : 0         Threshold : 500      TCA(enable)  : YES
    ESR-FE  : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    SES-FE  : 0         Threshold : 500      TCA(enable)  : YES
    SESR-FE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    UAS-FE  : 0         Threshold : 500      TCA(enable)  : YES
    BBE-FE  : 0         Threshold : 10000    TCA(enable)  : YES
    BBER-FE : 0.00000   Threshold : 0.00000  TCA(enable)  : NO
    FC-FE   : 0         Threshold : 10       TCA(enable)  : YES
Last clearing of "show controllers OTU" counters never
```

Note When the port-mode speed is configured for 150G (coupled optics controller), some of the OTN PM values, such as FC and UAS, are not counted for the far-end (FE) secondary controller. These values are counted on the far-end primary controller.

This command displays WAN-PHY related alarms and PM:

```
RP/0/RP0/CPU0:router#show controllers optics 0/0/1/10

 Controller State: Up

 Transport Admin State: In Service

 Laser State: On

 LED State: Green

 Optics Status

         Optics Type:  SFP+ 10G LR
         Wavelength = 1310.00 nm

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

         LOS/LOL/Fault Status:

         Laser Bias Current = 29.9 mA
         Actual TX Power = -2.67 dBm
         RX Power = -3.45 dBm

         Performance Monitoring: Disable

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

         Parameter                 High Alarm  Low Alarm  High Warning  Low Warning
         ------------------------  ----------  ---------  ------------  -----------
         Rx Power Threshold(dBm)          3.4      -18.3           0.4        -14.4
```

```
        Tx Power Threshold(dBm)          3.4      -12.1          0.4         -8.1
        LBC Threshold(mA)              80.00       8.00        75.00        10.00
        Temp. Threshold(celsius)       90.00     -10.00        85.00        -5.00
        Voltage Threshold(volt)         3.63       2.97         3.46         3.13

Polarization parameters not supported by optics

        Temperature = 20.00 Celsius
        Voltage = 3.28 V

 Transceiver Vendor Details

        Form Factor             : SFP+
        Optics type             : SFP+ 10G LR
        Name                    : CISCO-OCLARO
        OUI Number              : 00.0b.40
        Part Number             : TRS5024EE-S101
        Rev Number              : 0000
        Serial Number           : OPT1949011Q
        PID                     : SFP-10G-LR-X
        VID                     : V01
        Date Code(yy/mm/dd)     : 15/12/14
```

show controllers (CEM)

To display status and configuration information about the CEM (Circuit Emulation) client controller on a specific node, use the **show controllers** command in XR EXEC mode.

show controllers CEM *r/s/i/p* [**capabilities** | **description** | **payload-dejitter-mapping** | **periodic** | **pm** | **stats** | **xgxs**]

Syntax Description

CEM	Specifies CEM controller option.
r/s/i/p	Specifies the Rack/Slot/Instance/Port number of the controller.
capabilities	Displays CEM client capabilities information.
description	Displays controllers description.
payload-dejitter-mapping	Displays CEM client payload-dejitter mapping information.
periodic	Displays performance monitoring data periodically.
pm	Displays CEM performance monitoring.
stats	Displays stats information.
xgxs	Displays the 10 Gigabit Ethernet Extended Sublayer (XGXS) information.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.7.1	This command was introduced.

Usage Guidelines

The CEM command option is supported only on NC55-OIP-02 MPA.

Example

This example shows CEM status and configuration information:

```
RP/0/RP0/CPU0:router#show controllers CEM 0/0/2/4
Wed Jul 27 05:38:10.552 UTC
Interface                          : CEM0/0/2/4
Admin state                        : Up

Oper  state                        : Up

Port bandwidth                     : 10037274 kbps
Dejitter buffer (oper/in-use)      : 835/3526 usec
Payload size (oper)                : 1024 bytes
PDV (min/max/avg)                  : 1007/2784/1895 usec
```

```
Dummy mode                          : last-frame
Dummy pattern                       : 0xaa
Idle pattern                        : 0xff
Signalling                          : No CAS
RTP                                 : Enabled
Clock type                          : Differential
Detected Alarms                     : None
Statistics Info

Ingress packets          : 6088676782, Ingress packets drop     : 0
Egress packets           : 0, Egress packets drop      : 0
Total error              : 0
Missing packets          : 0, Malformed packets        : 0
Jitter buffer underrun   : 0, Jitter buffer overrun    : 0
Misorder drops           : 0
Reordered packets        : 0, Frames fragmented        : 0
Error seconds            : 0, Severely error seconds   : 0
Unavailable seconds      : 0, Failure counts           : 0

Generated L bits         : 0, Received  L bits         : 0
Generated R bits         : 0, Received  R bits         : 0
Endpoint Info

Passthrough     : No
```

show controllers (Ethernet controller)

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

show controllers *controller-type r/s/i/p* [**all** | **description** | **periodic** | **pm** | **priority-flow-control** | **xgxs**]

Syntax Description

controller-type	Specifies the type of Ethernet interface whose status and configuration information you want to display. The available options are: • GigabitEthCtrlr • TenGigECtrlr
r/s/i/p	Specifies the Rack/Slot/Instance/Port number of the controller.
all	Displays detailed information for the specified interface.
description	Displays controllers description.
periodic	Displays the performance monitoring data periodically.
pm	Displays the ethernet performance monitoring data.
priority-flow-control	Displays priority flow control information for the interface.
xgxs	Displays information about the Ethernet Extended Sublayer (XGXS).

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.7.1	This command was introduced.

Usage Guidelines

Note This command is supported only on NC55-OIP-02 MPA.

For the *r/s/i/p* argument, use the following guidelines:

- The naming notation for specifying a physical interface is *rack*/*slot*/*instance*/*port*. The slash between values is required as part of the notation. An explanation of each component of the naming notation is as follows:
  - *rack*: Chassis number of the rack.

- *slot*: Physical slot number of the line card.
- *instance*: Instance number. Minimum value is 2 and maximum value is 3.
- *port*: Physical port number of the interface.

Examples

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

```
RP/0/RP0/CPU0:router#show controllers tengigEctrlr 0/0/3/7?
0/0/3/7  R/S/I/P
RP/0/RP0/CPU0:router#show controllers tengigEctrlr 0/0/3/7 ?
  all                     Show all the information
  description             Controllers description
  periodic                show pm data periodically
  pm                      show ethernet performance monitoring
  priority-flow-control   Show priority flow control information
  stats                   Show stats information
  xgxs                    Show xgxs information
  |                       Output Modifiers
  <cr>
RP/0/RP0/CPU0:router#show controllers tengigEctrlr 0/0/3/7
Tue Jul 19 12:02:00.154 IST
Operational data for interface TenGigECtrlr0/0/3/7:

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

Phy:
    Media type: Not known

Autonegotiation disabled.

Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    Inter-packet gap: standard (12)
    BER monitoring:
        Not supported
```

show controllers (Fibre Channel)

To display the Fibre Channel controller details, use the **show controllers** command in XR EXEC mode.

show controllers *controller-type r/s/i/p* [**description** | **periodic** | **pm** | **prbs-info** | **summary** | **xgxs**]

Syntax Description

controller-type	Specifies the type of fibre channel interface whose status and configuration information you want to display. The available options are: • OneGigFibreChanCtrlr • twoGigFibreChanCtrlr • fourGigFibreChanCtrlr • eightGigFibreChanCtrlr • sixteenGigFibreChanCtrlr • thirtytwoGigFibreChanCtrlr
r/s/i/p	Specifies the Rack/Slot/Instance/Port number of the controller.
all	Displays detailed information for the specified interface.
description	Displays information for the specified interface.
periodic	Displays performance monitoring data periodically.
pm	Displays otu performance monitoring.
prbs-info	Displays the pseudorandom binary sequence (prbs) details.
statistics	Displays statistical information for the interface.
xgxs	Displays information about the 10 Gigabit Ethernet Extended Sublayer (XGXS).

Command Default

None

Command Modes

Optics controller

Command History

Release	Modification
Release 7.7.1	This command was introduced.

Usage Guidelines



Note This command is supported only on NC55-OIP-02 MPA.

No specific guidelines impact the use of this command.

Examples

This sample show command displays the 1G fibre channel parameters for an interface at location 0/0/2/5:

```
RP/0/RP0/CPU0:router# show controllers OneGigFibreChanCtrlr0/0/2/5
Thu Jul 14 10:43:16.130 UTC

Operational data for Fibre Channel controller OneGigFibreChanCtrlr0/0/2/5

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

Performance Monitoring is enabled

Operational values:
        Speed                    : 1 Gbps
        Loopback                 : None
        BER monitoring:
                Signal Degrade   : 1e-0
                Signal Fail      : 1e-0
        Hold-off Time            : 0 ms
        Forward Error Correction : Not Configured

Alarms :
        Current :
                Loss of Signal
                Loss of Synchronization
        Previous :
                Loss of Signal
                Loss of Synchronization
RP/0/RP0/CPU0:ios#
```

show controllers (OTN)

To display the OTN controller details, use the **show controllers** command in XR EXEC mode.

show controllers *controller-type r/s/i/p* [**description** | **periodic** | **pm** | **prbs-details** | **summary** | **xgxs**]

Syntax Description

controller-type	Specifies the type of otn interface whose status and configuration information you want to display. The available options are: • otu2 • odu2 • otu2e • odu2e
r/s/i/p	Specifies the Rack/Slot/Instance/Port number of the controller.
description	Displays information for the specified interface.
periodic	Displays performance monitoring data periodically.
pm	Displays otu performance monitoring.
prbs-details	Displays the pseudorandom binary sequence (prbs) details.
summary	Display a summary of controller information.
xgxs	Displays information about the 10 Gigabit Ethernet Extended Sublayer (XGXS).

Command Default

None

Command Modes

Optics controller

Command History

Release	Modification
Release 7.7.1	This command was introduced.

Usage Guidelines

This command is supported only on NC55-OIP-02 MPA and NC55-MPA-12T-S MPA.

Examples

This sample show command displays the otu2 parameters for an interface at location 0/0/2/1:

```
RP/0/RP0/CPU0:router# show controllers otu20/0/2/1
Thu Jul 14 10:41:57.642 UTC
```

```
Port                                               : OTU2 0/0/2/1
Controller State                                   : Down
LED state                                          : Red Flashing
Inherited Secondary State                          : Normal
Configured Secondary State                         : Normal
Derived State                                      : In Service
Loopback mode                                      : None
BER Thresholds                                     : SF = 1.0E-6  SD = 1.0E-7
Performance Monitoring                             : Enable

Alarm Information:
LOS = 0 LOF = 1 LOM = 0
OOF = 1 OOM = 1 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 = 0
Detected Alarms                                    : LOF OOF OOM

OTU TTI Received

FEC mode                                           : STANDARD

AINS Soak                                          : None
AINS Timer                                         : 0h, 0m
AINS remaining time                                : 0 seconds
```

show controllers coherentdsp (400G DCO)

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 0/0/0/13
Thu May 27 06:56:37.505 UTC

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

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

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

Q-Margin                                        : 2.70dB

OTU TTI Received
```

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

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

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

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

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

show controllers optics (400G DCO)

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* } **| fec-thresholds**]

Syntax Description

R/S/I/P	Rack/Slot/Instance/Port of the optics controller.
pm	Displays performance monitoring parameters for the controller.
current	Displays the current performance monitoring data in 30 second, 15 minute, and 24 hour intervals.
history	Displays the historical performance monitoring data in 30 second, 15 minute, and 24 hour intervals.
optics	Displays the PM data for optics controller.
lane-number	Displays the performance monitoring data for the applicable lanes in the optical module. The lane number is always 1.
fec-thresholds	Displays the FEC detected degrade (FDD) and FEC excessive degrade (FED) threshold values of the host and media side of the optical transceiver.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.3.2	This command was introduced.
Release 24.3.1	The **fec-thresholds** keyword was introduced.

Example

The following is a sample to view the status and configuration information about the optics controller:

```
Router#show controllers optics 0/0/0/7
 Controller State: Up
 Transport Admin State: In Service
 Laser State: On
 LED State: Green
 FEC State: FEC ENABLED
 Optics Status
         Optics Type:  QSFPDD 400G ZR
         DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,
         Wavelength=1552.524nm
         Alarm Status:
```

```
        -------------
        Detected Alarms: None
        LOS/LOL/Fault Status:
        Alarm Statistics:
        -------------
        HIGH-RX-PWR = 0            LOW-RX-PWR = 0
        HIGH-TX-PWR = 0            LOW-TX-PWR = 0
        HIGH-LBC = 0               HIGH-DGD = 0
        OOR-CD = 0                 OSNR = 55
        WVL-OOL = 0                MEA  = 0
        IMPROPER-REM = 0
        TX-POWER-PROV-MISMATCH = 0
        Laser Bias Current = 0.0
        Actual TX Power = -8.16 dBm
        RX Power = -7.85 dBm
        RX Signal Power = -7.55 dBm
        Frequency Offset = 5 MHz
        Performance Monitoring: Enable
        THRESHOLD VALUES
        ----------------
        Parameter                 High Alarm  Low Alarm  High Warning  Low Warning
        ------------------------  ----------  ---------  ------------  -----------
        Rx Power Threshold(dBm)          1.9      -28.2           0.0        -25.0
        Tx Power Threshold(dBm)          0.0      -15.0          -2.0        -16.0
        LBC Threshold(mA)               0.00       0.00          0.00         0.00
        Temp. Threshold(celsius)       80.00      -5.00         75.00        15.00
        Voltage Threshold(volt)         3.46       3.13          3.43         3.16
        LBC High Threshold = 98 %
        Configured Tx Power = -6.00 dBm
        Configured CD High Threshold = 80000 ps/nm
        Configured CD lower Threshold = -80000 ps/nm
        Configured OSNR lower Threshold = 9.00 dB
        Configured DGD Higher Threshold = 80.00 ps
        Baud Rate =  59.8437500000 GBd
        Modulation Type: 16QAM
        Chromatic Dispersion 2 ps/nm
        Configured CD-MIN -2400 ps/nm  CD-MAX 2400 ps/nm
        Second Order Polarization Mode Dispersion = 87.00 ps^2
        Optical Signal to Noise Ratio = 36.30 dB
        Polarization Dependent Loss = 0.40 dB
        Polarization Change Rate = 0.00 rad/s
        Differential Group Delay = 2.00 ps
        Temperature = 51.00 Celsius
        Voltage = 3.36 V
 Transceiver Vendor Details
        Form Factor            : QSFP-DD
        Optics type            : QSFPDD 400G ZR
        Name                   : CISCO-ACACIA
        OUI Number             : 7c.b2.5c
        Part Number            : DP04QSDD-E20-19E
        Rev Number             : 10
        Serial Number          : ACA2449003P
        PID                    : QDD-400G-ZR-S
        VID                    : ES03
        Firmware Version       : 61.12
        Date Code(yy/mm/dd)    : 20/12/03
```

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

```
Router#show controllers optics 0/0/0/7 pm current 30-sec optics 1
Thu May 27 07:11:33.466 UTC
Optics in the current interval [07:11:30 - 07:11:33 Thu May 27 2021]
Optics current bucket type : Valid
```

```
            MIN       AVG       MAX      Operational      Configured      TCA   Operational
      Configured     TCA
                                                 Threshold(min)   Threshold(min) (min) Threshold(max)
   Threshold(max) (max)
LBC[mA ]      : 52       52       52        0.0               NA              NO   100.0
          NA              NO
OPT[dBm]     : -8.17     -8.17     -8.17    -15.09            NA              NO   0.00
          NA              NO
OPR[dBm]     : -7.80     -7.80     -7.80    -30.00            NA              NO   8.00
          NA              NO
CD[ps/nm]    : 1         1         1        -2400             -2400           YES  2400
          2400            YES
DGD[ps ]     : 2.00      2.00      2.00     0.00              NA              NO   80.00
          NA              NO
SOPMD[ps^2]  : 53.00     53.00     53.00    0.00              NA              NO   2000.00
          NA              NO
OSNR[dB]     : 36.30     36.30     36.30    9.00              55.00           NO   40.00
          NA              NO
PDL[dB]      : 0.40      0.40      0.40     0.00              NA              NO   7.00
          NA              NO
PCR[rad/s]   : 0.00      0.00      0.00     3.00              3.00            NO   2500000.00
       3000000.00      YES
RX_SIG[dBm]  : -7.54     -7.54     -7.54    -30.00            NA              NO   1.00
          NA              NO
FREQ_OFF[Mhz]: 33        33        33       -3600             NA              NO   3600
          NA              NO
SNR[dB]      : 17.90     17.90     17.90    7.00              NA              NO   100.00
          NA              NO

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

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

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

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 7.10.1	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
```

show controllers npu interface-bandwidth-usage

To display the provisioned ports and to know the allocated or the remaining bandwidth availability and to know the possible port combinations, use `show controllers npu interface-bandwidth-usage` command in XR EXEC mode.

show controllers npu interface-bandwidth-usage [**brief** | **detail**]

Command Default None

Command Modes XR EXEC mode

Command History

Release	Modification
7.4.1	This command is introduced for N540-24Q8L2DD-SYS.

Example

The following example displays the bandwidth usage details `show controllers npu interface-bandwidth-usage brief instance 0 location 0/RP0/CPU0` command:

```
RP/0/RP1/CPU0:router#show controllers npu interface-bandwidth-usage brief instance 0 location
 0/RP0/CPU0

================================
Bandwidth usage
--------------------------------
Total BW             : 1000 GB
Total BW used        :    0 GB
Total BW available   : 1000 GB
================================
```

Example

The following example displays interfaces created `show controllers npu interface-bandwidth-usage detail instance 0 location 0/RP0/CPU0` command:

```
RP/0/RP0/CPU0:ios#show controllers npu interface-bandwidth-usage detail instance 0 location
 0/RP0/CPU0
Tue Dec  8 20:15:11.856 UTC
================================
Bandwidth usage
--------------------------------
Total BW             : 1000 GB
Total BW used        : 1000 GB
Total BW available   :    0 GB
================================

Bandwidth usage details
=======================
[X] : BW currently allocated
 X  : BW allocation possible
 -  : BW allocation not possible
 #  : Mandatory de-provisioning dependency
--------------------------------------------------------------------------------
```

```
    Port     1GigE  10GigE  25GigE  40GigE  50GigE 100GigE 200GigE 300GigE 400GigE
-------------------------------------------------------------------------------------
  0/0/0/00       -       -       -       X       -     [X]       -       -       -
  0/0/0/01       -       -       -       X       -     [X]       -       -       -
  0/0/0/02       X       X     [X]       -       #       -       -       -       -
  0/0/0/03       X       X     [X]       -       -       -       -       -       -
  0/0/0/04       X       X     [X]       -       #       -       -       -       -
  0/0/0/05       X       X     [X]       -       -       -       -       -       -
  0/0/0/06       X       X     [X]       -       #       -       -       -       -
  0/0/0/07       X       X     [X]       -       -       -       -       -       -
  0/0/0/08       X       X     [X]       -       #       -       -       -       -
  0/0/0/09       X       X     [X]       -       -       -       -       -       -
  0/0/0/10       X       X     [X]       -       -       -       -       -       -
  0/0/0/11       X       X     [X]       -       -       -       -       -       -
  0/0/0/12       X       X     [X]       -       -       -       -       -       -
  0/0/0/13       X       X     [X]       -       -       -       -       -       -
  0/0/0/14       X       X     [X]       -       -       -       -       -       -
  0/0/0/15       X       X     [X]       -       -       -       -       -       -
  0/0/0/16       X       X     [X]       -       -       -       -       -       -
  0/0/0/17       X       X     [X]       -       -       -       -       -       -
  0/0/0/18       X       X     [X]       -       -       -       -       -       -
  0/0/0/19       X       X     [X]       -       -       -       -       -       -
  0/0/0/20       X       X     [X]       -       -       -       -       -       -
  0/0/0/21       X       X     [X]       -       -       -       -       -       -
  0/0/0/22       X       X     [X]       -       -       -       -       -       -
  0/0/0/23       X       X     [X]       -       -       -       -       -       -
  0/0/0/24       X       X     [X]       -       -       -       -       -       -
  0/0/0/25       X       X     [X]       -       -       -       -       -       -
  0/0/0/26       X       X     [X]       -       -       -       -       -       -
  0/0/0/27       X       X     [X]       -       -       -       -       -       -
  0/0/0/28       X       X     [X]       -       -       -       -       -       -
  0/0/0/29       X       X     [X]       -       -       -       -       -       -
  0/0/0/30       X       X     [X]       -       -       -       -       -       -
  0/0/0/31       X       X     [X]       -       -       -       -       -       -
  0/0/0/32       X       X     [X]       -       -       -       -       -       -
  0/0/0/33       X       X     [X]       -       -       -       -       -       -

#: Mandatory de-provisioning dependency details:
================================================
  Port           Bandwidth        De-provision ports      Configuration
-------------------------------------------------------------------------------
0/0/0/01         300GigE          0/0/0/07, 0/0/0/09      no speed 50G
0/0/0/01         400GigE          0/0/0/03, 0/0/0/05,     no speed 50G
                                  0/0/0/07, 0/0/0/09
0/0/0/02          50GigE          0/0/0/03                speed none/speed 50G
0/0/0/03     1GigE,10GigE,25G     0/0/0/02                no speed 50G
0/0/0/03          50GigE          0/0/0/01                speed 40G/speed 100G/speed 200G
0/0/0/04          50GigE          0/0/0/05                speed none/speed 50G
0/0/0/05     1GigE,10GigE,25G     0/0/0/04                no speed 50G
0/0/0/05          50GigE          0/0/0/01                speed 40G/speed 100G/speed 200G
0/0/0/06          50GigE          0/0/0/07                speed none/speed 50G
0/0/0/07     1GigE,10GigE,25G     0/0/0/06                no speed 50G
0/0/0/07          50GigE          0/0/0/01                speed 40G/speed 100G/speed
200G/speed 300G
0/0/0/08          50GigE          0/0/0/09                speed none/speed 50G
0/0/0/09     1GigE,10GigE,25G     0/0/0/08                no speed 50G
0/0/0/09          50GigE          0/0/0/01                speed 40G/speed 100G/speed
200G/speed 300G
```

show controllers (SONET)

To display the SONET controller details, use the **show controllers** command in XR EXEC mode.

show controllers *controller-type r/s/i/p* [**description** | **periodic** | **pm** | **summary** | **xgxs**]

Syntax Description

controller-type	Specifies the type of SONET interface whose status and configuration information you want to display. The available options are: • OC48 • OC192
r/s/i/p	Specifies the Rack/Slot/Instance/Port number of the controller.
all	Displays detailed information for the specified interface.
description	Displays information for the specified interface.
periodic	Displays performance monitoring data periodically.
pm	Displays otu performance monitoring.
xgxs	Displays information about the 10 Gigabit Ethernet Extended Sublayer (XGXS).

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.2.1	This command is introduced.
Release 7.7.1	Support for **OC48** option was introduced.

Usage Guidelines

This command display a valid output for the specified interface only if WAN-PHY is enabled on that interface or on NC55-OIP-02 MPA.

Note The OC48 option is supported only on NC55-OIP-02 MPA.

Example

This sample show command displays the OC192 parameters for an interface at location 0/0/1/10:

```
RP/0/RP0/CPU0:ios#show controllers OC192 0/0/1/10
Port OC1920/0/1/10:


 Status:
 Primary State: Up
 Configured Sec admin State: Normal
 Inherited Sec admin State: Normal
 Derived State: In Service
 performace_monitoring enabled

Loopback: None

SECTION
  LOF = 0          LOS    = 0          TIM-S = 0          BIP(B1) = 0
Overhead
J0 Transmit:    (0)
J0 Receive:     (0)
J0 Expected:    (0)

LINE
  AIS = 0          RDI    = 0          FEBE = 0          BIP(B2) = 0

Last clearing of "show controllers SONET" counters never

Detected Alarms: None
Masked Alarms: None
Detected Alerts: None
Masked Alerts: None

Framing: SONET
BER thresholds:  SF = 1.0E-3  SD = 1.0E-6
TCA thresholds:  B1 = 1.0E-6  B2 = 1.0E-6
  Clock source: internal (actual) line (configured)
```

show controller STS192c

To display the STS192c controller details, use the **show controllers STS192c** command in XR EXEC mode.

show controllers STS192c

Syntax Description

STS192c	Specifies SONET STS-192c format for mapping Ethernet frames into SONET.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.2.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

This sample show command displays the STS192c parameters for an interface at location 0/0/1/10:

```
RP/0/RP0/CPU0:router#show controllers STS192c 0/0/1/10

 Primary State: Up

 Sec Admin State: Normal

 Derived State: In Service

PATH
  FEBE   = 0          BIP(B3) = 0
  NEWPTR = 0          PSE    = 0          NSE  = 0
Detected Alarms:       None

Mask for Detected->Asserted:      None

Detected Alerts: None
Mask for Detected->Reported: None
Payload Scrambling: Disabled
C2 State: Stable   C2_rx = 0x0 (0)   C2_tx = 0x0 (0) / Scrambling Derived
B3 = 10e-6
Overhead J1
Transmit        : (0)
Received        : (0)
Expected        : (0)

 performace_monitoring enabled
```

show controllers (SDH)

To display the SDH controller details, use the **show controllers** command in XR EXEC mode.

show controllers *controller-type r/s/i/p* [**description** | **periodic** | **pm** | **summary** | **xgxs**]

Syntax Description

controller-type	Specifies the type of SDH interface whose status and configuration information you want to display. The available options are: • STM16 • STM64
r/s/i/p	Specifies the Rack/Slot/Instance/Port number of the controller.
all	Displays detailed information for the specified interface.
description	Displays information for the specified interface.
periodic	Displays performance monitoring data periodically.
pm	Displays otu performance monitoring.
xgxs	Displays information about the 10 Gigabit Ethernet Extended Sublayer (XGXS).

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.2.2	This command was introduced.
Release 7.7.1	Support for **STM16** option was introduced.

Usage Guidelines

The **STM16** option is supported only on NC55-OIP-02 MPA.

Example

This sample show command displays the STM64 parameters for an interface at location 0/0/2/1:

```
RP/0/RP0/CPU0:router#show controllers STM64 0/0/2/1

 Mon Dec  7 11:13:31.697 UTC


Port STM640/0/2/1:
```

```
Status:
 Primary State: Down

 Configured Sec admin State: Normal

 Inherited Sec admin State: Normal

 Derived State: In Service

 performace_monitoring enabled

Loopback: None

REGENERATOR SECTION
  LOF = 1          LOS    = 0          RS-TIM = 0     RS-BIP = 0
Overhead
J0 Transmit:    (0)
J0 Receive:     (0)
J0 Expected:    (0)

MULTIPLEX SECTION
  AIS = 0          RDI    = 0          FEBE = 0          MS-BIP  = 0

Last clearing of "show controllers SDH" counters never

Detected Alarms: LOF
Masked Alarms: None
Detected Alerts: None
Masked Alerts: None

Framing: SDH
BER thresholds:  SF = 1.0E-3  SD = 1.0E-6
TCA thresholds:  B1 = 1.0E-6  B2 = 1.0E-6
  Clock source: internal (actual) line (configured)
```

This sample show command displays the STM16 parameters for an interface at location 0/0/3/4:

```
RP/0/RP0/CPU0:router#show controllers STM16 0/0/3/4
Tue Jul 19 12:13:14.626 IST


Port STM160/0/3/4:

Status:
 Primary State: Up

 Configured Sec admin State: Maintenance

 Inherited Sec admin State: Normal

 Derived State: Maintenance

 LED state: Green On

 performace_monitoring enabled

Loopback: None

REGENERATOR SECTION
  LOF = 1          LOS    = 0          RS-TIM = 1     RS-BIP = 0
Overhead
J0 Transmit:    (0)
J0 Receive:     0x1(1)
J0 Expected:    0x1(1)
```

```
MULTIPLEX SECTION
  AIS = 0          RDI    = 0          FEBE = 0          MS-BIP  = 0

Last clearing of "show controllers SDH" counters never

Detected Alarms: None
Masked Alarms: None
Detected Alerts: None
Masked Alerts: None

Framing:
BER thresholds:  SF = 1.0E-3  SD = 1.0E-6
TCA thresholds:  B1 = 1.0E-6  B2 = 1.0E-6
  Clock source: internal (actual) None (configured)

PRBS details:
        Status       : Not Running
        Mode         : None
        Pattern      : None
        Framing      : None
        Direction    : None
        Error Inject : None
        User-pattern : 0x0
```

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 7.10.1	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
```



Global Interface Commands

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

Note

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

This module describes the global command line interface (CLI) commands for configuring interfaces on the Cisco NCS 5500 Series RouterCisco NCS 540 Series Router.

For detailed information about Global interfaces concepts, configuration tasks, and examples, refer to the *Interface and Hardware Component Configuration Guide for Cisco NCS 5500 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 540 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 560 Series Routers*

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bandwidth (global)

To configure the bandwidth of an interface, use the **bandwidth** command in interface configuration mode.

bandwidth *rate*

Syntax Description

rate	Amount of bandwidth to be allocated on the interface, in Kilobits per second (kbps). Range is from 0 through 4294967295.

Command Default

The default bandwidth depends on the interface type.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

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 HundredGigE Ethernet interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router# interface HundredGigE 0/4/0/0
RP/0/RP0/CPU0:router# bandwidth 4000000
```

cfm delay measurement

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 XR EXEC mode.

ethernet sla on-demand operation type cfm-delay-measurement-v0 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**}] [**packet size** *bytes* [**test pattern hex 0x** *HHHHHHHH*]] **domain** *domain_name* **source interface** *type interface-path-id* **target** {**mac-address H.H.H.H** | **mep-id** *id_number*} [**statistics measure** {**one-way-delay-ds** | **one-way-delay-ds** | **one-way-jitter-ds** | **one-way-jitter-sd** | **round-trip-delay** | **round-trip-jitter**} [**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.
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

XR EXEC mode

Command History

Release	Modification
Release 6.3.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

This example shows how to 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/RP0/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
```

cfm synthetic loss measurement

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 (#)

Command History

Release	Modification
Release 6.3.1	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 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/RP0/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
```

clear interface

To clear interface statistics or packet counters, use the **clear interface** command in XR EXEC mode.

clear interface *type interface-path-id*

Syntax Description

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

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	execute
basic-services	read, write

Examples

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

```
RP/0/RP0/CPU0:router# clear interface loopback 2
```

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 6.3.1	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 run the **clear ethernet udld statistics** command for an interface:

```
RP/0/RP0/CPU0:routerclear ethernet udld statistics interface GigabitEthernet
 0/1/0/1
```

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 6.0	This command was introduced.

Usage Guidelines

Event dampening suppresses a constantly unstable interface until it remains stable for a period of time. Enabling dampening on an interface that already has dampening configured has the effect of resetting the penalty associated with that interface to zero. The reuse threshold must always be less than the suppress threshold.

Consider the following guidelines when configuring event dampening:

- Configuring dampening on both a subinterface and its parent is usually unnecessary because their states are almost always the same and dampening would be triggered at the same time on each interface.
- If all subinterfaces require dampening, then apply dampening to the main interface only. Applying configuration to large numbers of subinterfaces requires an abundance of memory and increases the time required to process the configuration during boot and failover.

- When dampening is enabled, an interface has a penalty value associated with it. The value starts at 0 and is increased by 1000 whenever the underlying state of the interface changes from up to down.
- The penalty value decreases exponentially while the interface state is stable. If the penalty value exceeds a configured suppress threshold, then the state of the interface is suppressed and IM will not notify upper layers of further state transitions. The suppressed state remains until the penalty value decreases past a configured reuse threshold.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enable dampening with default values on an interface:

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

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 6.3.1	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 run the **ethernet udld reset interface** command:

```
RP/0/RP0/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 6.3.1	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/RP0/CPU0:router(config)# interface gigabitethernet 0/0/0/0
RP/0/RP0/CPU0:router(config-if)# ethernet uni id PE1-CustA-Slot0-Port0
```

hw-module irb

To enable the two-pass model for IRB/BVI, use the **hw-module irb** command in the global configuration mode with suitable keywords to denote the specific forwarding flow. To disable two-pass model and default to single-pass model, use the **no**form of the command.

hw-module irb { **L2-L3** | **L3-L2** } **2-pass**

Syntax Description

irb	Configures IRB forwarding model.
L2-L3	Specifies IRB Layer 2 to Layer 3 forwarding options.
L3-L2	Specifies IRB Layer 3 to Layer 2 forwarding options.
2-pass	Configures IRB processing to two-pass model on ingress.

Command Default

The command is not enabled by default and the single-pass model is used for IRB processing.

Command Modes

Global Interface Configuration

Command History

Release	Modification
Release 7.9.1	This command was introduced.

Usage Guidelines

The VRRP over BVI traffic is not supported with IRB processing to two-pass model on ingress.

To activate the new IRB model, you must manually reload the chassis or all line cards after running the command.

Task ID

Task ID	Operation
config-services	read, write
root-lr	read, write

In the following example, two-pass model is configured for L3-L2 forwarding flow.

```
RP/0/(config)hw-module irb L3-L2 2-pass
```

mtu

To adjust the maximum transmission unit (MTU) value for packets on an interface, use the **mtu** command in interface configuration mode.

To return 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
- Tunnel—1500 bytes
- Loopback—1514 bytes

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

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

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

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

The Ethernet interface is the Layer 3 datagram plus 14 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.

Task ID

Task ID	Operations
interface	read, write

Examples

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

```
RP/0/RP0/CPU0:router# show interfaces all brief

                Intf        Intf         LineP              Encap  MTU       BW
                Name        State        State               Type (byte)   (Kbps)
--------------------------------------------------------------------------------
                 Nu0          up           up               Null  1500   Unknown
           HundredGigE0/6/0/0     up           up               HDLC  4474   2488320
           HundredGigE0/6/0/1     up           up               HDLC  4474   2488320
           HundredGigE0/6/0/2   admin-down   admin-down         HDLC  4474   2488320
           HundredGigE0/6/0/3   admin-down   admin-down         HDLC  4474   2488320


RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/6/0/0
RP/0/RP0/CPU0:router(config-if)# mtu 1000
```

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**}
no profile *profile-name*

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 6.3.1	This command 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/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# ethernet sla
RP/0/RP0/CPU0:router(config-sla)# profile  Prof1  type  cfm-loopback
RP/0/RP0/CPU0:router(config-sla-prof)#
```

propagate-remote-status

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

propagate-remote-status [**restore-timer** *interval*]

Syntax Description

restore-timer *interval*	(Optional) Sets the restore timer, which is started after the fault is cleared. After expiry of the timer, the link is brough back up. The interval ranges from 1 to 3600000 milliseconds.

Command Default

3.5 * CCM packet interval is the default restore timer.

Command Modes

Interface CFM MEP configuration

Command History

Release	Modification
Release 25.4.1	A new keyword, **restore-timer**, was added to the command.
Release 7.5.1	This command was introduced.

Usage Guidelines

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

If you have not configured **propagate-remote-status restore-timer**, link loss forwarding uses the default restore timer which is 3.5 times the configured CCM packet interval.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to use the command on an interface with the default restore timer (3 * CCM packet interval).

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

This example shows how to configure the restore timer.

```
Router# configure
Router(config)# interface GigabitEthernet0/2/0/0
Router(config-if)# ethernet cfm
Router(config-if-cfm)# mep domain dom1 service ser1 mep-id 1
Router(config-if-cfm-mep)# propagate-remote-status restore-timer 3600
```

replace

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

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

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

Syntax Description

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

Command Default

No default behavior or values.

Command Modes

Global ConfigurationXR Config

Command History

Release	Modification
Release 7.0.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

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 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
```

show ethernet cfm interfaces

To display Link Loss Forwarding (LLF) information, use the **show ethernet cfm interfaces** command in XR EXEC mode.

show ethernet cfm interfaces [*interface*] **llf** [**location** *node*]

Syntax Description

interface	Specifies the interface on which you want to enable llf.
llf	Allows you to enable llf on a location.
location	Specifies the location.

Command Default

None

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 7.5.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This sample output displays an LLF summary:

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

   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              F - CSF received


GigabitEthernet0/1/0/0
  MEP Defects                           Restore Timer
----- ---------------------------------- --------------
  100 R                             Not running
  101 None       10s remaining
  102 RPF                               Not running

GigabitEthernet0/1/0/1
```

```
  MEP Defects                           Restore Timer
----- ---------------------------------- --------------
  110 None        3s remaining

GigabitEthernet0/1/0/2
  MEP Defects                           Restore Timer
----- ---------------------------------- --------------
  120 P                Not running
```

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 6.3.1	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 a sample output of the **show ethernet udld interfaces** command:

```
RP/0/RP0/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/RP0/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 9: 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.

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 6.3.1	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 a sample output of the **show ethernet udld statistics** command:

```
RP/0/RP0/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
```

show im dampening

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

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

Syntax Description

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

Command Default

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

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

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

The physical hardware (layer 1) is not the only part of an interface that can change state. L2 keepalive failure event is one of the many instances that can have a similar impact on routing protocols despite the underlying interface state staying UP. To take account of such events, when dampening is configured on an interface, it is applied independently to every layer. They all use the same parameters as the interface but they have their own penalty value which is incremented when that layer changes state.

Capsulations that may be dampened in this way include:

- L3 capsulations (for example ipv4, ipv6). These may be brought down if another link has a conflicting IP address configured.

Task ID

Task ID	Operations
interface	read

Examples

This example shows the output from the **show im dampening** command issued with default values:

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/4/0/0
RP/0/RP0/CPU0:router(config-if)# no shutdown
RP/0/RP0/CPU0:router(config-if)# dampening
RP/0/RP0/CPU0:router# show im dampening

Interface              Proto             Caps              Penalty Suppressed

---------              -----             ----              ----------------
```

```
HundredGigE0/4/0/0              0                   0                   0       NO

RP/0/RP0/CPU0:router# show im dampening interface HundredGigE 0/4/0/0

HundredGigE0/4/0/0 (0x05000d00)
Dampening enabled: penalty 0, not suppressed
  underlying state: Up
  half_life: 1        reuse:             750
  suppress:  3000     max-suppress-time: 4
  restart-penalty:   0

RP/0/RP0/CPU0:router# show interfaces HundredGigE 0/4/0/0

HundredGigE0/4/0/0 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
```

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 10: 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.

Field	Description
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.

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 XR 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

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The **show interfaces** command displays statistics, state and other information such as mac address etc. for the network interfaces.

For example, if you type the **show interfaces** command without an interface type, you receive information for all the interfaces installed in the networking device. Only by specifying the interface *type*, *slot*, and *port* arguments can you display information for a particular interface.

If you enter a **show interfaces** command for an interface type that has been removed from the networking device, an error message is displayed: “Interface not found.”

The output displayed depends on the network for which an interface has been configured.

Note Executing **show interfaces** command without filters obtains and displays interface statistics for all interfaces. Hence, it is recommended to execute the command with filters to select specific interfaces or interface types of interest for a faster response. Executing **show interfaces** with options **brief** or **sparse** excludes interface statistics thus providing a faster response.

Note The 5-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average is within 2 percent of the instantaneous rate of a uniform stream of traffic over that period.

Task ID

Task ID	Operations
interface	read

Examples

This example shows the output from the **show interfaces** command. The output displayed depends on the type and number of interface cards in the networking device.

```
Router# show interfaces HundredGigE 0/3/0/35

HundredGigE0/3/0/35 is up, line protocol is up
  Interface state transitions: 1
  Hardware is HundredGigE, address is e666.9aa0.223c (bia e666.9aa0.223c)
  Description: **To RouterX Hu0/7/0/2**
  Internet address is 192.168.1.29/30
  MTU 1514 bytes, BW 100000000 Kbit (Max: 100000000 Kbit)
     reliability 255/255, txload 239/255, rxload 238/255
  Encapsulation ARPA,
  Full-duplex, 100000Mb/s, unknown, link type is force-up
  output flow control is off, input flow control is off
  Carrier delay (up) is 10 msec
  loopback not set,
  Last link flapped 3w3d
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:00:00, output 00:00:00
  Last clearing of "show interface" counters never
  30 second input rate 93725392000 bits/sec, 32528692 packets/sec
  30 second output rate 93726416000 bits/sec, 32527860 packets/sec
     68118736643563 packets input, 24783244282360579 bytes, 0 total input drops
     0 drops for unrecognized upper-level protocol
     Received 0 broadcast packets, 0 multicast packets
              0 runts, 0 giants, 0 throttles, 0 parity
     174 input errors, 174 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     68115867305777 packets output, 24782409845763776 bytes, 0 total output drops
     Output 0 broadcast packets, 0 multicast packets
     0 output errors, 0 underruns, 0 applique, 0 resets
     0 output buffer failures, 0 output buffers swapped out
     0 carrier transitions
```

This example shows bundle member links whose link interface status is “err-disable” and line protocol state is “admin-down” after the bundle interface has been administratively shut down using the **shutdown** command:

```
Router# show interfaces brief

Thu May  6 06:30:55.797 DST

               Intf       Intf        LineP              Encap  MTU        BW
               Name       State       State               Type (byte)    (Kbps)
```

```
--------------------------------------------------------------------------------
              BE10        down        down               ARPA  1514          0
             BE100          up          up               ARPA  1514  100000000
             BE101          up          up               ARPA  1514  100000000
               Lo0          up          up           Loopback  1500          0
               Nu0          up          up               Null  1500          0
         Fo0/3/0/26  admin-down  admin-down               ARPA  1514   40000000
          Hu0/3/0/0  admin-down  admin-down               ARPA  1514  100000000
          Hu0/3/0/1  admin-down  admin-down               ARPA  1514  100000000
          Hu0/3/0/2  admin-down  admin-down               ARPA  1514  100000000
          Hu0/3/0/3  admin-down  admin-down               ARPA  1514  100000000
          Hu0/3/0/4  admin-down  admin-down               ARPA  1514  100000000
          Hu0/3/0/5  admin-down  admin-down               ARPA  1514  100000000
          Hu0/3/0/6  admin-down  admin-down               ARPA  1514  100000000
          Hu0/3/0/7  admin-down  admin-down               ARPA  1514  100000000
          Hu0/3/0/8  admin-down  admin-down               ARPA  1514  100000000
          Hu0/3/0/9  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/10  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/11  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/12  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/13        down        down               ARPA  1514  100000000
         Hu0/3/0/14          up          up               ARPA  1514  100000000
         Hu0/3/0/15          up          up               ARPA  1514  100000000
         Hu0/3/0/16  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/17  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/18          up          up               ARPA  1514  100000000
         Hu0/3/0/19          up          up               ARPA  1514  100000000
         Hu0/3/0/20  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/21  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/22  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/23  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/24          up          up               ARPA  1514  100000000
         Hu0/3/0/25  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/27  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/28  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/29  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/30  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/31  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/32  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/33  admin-down  admin-down               ARPA  1514  100000000
         Hu0/3/0/34        down        down               ARPA  1514  100000000
         Hu0/3/0/35          up          up               ARPA  1514  100000000
     Mg0/RP0/CPU0/0          up          up               ARPA  1514    1000000
     Mg0/RP1/CPU0/0          up          up               ARPA  1514    1000000
```

This example shows the output from the **show interfaces** *interface-path-id* **sparse** command.

```
Router#show interfaces gigabitEthernet 0/1/0/0 sparse
Wed Apr 5 18:05:34.000 IST

Interface name : GigabitEthernet0/1/0/0
Operational state : administratively down
Admin state : administratively down
MAC address : 02:7d:42:e9:bd:36
Burned In Address : 027d.42e9.bd36
IPv4 Address : 2.2.2.2/24
Max. Bandwidth (Kbit) : 1000000
Effective Bandwidth (Kbit) : 1000000
MTU (in bytes) : 1514
Duplexity : Full-duplex
Link type : force-up
```

Table 11: 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.
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.

Field	Description
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.
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.

Field	Description
loopback or controller loopback	Indicates whether the hardware has been configured to be looped back. **Note** Enter the **loopback** command to configure the loopback or controller loopback.
keepalive	Displays the configured keepalive value, in seconds. **Note** Enter the **keepalive** command to configure the value of the keepalive field. **Note** The *keepalive* field may not be present if it is not applicable to the interface type.
Duplexity	Displays the duplexity of the link. **Note** This field is present only for shared media. **Note** For some interface types, you can configure the duplexity by entering the **full-duplex** and **half-duplex** commands.
Speed	Speed and bandwidth of the link in Mbps. This field is present only when other parts of the media info line are also displayed (see duplexity and media type).
Media Type	Media type of the interface.
output flow control	Whether output flow control is enabled on the interface.
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*.

Field	Description
Input rate	Average number of bits and packets received per second during the load-interval. If the interface is not in promiscuous mode, it senses network traffic that it sends and receives (rather than all network traffic). **Note** Load duration is based on load-interval configured under the interface. The default load duration is 5 minutes, if load-interval is not configured under the interface. **Note** The input rate should be used only as an approximation of traffic per second during a given load duration. This rate is exponentially weighted average with a time constant of load duration. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
packets input	Number of packets received on the interface that were successfully delivered to higher layers.
bytes input	Total number of bytes successfully received on the interface. **Note** This does not include FCS bytes.
total input drops	Total number of packets that were dropped after they were received. This includes packets that were dropped due to configured quality of service (QoS) or access control list (ACL) policies. This does not include drops due to unknown Layer 3 protocol.
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.

Field	Description
giants	Number of received packets that were too large to be handled. This is a subset of the input errors count.
throttles	Number of packets dropped due to throttling (because the input queue was full).
parity	Number of packets dropped because the parity check failed.
input errors	Total number of received packets that contain errors and hence cannot be delivered. Compare this to total input drops, which counts packets that were not delivered despite containing no errors.
CRC	Number of packets that failed the CRC check.
frame	Number of packets with bad framing bytes.
overrun	Number of overrun errors experienced by the interface. Overruns represent the number of times that the receiver hardware is unable to send received data to a hardware buffer because the input rate exceeds the receiver's ability to handle the data.
ignored	Total number of ignored packet errors. Ignored packets are those that are discarded because the interface hardware does not have enough internal buffers. Broadcast storms and bursts of noise can result in an increased number of ignored packets.
abort	Total number of abort errors on the interface.
packets output	Number of packets received on the interface that were successfully delivered to higher layers.
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.

Field	Description
output errors	Number of times that the receiver hardware was unable to handle received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
underruns	Number of underrun errors experienced by the interface. Underruns represent the number of times that the hardware is unable to transmit data to a hardware buffer because the output rate exceeds the transmitter’s ability to handle the data.
applique	Number of applique errors.
resets	Number of times that the hardware has been reset. The triggers and effects of this event are hardware-specifc.
output buffer failures	Number of times that a packet was not output from the output hold queue because of a shortage of MEMD shared memory.
output buffers swapped out	Number of packets stored in main memory when the output queue is full; swapping buffers to main memory prevents packets from being dropped when output is congested. The number is high when traffic is bursty.
carrier transitions	Number of times the carrier detect (CD) signal of a serial interface has changed state.

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 6.0	This command was introduced.

Usage Guidelines

Use the **shutdown** command to move the state of an interface to administratively down, which stops traffic flowing through the interface. This state does not stop other action from happening on the interface such as changes in configuration, protocols, capsulations, and so forth.

The **shutdown** command also marks the interface as unavailable. To check whether the state of an interface is down, use the **show interfaces** command in XR 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, HundredGigE interface 0/4/0/2 is turned off:

```
RP/0/RP0/CPU0:router(config)#  interface HundredGigE 0/4/0/2
RP/0/RP0/CPU0:router(config-if)# shutdown
```



GRE Tunnel Interface Commands

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

Note

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

This module describes the command line interface (CLI) commands for configuring GRE tunnel interfaces on the Cisco NCS 5500 Series RoutersCisco NCS 540 Series Routers.

For information on configuring GRE tunnels, see the *Interface and Hardware Component Configuration Guide for Cisco NCS 5500 Series Routers*.

- interface tunnel-ip, on page 209
- hw-module profile gue , on page 210
- keepalive, on page 212
- tunnel destination, on page 213
- tunnel dfbit , on page 214
- tunnel mode, on page 216
- tunnel source, on page 217
- tunnel tos, on page 218
- tunnel ttl, on page 220
- tunnel vrf, on page 222

interface tunnel-ip

Configures an IP-in-IP tunnel interface.

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

interface tunnel-ip *id*
no interface tunnel-ip *id*

Syntax Description

id	Specifies the tunnel interface identifier. Range is from 0 to 131070.

Command Default

None

Command Modes

XR Config mode

Release	Modification
Release 6.1.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure an IP-in-IP tunnel interface.

```
RP/0/RP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0/CPU0:router(config-if)# tunnel destination 50.10.1.2/32
```

hw-module profile gue

To configure unique GUE port numbers to decapsulate IPv4, IPv6, and MPLS packets using UDP, use the **hw-module profile gue udp-dest-port ipv4 <port number> ipv6 <port number> mpls <port number>** command in XR Config mode on the destination router.

hw-module profile gue udp-dest-port ipv4 *<port number>* **ipv6** *<port number>* **mpls** *<port number>*

Table 12: Command Description

Keyword	Description
gue	The UDP destination port configuration of the GUE decapsulation tunnel.
udp-dest-port	Configure separate UDP port numbers for IPv4, IPv6, and MPLS.
ipv4	Configure unreserved UDP port numbers for IPv4 payload. The supported range is from 1000 through 64000.
ipv6	Configure unreserved UDP port numbers for IPv6 payload. The supported range is from 1000 through 64000.
mpls	Configure unreserved UDP port numbers for MPLS payload. The supported range is from 1000 through 64000.

To remove this configuration, use the no prefix of the command:

```
no hw-module profile gue udp-dest-port ipv4 <port number> ipv6 <port number> mpls <port number>
```

Command Default

None

Command Modes

XR Config

Command History

Release	Modification
Release 7.3.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure unique GUE port numbers to decapsulate IPv4, IPv6, and MPLS packets using UDP.

```
Router(config)#hw-module profile gue udp-dest-port ipv4 1001 ipv6 1002 mpls 1003
```

keepalive

To enable keepalive for a tunnel interface, use the **keepalive** command. To remove keepalive, use the **no** form of this command.

keepalive [*time_in_seconds* [*retry_num*]]
no keepalive

Syntax Description

time_in_seconds	Specifies the frequency (in seconds) at which keepalive check is performed. The default is 10 seconds. The minimum value is 1 second.
retry_num	Specifies the number of keepalive retries before declaring that a tunnel destination is unreachable. The default is 3 retries. The minimum value is 1 retry.

Command Default

None

Command Modes

interface configuration

Command History

Release	Modification
Release 6.1.3	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.

Use the **keepalive** command to enable keepalive for a tunnel interface.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to configure interface tunnel:

```
router# configure
router(config)# interface tunnel-ip 400
router(config-if)# keepalive 30
```

tunnel destination

Configures the tunnel destination for the tunnel interface.

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

tunnel destination { *ipv4-address* | *ipv4 address/subnet-mask* | *ipv6-address* }
no tunnel destination { *ipv4-address* | *ipv4 address/subnet-mask* | *ipv6-address* }

Syntax Description

ipv4-address	Configures the specified IPv4 address as the destination IP for the tunnel interface.
ipv4-address/subnet mask	Configures the specified IPv4 address with subnet mask as the destination IP for the tunnel interface.
ipv6-address	Configures the specified IPv6 address as the destination IP for the tunnel interface.

Command Default

None

Command Modes

Tunnel interface configuration mode

Release	Modification
Release 6.1.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure an IPv4 address with subnet mask as the tunnel destination for an IP-in-IP tunnel interface.

```
RP/0/RP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0/CPU0:router(config-if)# tunnel destination 50.10.1.2/32
```

tunnel dfbit

To configure the DF bit setting in the tunnel transport header, use the **tunnel dfbit** command. To revert to the default DF bit setting value, use the **no** form of this command.

tunnel dfbit { **disable** | **copy** }
no tunnel dfbit

Syntax Description

disable	Disables the DF bit in the outer packet. This allows the outer packet to be fragmented, if required.
copy	Copies the DF bit value from the inner packet to the outer packet. **Note** This is valid only for an IPv4 transport network in an IP in IP tunnel.

Command Default

The DF bit value in the outer packet is disabled. This allows outer packet fragmentation, if required.

Command Modes

interface configuration

Command History

Release	Modification
Release 6.1.3	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.

Copying the DF bit value from the inner packet to the outer packet is only supported for an IPv4 transport network in an IP in IP tunnel. If **copy** option is configured, you cannot configure an IP in IP tunnel over an IPv6 transport network.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to enable fragmentation over an interface tunnel.

```
router# configure
router(config)# interface tunnel-ip 400
router(config-if)# tunnel dfbit disable
```

Related Commands

Command	Description
tunnel destination, on page 213	Configures the tunnel destination for the tunnel interface.

Command	Description
tunnel mode, on page 216	Configures the mode of encapsulation for the tunnel interface.
tunnel source, on page 217	Configures the source IP address for a tunnel interface.
tunnel tos, on page 218	Specifies the value of the TOS field in the tunnel encapsulating packets.
tunnel ttl, on page 220	Configures the Time-To-Live (TTL) for packets entering the tunnel.
tunnel vrf, on page 222	

tunnel mode

Configures the mode of encapsulation for the tunnel interface.

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

tunnel mode [**gre** | **ipsec**] **ipv4** [**decap** | **encap**]
no tunnel mode [**gre**] **ipv4** [**decap** | **encap**]

Syntax Description

tunnel mode gre	Configures IP-over-GRE encapsulation for the tunnel interface.
tunnel mode ipsec ipv4	Configures generic packet tunneling over IPv4 encapsulation for the tunnel interface.
tunnel mode gre ipv4	Configures GRE-over-IPv4 encapsulation for the tunnel interface.
tunnel mode ipsec ipv4	Configures IPSec feature for the tunnel interface.
decap	Configures the IP-in-IP or GRE tunnel to be used only for decapsulation.
encap	Configures GRE Single-Pass over IPv4.

Command Default

None

Command Modes

Tunnel interface configuration mode

Release	Modification
Release 7.8.1	The **ipsec** keyword was introduced.
Release 6.1.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure the tunnel mode for an IP-in-IP tunnel interface.

```
RP/0/RP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0/CPU0:router(config-if)# tunnel destination 50.10.1.2/32
```

Related Topics

Configuring GRE Tunnels

tunnel source

Configures the source IP address for a tunnel interface.

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

tunnel source { **direct** | *ipv4-address* | *interface-type interface-number* }
no tunnel source { *ipv4-address* | *interface-type interface-number* }

Syntax Description

ipv4-address	Configures the specified IPv4 address as the source IP for the tunnel interface.
interface-type interface-number	Configures the specified interface type as the source for the tunnel interface.
direct	Allows you to decapsulate tunnels on any L3 interface on the router.

Command Default

None

Command Modes

Tunnel interface configuration mode

Release	Modification
Release 6.1.3	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Example

The following example shows how you can configure the Loopback 0 interface as the tunnel source for an IP-in-IP tunnel interface.

```
RP/0/RP0/CPU0:router(config)# interface tunnel-ip 10
RP/0/RP0/CPU0:router(config-if)# ipv4 unnumbered loopback 20
RP/0/RP0/CPU0:router(config-if)# tunnel mode ipv4 decap
RP/0/RP0/CPU0:router(config-if)# tunnel source loopback 0
RP/0/RP0/CPU0:router(config-if)# tunnel destination 50.10.1.2/32
```

This example shows how to configure IP-in-IP tunnel decapsulation on directly connected IP addresses:

```
Router# configure terminal
Router(config)#interface Tunnel4
  Router(config)#tunnel mode ipv4 decap
  Router(config)#tunnel source direct
  Router(config)#no shutdown
```

tunnel tos

To specify the value of the TOS field in the tunnel encapsulating packets, use the **tunnel tos** command. To return to the default TOS value, use the **no** form of this command.

tunnel tos *tos_value*
no tunnel tos *tos_value*

Syntax Description

tos_value	Specifies the value of the TOS field in the tunnel encapsulating packets. The TOS value ranges between 0 to 255.

Command Default

Copies the TOS/COS bits of the internal IP header to the GRE IP header. In case of labeled payload, EXP bits are copied to TOS bits of the GRE IP header.

Command Modes

interface configuration

Command History

Release	Modification
Release 6.1.3	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	Operations
interface	read, write

Examples

The following example shows how to configure interface tunnel:

```
router# configure
router(config)# interface tunnel-ip 400
router(config-if)# tunnel tos 100
```

Related Commands

Command	Description
tunnel destination, on page 213	Configures the tunnel destination for the tunnel interface.
tunnel dfbit , on page 214	Configures the DF bit setting in the tunnel transport header.
tunnel mode, on page 216	Configures the mode of encapsulation for the tunnel interface.
tunnel source, on page 217	Configures the source IP address for a tunnel interface.

Command	Description
tunnel ttl, on page 220	Configures the Time-To-Live (TTL) for packets entering the tunnel.
tunnel vrf, on page 222	

tunnel ttl

To configure the Time-To-Live (TTL) for packets entering the tunnel, use the **tunnel ttl** command. To undo the configuration, use the **no** form of this command.

tunnel ttl *ttl_value*
no tunnel ttl *ttl_value*

Syntax Description

ttl_value	Specifies the value of TTL for packets entering the tunnel. The TTL value ranges between 1 to 255.

Command Default

The default TTL value is set to 255.

Command Modes

interface configuration

Command History

Release	Modification
Release 6.1.3	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.

This command specifies the Time-To-Live for packets entering the tunnel so that the packets are not dropped inside the carrier network before reaching the tunnel destination.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to configure interface tunnel:

```
router# configure
router(config)# interface tunnel-ip 400
router(config-if)#tunnel source 10.10.10.1
```

Related Commands

Command	Description
tunnel destination, on page 213	Configures the tunnel destination for the tunnel interface.
tunnel dfbit , on page 214	Configures the DF bit setting in the tunnel transport header.
tunnel mode, on page 216	Configures the mode of encapsulation for the tunnel interface.

Command	Description
tunnel source, on page 217	Configures the source IP address for a tunnel interface.
tunnel tos, on page 218	Specifies the value of the TOS field in the tunnel encapsulating packets.
tunnel vrf, on page 222	

tunnel vrf

To specify the virtual routing and forwarding (VRF) instance of the interfaces of the tunnel endpoints, use the **tunnel vrf** command in tunnel interface configuration mode. To disassociate a VRF from the tunnel endpoints, use the **no** form of this command.

tunnel vrf *vrf-name*

Syntax Description

vrf-name	The name of the VRF instance.

Command Default

The tunnel addresses are looked up in the default VRF instance, that is, the global routing table.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.1.3	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.

Note The **tunnel vrf** command is not supported on Cisco NCS 540 Series Routers.

Task ID

Task ID	Operation
tunnel	read, write
interface	read, write

Example

The following example shows the tunnel "tunnel-ip1" endpoints associated with the VRF instance "blue".

```
RP/0/RSP0/CPU0:router(config)# interface tunnel-ip1
RP/0/RSP0/CPU0:router(config-if)# ipv4 address 10.3.3.3 255.255.255.0
RP/0/RSP0/CPU0:router(config-if)# keepalive 5 3
RP/0/RSP0/CPU0:router(config-if)# tunnel mode gre ipv4
RP/0/RSP0/CPU0:router(config-if)# tunnel source Loopback0
```

```
RP/0/RSP0/CPU0:router(config-if)# tunnel destination 10.5.5.5
RP/0/RSP0/CPU0:router(config-if)# tunnel vrf blue
```

Related Commands

Command	Description
tunnel destination, on page 213	Configures the tunnel destination for the tunnel interface.
tunnel dfbit , on page 214	Configures the DF bit setting in the tunnel transport header.
tunnel mode, on page 216	Configures the mode of encapsulation for the tunnel interface.
tunnel source, on page 217	Configures the source IP address for a tunnel interface.
tunnel tos, on page 218	Specifies the value of the TOS field in the tunnel encapsulating packets.
tunnel ttl, on page 220	Configures the Time-To-Live (TTL) for packets entering the tunnel.



Link Bundling Commands

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

Note

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

This module provides command line interface (CLI) commands for configuring Link Bundle interfaces on the Cisco NCS 5500 Series RouterCisco NCS 540 Series Router.

For detailed information about Link Bundle interfaces concepts, configuration tasks, and examples, refer to the *Interface and Hardware Component Configuration Guide for Cisco NCS 5500 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 540 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 560 Series Routers*

- bundle-hash, on page 227
- bundle id, on page 232
- bundle maximum-active links, on page 234
- bundle minimum-active bandwidth, on page 238
- bundle minimum-active links, on page 239
- bundle port-priority, on page 240
- clear lacp counters, on page 242
- hw-module profile load-balance algorithm, on page 244
- hw-module profile bundle-hash, on page 247
- interface (bundle), on page 250
- lacp packet-capture, on page 251
- lacp period short, on page 253
- lacp system priority, on page 255
- show bundle, on page 256
- show bundle brief, on page 268
- show lacp bundle-ether, on page 271
- show lacp packet-capture, on page 273
- show lacp system-id, on page 276

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 .

bundle-hash {**Bundle-Ether** *bundle-id* | **members** {**TenGigabitEthernet** | **HundredGigabitEthernet**} *interface-path-id*}

Syntax Description

Bundle-Ether *bundle-id*	Specifies an Ethernet bundle for which you want to calculate load balancing. Range is 1- 65535.
ibundle-id	Number from 1 to 65535 that identifies a particular bundle.
members	Identifies specific bundle member links for which you want to calculate load balancing.
TenGigE	Specifies the 10 Gigabit Ethernet interface for which you want to calculate load balancing.
HundredGigE	Specifies the 100 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.

Command Default

No default behavior or values

Command Modes

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

Bundle interface traffic is distributed over the various member links of a bundle according to a hash function. The **bundle-hash** command allows you to determine which bundle member link will carry a particular flow of traffic.

You can use the **bundle-hash** command to get these information:

- Which members are used for a specified source/destination address pair, such as 10.10.10.1 20.20.20.1
- The destination IP address for a specified source IP address on a specified member.
- The load balancing distribution–how many times the members of a bundle are used for a specified range of IP addresses.

The **bundle-hash** command does not display all possible IP addresses in an entire series. It stops displaying addresses after all the addresses for all the members of the bundle have been displayed once.

The **bundle-hash** command invokes a utility that initially prompts you to select some options. Based on the options you select, the utility prompts you more options to select. The initial options to select are as follows:

- L3/3-tuple or L4/7-tuple
- Single pair or Range
- IPv4 or IPv6

The **bundle-hash** command utility prompts you for these options as follows:

- Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4):
- Single SA/DA pair (IPv4,IPv6) or range (IPv4 only): S/R [S]:
- Enter bundle type IP V4 (1) or IP V6 (2):
- Enter source IP V4 address:
- Enter destination IP V4 address:
- Compute destination address set for all members? [y/n]:
- Enter subnet prefix for destination address set:
- Enter bundle IP V4 address [10.10.10.10]:

You may also be prompted to make further option choices depending on your selections.

You can use the **show bundle** command to get IP address information.

The below table provides a general summary of the options and the information you need to provide for each selected option. The actual information that you need to provide depends on the selections you make and may vary from the information provided in the below table.

Table 13: bundle-hash Command Options

Option	Information You Need to Provide
L3/3-tuple	L3 information: • Source IP address • Destination IP address • Destination subnet prefix • Bundle IP address
L4/7-tuple	L3 information: • Source IP address • Destination IP address • Protocol L4 information: • Source port • Destination port Platform-related information: • Router ID • Ingress interface

Option	Information You Need to Provide
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/RP0/CPU0:router# bundle-hash bundle-ether 28

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): l3
Single SA/DA pair (IPv4,IPv6) or range (IPv4 only): S/R [S]: s

Enter bundle type IP V4 (1) or IP V6 (2): 1
Enter source IP V4 address: 10.12.28.2
Enter destination IP V4 address: 10.12.28.1
Compute destination address set for all members? [y/n]: y
Enter subnet prefix for destination address set: 8
Enter bundle IP V4 address [10.12.28.2]: 10.12.28.2

Link hashed to is HundredGigE0/6/0/7

Destination address set for subnet 10.0.0.0:
  10.0.0.6 hashes to link HundredGigE0/1/0/0
  10.0.0.8 hashes to link HundredGigE0/6/0/5
  10.0.0.12 hashes to link HundredGigE0/6/0/6
  10.0.0.2 hashes to link HundredGigE0/6/0/7
  10.0.0.1 hashes to link HundredGigE0/1/0/1
```

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 28) using the 3-tuple hash algorithm, a range of source and destinations, and IPv4 addresses:

```
RP/0/RP0/CPU0:router# bundle-hash bundle-ether 28

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): 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 HundredGigE0/1/0/0 has 6 hits
Member HundredGigE0/6/0/5 has 2 hits
Member HundredGigE0/6/0/6 has 2 hits
Member HundredGigE0/6/0/7 has 9 hits
Member HundredGigE0/1/0/1 has 1 hits
```

The following example shows how to calculate load balancing across the members of a link bundle (bundle-ether 202) using the 7-tuple hash algorithm, a single source and destination, and IPv4 addresses:

```
RP/0/RP0/CPU0:router# bundle-hash bundle-ether 202

Specify load-balance configuration (L3/3-tuple or L4/7-tuple) (L3,L4): 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: [ TenGigE |  HundredGigE]R/S/I/P
  - bundle interface format:   [ Bundle-Ether]bundle-id
  Enter ingress interface: HundredGigE0/2/0/3

  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 HundredGigE0/3/0/6

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: [HundredGigE | TenGigE ]R/S/I/P
  - bundle interface format:   [ Bundle-Ether ]bundle-id
  Enter ingress interface [HundredgigE0/2/0/3]: HundredGigE0/2/0/3

  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 HundredGigE0/3/0/6

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 HundredGigE0/3/0/6
  S/D pair 172.20.180.167:1000/172.30.15.6:2000 hashes to link HundredGigE0/2/0/1
  S/D pair 172.20.180.167:1000/172.30.15.3:2000 hashes to link HundredGigE0/2/0/2
  S/D pair 172.20.180.167:1000/172.30.15.5:2000 hashes to link HundredGigE0/2/0/3

Another? [y]: n
```

bundle id

To add a port to an aggregated interface (or bundle), enter the **bundle id** command in interface configuration mode.

bundle id *bundle-id* [**mode** {**active** | **on** | **passive**}]
no bundle id *bundle-id*

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 6.0	This command was introduced.

Usage Guidelines

If you enter the **bundle id** command and specify a port that is already bound to a bundle, the port unbinds from the original bundle and becomes attached to the new bundle. If the bundle numbers are the same, then the port does not unbind, but the mode changes to mode you specified with the **bundle id** command.

Task ID

Task ID	Operations
bundle	read, write

Examples

This example shows how to add a port onto a bundle:

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# bundle id 1
```

This example shows how to add an active LACP port onto an aggregated interface (or bundle):

```
RP/0/RP0/CPU0:router(config)# interface TenGigE 0/6/0/1
RP/0/RP0/CPU0:router(config-if)# bundle id 5 mode active
```

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**
no bundle maximum-active links *links*

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 6.0	This command was introduced.

Usage Guidelines

By default, multiple links can actively carry traffic for a bundle. However, if one of the links fails, there is no dedicated standby link to take its place. The **bundle maximum-active links** command enables you to implement the optional 1:1 link protection, which means for the specified bundle, you designate one active link and one or more standby links that can take over immediately if the active link fails.

By setting the **bundle maximum-active links** command to 1, the highest-priority link within the bundle becomes active (distributing state) and the remaining links are in standby mode. If a standby link meets one of the following criteria, it is in the collecting state:

The 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 a standby link does not meet either of these criteria, it is in the waiting state.

The second highest-priority link within the bundle becomes the standby link that takes over immediately if the active link fails. The priority is based on the value from the **bundle port-priority** command, where a lower value is a higher priority. Therefore, you must configure the highest priority (lowest value) forthe link that you want to be active and the second-highest priority for the link that you want to act as a backup to the active link.



Note We recommend designating only one backup link to the active link. Although you can designate an additional backup link, maintaining two backup links consumes more bandwidth and offsets any benefits that may be gained.

Note If a link is not running LACP, the configuration of the **bundle maximum-active links** and **bundle port-priority** commands or equivalent commands must be the same on both ends of the link. If a link is running LACP, the configuration of the **bundle maximum-active links** command only must be the same on both ends of the link.

The **hot-standby** option of using an IEEE standard-based switchover (the default) or a faster proprietary optimized switchover is available only for active and standby links running LACP. For links not running LACP, the proprietary optimized switchover option is used.

When using one of the **hot-standby** options on a Cisco IOS XR device, the peer device must have a standby link configured and be one of the following:

- Another Cisco IOS XR device using the same option.
- Another device using an IEEE standard-based switchover. (Cisco does not recommend using this option because unexpected behavior, such as the peer sending traffic on the standby link, can occur.)

Task ID

Task ID	Operations
bundle	read, write

Examples

In the following example, the user implements 1:1 link protection for Ethernet bundle 5 and specifies that the proprietary optimization is used for the LACP-enabled active and standby links:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RP0/CPU0:router(config-if)# bundle maximum-active links 1 hot-standby
```

The following example shows how to set default values for timeouts, to avoid bundle-level flaps when the highest priority link fails or recovers:

```
RP/0/RP0/CPU0:router(config-if)# bundle maximum-active links 1 hot-standby
```

Examples

The following example shows how to display information about Ethernet bundle 5:

```
RP/0/RP0/CPU0:router(config)# show Bundle-Ether 5

State: 0 - Port is Detached. 1 - Port is Waiting.
       2 - Port is Attached. 3 - Port is Collecting.
       4 - Port is Distributing.

Bundle-Ether 5
                                Minimum active     Maximum active
  B/W (Kbps)   MAC address      Links  B/W (Kbps)  Links
  ----------   --------------   -----  ----------  -----
10000000001d.e5eb.2898111

  Port           State  Port ID          B/W (Kbps)  MAC address
```

```
  ------------   -----  --------------   ----------  ---------------
  Te0/1/0/1      4      0x8000, 0x0001     10000000  0000.abab.0001
  Te0/1/0/0      3      0x8000, 0x0002     10000000  0000.abab.0000
```

In the **show bundle bundle-ether 5** command output, the state of the active link is 4, which indicates that the port is distributing. The state of the standby link is 3, which indicates that the port is collecting.

Examples

In the following example, the user implements 1:1 link protection for Ethernet bundle 5 and does not specify the **hot-standby** keyword, because the user wants to use the default IEEE standard-based switchover on the LACP-enabled active and standby links:

```
RP/0/RP0/CPU0:router(config)# show Bundle-Ether 5


State: 0 - Port is Detached. 1 - Port is Waiting.
       2 - Port is Attached. 3 - Port is Collecting.
       4 - Port is Distributing.

Bundle-Ether 5
                               Minimum active     Maximum active
  B/W (Kbps)   MAC address      Links  B/W (Kbps)  Links
  ----------   --------------   -----  ----------  -----
10000000001d.e5eb.2898111

  Port           State     Port ID          B/W (Kbps)  MAC address
  ------------   -----  --------------   ----------  ---------------
  Te0/1/0/1      4      0x8000, 0x0001     10000000  0000.abab.0001
  Te0/1/0/0      1      0x8000, 0x0002     10000000  0000.abab.0000
```

In the **show bundle bundle-ether 5** command output, the state of the active link is 4, which indicates that the port is distributing. The state of the standby link is 1, which indicates that the port is waiting.

Examples

The following example, the user implements 1:1 link protection for Ethernet bundle 5 and does not specify the **hot-standby** keyword, because the LACP-disabled link automatically uses the proprietary optimized switchover:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RP0/CPU0:router(config-if)#
```

The following example shows how to display information about Ethernet bundle 5:

```
RP/0/RP0/CPU0:router# show bundle bundle-ether 5

State: 0 - Port is Detached. 1 - Port is Waiting.
       2 - Port is Attached. 3 - Port is Collecting.
       4 - Port is Distributing.

Bundle-Ether 5
                               Minimum active     Maximum active
  B/W (Kbps)   MAC address      Links  B/W (Kbps)  Links
  ----------   --------------   -----  ----------  -----
10000000001d.e5eb.2898111

  Port           State  Port ID          B/W (Kbps)  MAC address
  ------------   -----  --------------   ----------  ---------------
```

```
Te0/1/0/1       4       0x8000, 0x0001     10000000  0000.abab.0001
Te0/1/0/0       3       0x8000, 0x0002     10000000  0000.abab.0000
```

In the show bundle bundle-ether 5 command output, the state of the active link is 4, which indicates the port is distributing. The state of the standby link is 3, which indicates that the port is collecting.

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 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read, write

Examples

This example shows how to set the minimum amount of bandwidth required before a user can bring up a specific bundle. In this example, the user sets the minimum amount of bandwidth required to bring up Ethernet bundle 1 to 620000:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# bundle minimum-active bandwidth 620000
```

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 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to set the number of active links required to bring up a specific bundle. In this example, the user configures Ethernet bundle 5 so that 2 links must be active before the bundle can be brought up:

```
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 5
RP/0/RP0/CPU0:router(config-if)# bundle minimum-active links 2
```

bundle port-priority

To configure 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*
no 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 6.0	This command was introduced.

Usage Guidelines

The bundle port-priority command enables you to determine whether or not similar ports, for example, Gigabit Ethernet ports with Link Aggregation Control Protocol (LACP) enabled or with LACP disabled, are aggregated based on the priority of the port.

In cases where LACP is enabled on aggregated ports, the port priority forms part of the port ID, which is transmitted within a packet when a device exchanges packets with its peer. The peers use the port ID within the packets to determine whether a given port should carry traffic for the bundle.

In cases where LACP is disabled, the port priority is used locally, and a device does not communicate its priority to a peer. Therefore, the peers should have the same priority configured to avoid a mismatch in which links are used for carrying traffic. For example, you could set up the port priorities so that a device would use links 1, 3, and 4 for carrying traffic, and its peer would use links 1, 2, and 3, where links use the same numbering sequence at both ends.

Note A lower value is a higher priority for the port.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to configure LACP priority on a port:

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

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/1
RP/0/RP0/CPU0:router(config-if)# bundle port-priority 1
```

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 .

clear lacp counters [**bundle Bundle-Ether** *bundle-id* | *bundle-id* | **port** {**HundredGigE** *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.
HundredGigE	(Optional) Hundred Gigabit Ethernet interface. Use the *interface-path-id* argument to specify the interface whose LACP counters you want to clear.
TenGigE	(Optional) Ten Gigabit Ethernet interface. Use the *interface-path-id* argument to specify the interface whose LACP counters you want to clear.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

No default behavior or values

Command Modes

Command History

Release	Modification
Release 6.0	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:
  - If specifying a virtual interface, the number range varies, depending on interface type.

Task ID

Task ID	Operations
bundle	execute

Task ID	Operations
basic-services	read, write

Examples

The following example shows how to clear LACP counters:

```
RP/0/RP0/CPU0:router# clear lacp counters
```

hw-module profile load-balance algorithm

To modify the hashing algorithm that is used for ECMP and bundle member selection, use the **hw-module profile load-balance algorithm** command in XR Config mode.

hw-module profile load-balance algorithm { **L3-only** | **PPPoE** | **gtp** | **gtp-mpls** | **inner-l2-field** | **ip-tunnel** | **layer2** | **mpls-lsr-ler** | **mpls-lsr-ler-optimized** | **mpls-safe-speculative-parsing** }

Syntax Description

ip-tunnel	Allows the hashing algorithm to use the outer IPv4 GRE header even while doing an IP tunnel decapsulation.
layer2	Allows the hashing algorithm to use the inner IP header information while doing layer 2 forwarding with inner payload as MPLS.
gtp	Allows hashing based on the tunnel id in GTP-U packets.
gtp-mpls	Allows hashing based on the tunnel id in GTP-U packets intead of Layer 4 packets when underlay network is MPLS.
mpls-safe-speculative-parsing	Allows hashing based on the first nibble of the MAC DA address.
pppoe	Allows hashing based on inner IPv4 or IPv6 headers for PPPoE packets. We recommend enabling this hashing on head and tail nodes.
L3-Only	Allows hashing for L3 header only. We recommend enabling this hashing when majority of traffic is fragmented.
mpls-lsr-ler	Allows hashing in Label Edge Router (LER) and Label Switched Routers (LSRs) with MPLS traffic. This profile is recommended to be used when the following traffic flows are prominent: • IPv4 pop and lookup flows (EthoMPLS2/3oIPv4oL4) with L4 as TCP or UDP • IPv6 pop and lookup flows (EthoMPLS2/3oIPv6oXX) with L4 as TCP or UDP
mpls-lsr-ler-optimized	Allows optimized hashing in LER and LSR with MPLS IPv6 traffic. This profile is recommended to be used when the following traffic flows are prominent: • 4 Label IPv6 flows (EthoMPLS4/6oIPv6) • IPv6 pop and lookup flows (EthoMPLS2/3oIPv6oXX) with L4 as non-TCP/UDP (for example, no next header, GRE)
inner-L2-field	Allows the hashing algorithm to use the inner ethernet fields of the source MAC and destination MAC addresses.

Command Default No load-balancing profile is configured.

Command Modes XR Config mode

Command History

Release	Modification
7.10.1	The **mpls-lsr-ler-optimized** keyword was introduced.
7.7.2	The **inner-l2-field** keyword was introduced.
6.5.1	This command was modified.
6.3.2	This command was introduced.

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

Without control-word, L2VPN traffic is considered to be IPv4 or IPv6 traffic depending on the presence of nibble 4 or nibble 6 in the payload after the last label in the traffic. The matching offset fields are considered for load-balancing hash calculation. This may cause hashing of a single flow to different links resulting in decrease of end user throughput.

Note

- Only one of the load-balancing profiles should be enabled at a time. The last configured CLI takes precedence.
- While adding or removing the **hw-module profile load-balance algorithm mpls-lsr-ler** and **hw-module profile load-balance algorithm mpls-lsr-ler-optimized**commands, there is no need to reload the router.
- While adding or removing the **hw-module profile load-balance algorithm ip-tunnel** and **hw-module profile load-balance algorithm PPPoE**commands, you must reload the router.
- The **hw-module profile segment-routing srv6** is mutually exclusive with **hw-module profile load-balance algorithm PPPoE** and **hw-module profile load-balance algorithm ip-tunnel** commands.

Task ID

Task ID	Operation
bundle	read, write

This example shows how to configure the **hw-module profile load-balance algorithm** command to use the outer IPv4 GRE header for hashing even while doing an IP tunnel decapsulation.

```
RP/0/RP0/CPU0:Router(config)# hw-module profile load-balance algorithm ip-tunnel
```

This example shows how to configure the **hw-module profile load-balance algorithm** command to use the tunnel id in GTP-U packets for hashing.

```
RP/0/RP0/CPU0:Router(config)# hw-module profile load-balance algorithm gtp
```

This example shows how to configure the **hw-module profile load-balance algorithm** command to hash the L2VPN traffic to the right egress link.

```
RP/0/RP0/CPU0:Router(config)# hw-module profile load-balance algorithm
mpls-safe-speculative-parsing
```

This example shows how to configure the **hw-module profile load-balance algorithm** command to hash the IPv6 traffic with four MPLS labels to ensure optimized load-balancing.

```
RP/0/RP0/CPU0:ios(config)#hw-module profile load-balance algorithm mpls-lsr-ler-optimized
```

hw-module profile bundle-hash

To customize the hash key used in per-packet load balancing on a link aggregation group (LAG) or bundle interfaces, use the **hw-module profile bundle-hash** command in global configuration mode.

hw-module profile bundle-hash { **hash-index** *index* **location** *location* | **ignore-ingress-port** | **per-packet-round-robin** }

Syntax Description

hash-index	Configures the hash polynomial for the ASIC to customize the LAG load-balancing algorithm.
index	Specifies the hashing index.
location	Specifies that the location of the bundle-hash polynomial configuration follows.
location	Specifies the location of the bundle-hash polynomial configuration.
ignore-ingress-port	Excludes ingress traffic port from the hash-key computation.
per-packet-round-robin	Enables egressing traffic in a per-packet round robin manner across all LAG or bundle members.

Command Default

No default behavior or values

Command Modes

Global Configuration

Command History

Release	Modification
Release 7.3.1	This command was modified to introduce: • **hash-index** • **per-packet-round-robin**
Release 7.1.2	This command was introduced.

Usage Guidelines

- The **hw-module profile bundle-hash** command is applicable to NCS 5500 fixed port routers and NCS 5500 modular routers with NCS 5500 line cards.
- The **hw-module profile bundle-hash ignore-ingress-port** command configures the hash-key computation for LAG and bundle interfaces load balancing to exclude ingress traffic port.
- The **hw-module profile bundle-hash per-packet-round-robin** command enables the router to egress traffic in a per-packet round robin method across all LAG and bundle interfaces. This command suppresses any internal load-balancing algorithms and uses only the per-packet round robin method.

Caution Use the **hw-module profile bundle-hash per-packet-round-robin** command for debug purposes only. Do not use the command in a production environment as it could cause an out-of-order (OOO) delivery of packets.

- The **hw-module profile bundle-hash ignore-ingress-port** and **hw-module profile bundle-hash per-packet-round-robin** commands are configured at global level and is applicable to all line cards installed in the router.
- The **hw-module profile bundle-hash hash-index** command enables you to customize the LAG load-balancing algorithm by changing the hash polynomial used by the load-balancing ASIC. The router continues to use the existing 7-tuples algorithm, but you can change the polynomial value used internally.
- The **hw-module profile bundle-hash hash-index** command supports the following hash-indices:
  - **1 Use Polynomial value 0x8011**
  - **10 Use LB-Key-Pkt-Data directly**
  - **11 Use counter incremented every packet**
  - **12 Use counter incremented every two clocks**
  - **2 Use Polynomial value 0x8423**
  - **3 Use Polynomial value 0x8101**
  - **4 Use Polynomial value 0x84A1**
  - **5 Use Polynomial value 0x9019**
- The **hw-module profile bundle-hash hash-index** command is applicable only to the particular location or line card specified while configuring this command.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to configure **hash-index** using **hw-module profile bundle-hash**:

```
Router# configure
Router (config)# hw-module profile bundle-hash hash-index 10 location 0/0/CPU0
Router (config)# commit
```

Examples

The following example shows how to configure **ignore-ingress-port** using **hw-module profile bundle-hash**:

```
Router# configure
Router (config)# hw-module profile bundle-hash ignore-ingress-port
Router (config)# commit
```

Examples

The following example shows how to configure **per-packet-round-robin** using **hw-module profile bundle-hash**:

```
Router# configure
Router (config)# hw-module profile bundle-hash per-packet-round-robin
Router (config)# commit
```

interface (bundle)

To create a new bundle and enter interface configuration mode for that bundle, use the **interface (bundle)** command in XR Config mode. To delete a bundle, use the **no** form of this command.

interfaceBundle-Ether*bundle-id*
no interfaceBundle-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

XR Config mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
bundle	read, write

This example shows how to create an Ethernet bundle and enter interface configuration mode:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 3
RP/0/RP0/CPU0:router(config-if)#
```

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 .

{**lacp packet-capture HundredGigE** *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 .

{**lacp packet-capture** [**bundle-ether** *bundle-id*][**HundredGigE** *interface-path-id*] [**TenGigE** *interface-path-id*] **clear** | **stop**}

Syntax Description

bundle-ether	Ethernet bundle interface specified by *bundle-id*.
HundredGigE	Hundred 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

Command History

Release	Modification
Release 6.0	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

This example shows how to stop LACP packets on an interface:

```
RP/0/RP0/CPU0:router# lacp packet-capture HundredGigE 0/2/0/0 100
```

The following example shows how to stop capturing LACP packets on a Gigabit Ethernet interface:

```
RP/0/RP0/CPU0:router# lacp packet-capture HundredGigE 0/2/0/0 stop
```

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*]
no 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 6.0	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 an interface:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short
RP/0/RP0/CPU0:router(config-if)# commit
```

The following example shows how to configure custom Link Aggregation Control Protocol (LACP) short period transmit and receive intervals at both ends of a connection:

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RP0/CPU0:router(config-if)# commit
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short transmit 500
RP/0/RP0/CPU0:router(config-if)# commit
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RP0/CPU0:router(config-if)# commit
```

```
RP/0/RP0/CPU0:router# config
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# lacp period short receive 500
RP/0/RP0/CPU0:router(config-if)# commit
```

lacp system priority

To configure the priority for the current system, enter the **lacp system priority** command in XR Config mode mode.

lacp system priority *priority*

Syntax Description

priority	Priority for this system. Replace *priority* with a number. Range is from 1 through 65535. A lower value is higher priority.

Command Default

The default setting is *priority* = 32768.

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The system priority value forms part of the LACP system ID, which is transmitted within each LACP packet. The system ID, port ID and key combine to uniquely define a port within a LACP system.

Task ID

Task ID	Operations
bundle	read, write

Examples

The following example shows how to configure an LACP priority of 100 on a router:

```
RP/0/RP0/CPU0:router(config)# lacp system priority 100
```

The following example shows how to configure an LACP priority of 10 and MAC address on the Bundle-Ether interface:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface Bundle-Ether 1
RP/0/RP0/CPU0:router(config-if)# lacp system priority 10
RP/0/RP0/CPU0:router(config-if)# lacp system mac 00c1.4c00.bd15
RP/0/RP0/CPU0:router(config-if)# commit
```

show bundle

To display information about all bundles or a specific bundle of a particular type, use the **show bundle** command in XR EXEC mode.

show bundle [**Bundle-Ether***bundle-id*]

Syntax Description

Bundle-Ether	Displays information for the specified Ethernet bundle.
bundle-id	Number from 1 to 65535 that identifies a particular bundle.

Command Default

Information is displayed for all configured bundles.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

To see information for all bundles configured on the router, use the **show bundle** form of the command.

To see information for a specific bundle, use the **show bundle Bundle-Ether***bundle-id* form of the command with the number of the configured bundle.

Task ID

Task ID	Operation
bundle	read

This example shows output for all bundle interfaces that are configured on the router:

Note Though mLACP related fields are shown in the output, MC-LAG is not currently supported.

```
RP/0/RP0/CPU0:router# show bundle
Bundle-Ether 1

 Bundle-Ether1
  Status:                                  Up
  Local links <active/standby/configured>:   2 / 0 / 2
  Local bandwidth <effective/available>:     20000000 (20000000) kbps
  MAC address (source):                    ea74.b3bd.f484 (Chassis pool)
  Inter-chassis link:                      No
  Minimum active links / bandwidth:        1 / 1 kbps
  Maximum active links:                    64
  Wait while timer:                        2000 ms
  Load balancing:
    Link order signaling:                  Not configured
    Hash type:                             Default
    Locality threshold:                    None
  LACP:                                    Operational
```

```
  Flap suppression timer:                 Off
  Cisco extensions:                       Disabled
  Non-revertive:                          Disabled
mLACP:                                    Not configured
IPv4 BFD:                                 Not configured
IPv6 BFD:                                 Not configured

Port                  Device           State        Port ID         B/W, kbps
--------------------  ---------------  -----------  --------------  ----------
Te0/0/0/0/0           Local            Active       0x8000, 0x0006    10000000
    Link is Active
Te0/0/0/0/1           Local            Active       0x8000, 0x0005    10000000
    Link is Active
```

Table 14: 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.

Field	Description
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.
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.)

Field	Description
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.
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.

Field	Description
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.
LACP:	Displays whether or not Link Aggregation Control Protocol (LACP) is active on the bundle, with the following possible values: • Operational—All required configuration has been committed and LACP is in use on active members. • Not operational—LACP is not working because some mandatory configuration is missing on the bundle or on the active members of the bundle. • Not configured—None of the mandatory configuration for LACP has been committed on the bundle, and the LACP sub-fields are not displayed.
Flap suppression timer:	Displays the status of the flap suppression timer, with the following possible values: • Off—The flap suppression timer is not configured using the **lacp switchover suppress-flaps** command. • *x* ms—Amount of time allowed (in milliseconds) for standby links to activate after a working link fails, before putting the link in Down state.
Cisco extensions:	Displays whether or not the Cisco-specific TLVs for LACP are enabled. The possible values are "Enabled" and "Disabled".
Non-revertive:	Displays whether non-revertive behavior for the bundle interface is enabled or not. The possible values are "Enabled" and "Disabled".

Field	Description
mLACP:	Displays whether or not the bundle is operating using Multichassis Link Aggregation (MC-LAG), with the following possible values: • Operational—All required configuration has been committed for MC-LAG and mLACP is in use on the bundle. • Not operational—mLACP is not working because some mandatory configuration for MC-LAG is missing on the bundle or on the active members of the bundle. • Not configured—None of the mandatory configuration for MC-LAG has been committed on the bundle, and the mLACP sub-fields are not displayed.
IPv4 BFD:	Displays whether or not IPv4-based bidirectional forwarding (BFD) is operating on the bundle interface, with the following possible values: • Operational—All required configuration has been committed for IPv4 BFD, and it is in use on the bundle. • Not operational—IPv4 BFD is not working because some mandatory configuration is missing on the bundle or on the active members of the bundle. • Not configured—None of the mandatory configuration for IPv4 BFD has been committed on the bundle, and the BFD sub-fields are not displayed.
State:	When BFD is enabled, displays the state of BFD sessions on the bundle from the sessions running on bundle members that is communicated to interested protocols, with the following possible values: • Down—The configured minimim threshold for active links or bandwidth for BFD bundle members is not available so BFD sessions are down. • Off—BFD is not configured on bundle members. • Up—BFD sessions on bundle members are up because the minimum threshold for the number of active links or bandwidth is met.

Field	Description
Fast detect:	Displays whether or not BFD fast detection is configured on the bundle, with the following possible values: • Enabled—The**bfd fast-detect** command is configured on the bundle. • Disabled—The **bfd fast-detect** command is not configured on the bundle.
Start timer:	Displays status of the BFD start timer that is configured using the **bfd address-family ipv4 timers start** command, with the following possible values: • *x* s—Number of seconds (from 60 to 3600) after startup of a BFD member link session to wait for the expected notification from the BFD peer to be received, so that the session can be declared up. If the SCN is not received after that period of time, the BFD session is declared down. • Off—The start timer is not configured, and a BFD session is only declared Down upon notification from the BFD server.
Neighbor-unconfigured timer:	Displays status of the BFD start timer that is configured using the **bfd address-family ipv4 timers nbr-unconfig** command, with the following possible values: • *x* s—Number of seconds (from 60 to 3600) to wait after receipt of notification that the BFD configuration has been removed by a BFD neighbor, so that any configuration inconsistency between the BFD peers can be fixed. If the BFD configuration issue is not resolved before the specified timer is reached, the BFD session is declared down. • Off—The neighbor-unconfigured timer is not configured, and a BFD session is only declared Down upon notification from the BFD server.
Preferred min interval:	Number of milliseconds (in the format *x* ms) as the minimum control packet interval for BFD sessions. The range is 15 to 30000.
Preferred multiple:	Value of the multiplier (from 2 to 50) that is used for echo failure detection, which specifies the maximum number of echo packets that can be missed before a BFD session is declared Down.

Field	Description
Destination address:	Destination IP address for BFD sessions on bundle member links that is configured using the **bfd address-family ipv4 destination** command. "Not configured" is displayed when no destination IP address is configured.
Port	Name of the local interface port that is configured to be a bundle member, or a foreign interface received by an mLACP peer device. The possible values are the shortened interface name or a text string.
Device	Label Distribution Protocol (LDP) address of the device where the interface port is located, with the following possible values: • *address*—IP address of the device. • Local—Interface port is on the local device.
State	Status of the port, with one of the following possible values • Active—Link can send and receive traffic. • BFD Running—Link is inactive because BFD is down or has not been fully negotiated. • Configured—Link is not operational or remains down due to a configuration mismatch. The link is not available for switchover from failure of an active link. • Hot Standby—Link is ready to take over if an active link fails and can immediately transition to Active state without further exchange of LACP protocol data units (PDUs). • Negotiating—Link is in the process of LACP negotiation and is being held in a lower LACP state by the peer (for example, because the link is Standby on the peer.) • Standby—Link is not sending or receiving traffic, but is available for swithchover from failure of an active link.
Port ID	ID of the interface port in the format *x/y*, with the following values: • *x*—Port priority as a 2-byte hexadecimal value. • *y*—Link ID as a 2-byte hexadecimal value.

Field	Description
B/W, kbps	Bandwidth of the interface port in kilobits per second.
State reason	Text string that is displayed beneath the bundle member listing explaining why a link has not reached Active state.

Table 15: State Reasons

Reason	Description
BFD session is unconfigured on the remote end	The link is in BFD Running state because LACP is negotiated but the BFD session from the remote device has been unconfigured.
BFD state of this link is Down	The link is in BFD Running state because LACP is negotiated but the BFD session between the local system and the remote device is Down.
Bundle has been shut down	The link is in Configured state because the bundle it is configured as a member of is administratively down.
Bundle interface is not present in configuration	The link is in Configured state because the bundle it is configured as a member of has not itself been configured.
Bundle is in the process of being created	The link is in Configured state because the bundle it is configured as a member of is still being created.
Bundle is in the process of being deleted	The link is in Configured state because the bundle it is configured as a member of is being deleted.
Bundle is in the process of being replicated to this location	The link is in Configured state because the bundle it is configured as a member of is still being replicated to the linecard where the link is located.
Forced switchover to the mLACP peer	The link is in Configured state because it has been brought down as part of a forced switchover to the mLACP peer PoA. This happens only when brute force switchovers are configured.
ICCP group is isolated from the core network	The link is in Configured state because there is no connectivity through the network core for the ICCP group that the link and its bundle are part of. Therefore, the link has been brought down to prevent any traffic being sent by the LACP partner device.
Incompatible with other links in the bundle (bandwidth out of range)	The link is in Configured state because its bandwidth is incompatible with other links configured to be in the same bundle. The bandwidth may be too high or too low.

Reason	Description
LACP shutdown is configured for the bundle	The link is in Standby state because the bundle is configured with LACP shutdown.
Incompatible with other links in the bundle (LACP vs non-LACP)	The link is in Configured state because its use of LACP is incompatible with other links configured in the same bundle. Some links might be running LACP while others are not.
Link is Attached and has not gone Collecting (reason unknown)	The link is in Negotiating state because the mLACP peer PoA has not indicated that the link has gone Collecting in the Mux machine. This could be because of an issue between the mLACP peer and its LACP partner or because this state has not been communicated to the local system.
Link is Collecting and has not gone Distributing (reason unknown)	The link is in Negotiating state because the mLACP peer PoA has not indicated that the link has gone Distributing in the Mux machine. This could be because of an issue between the mLACP peer and its LACP partner or because this state has not been communicated to the local system.
Link is being removed from the bundle	The link is being removed from the bundle and remains in Configured state while this happens.
Link is Defaulted; LACPDUs are not being received from the partner	The link is in Configured state because no LACPDUs are being received from the LACP partner device. Either the partner is not transmitting or the packets are getting lost.
Link is down	The link is in Configured state because it is operationally or administratively down.
Link is Expired; LACPDUs are not being received from the partner	The link is in Negotiating state because no LACPDUs have been received from the LACP Partner device in the Current-While period and the link is now marked as Expired in the Receive machine.
Link is in the process of being created	The link is in Configured state because the member configuration is still being processed.
Link is marked as Standby by mLACP peer	The link is in Standby state because this has been indicated by the mLACP peer PoA.
Link is Not Aggregatable (reason unknown)	The link is in Configured state because it is marked as an Individual link by the mLACP peer PoA.
Link is not operational as a result of mLACP negotiations	mLACP negotiations with the peer have led to this link being kept in Configured state. This is likely to indicate a misconfiguration between the two peer devices.

Reason	Description
Link is Standby; bundle has more links than are supported	The link is in Standby state because the number of links in Selected state has already reached the hard platform limit on the number of active links.
Link is Standby due to maximum-active links configuration	The link is in Standby state because the number of links in Selected state has already reached the configured maximum active links threshold.
Link is waiting for BFD session to start	The link is in BFD Running state because LACP is negotiated but the BFD session has not started from the remote device.
Loopback: Actor and Partner have the same System ID and Key	The link is in Configured state because a loopback condition has been detected on the link—two links configured to be members of the bundle are actually connected to each other.
Not enough links available to meet minimum-active threshold	The link is in Standby state because there are not enough selectable links (i.e. links which meet the criteria to be marked Selected within the bundle) to meet the minimum active links/bandwidth threshold.
Partner has marked the link as Not Aggregatable	The link is in Configured state because it is marked as an Individual link by the LACP partner device.
Partner has not advertised that it is Collecting	The link is in Negotiating state because the LACP partner device has not advertised that the link is in Collecting state in its LACPDUs.
Partner has not echoed the correct parameters for this link	The link is in Negotiating state because the LACP partner device has not correctly echoed the local system's port information in the LACPDUs it is sending.
Partner is not Synchronized (Waiting, not Selected, or out-of-date)	The link is in Negotiating state because the mLACP peer PoA has not indicated that its LACP partner device is Synchronized. This could be because the devices are genuinely not Synchronized or because this state has not been communicated to the local system.
Partner is not Synchronized (Waiting, Standby, or LAG ID mismatch)	The link is in Negotiating state because the LACP partner device has not indicated that it is Synchronized in the LACPDUs it is sending. On the partner device the link could still be waiting for the Wait-While timer to expire, it could be held in Standby state, or there could be a misconfiguration leading to a LAG ID mismatch between links configured to be within the same bundle.

Reason	Description
Partner System ID/Key do not match that of the Selected links	The link is in Configured state because the System ID or Operational Key specified by the LACP partner device does not match that seen on other Selected links within the same bundle. This probably indicates a misconfiguration.
Wait-while timer is running	The link is in Configured state because the Wait-While timer is still running and the new state has not yet been determined.

show bundle brief

To display summary information about all configured bundles, use the **show bundle brief** command in XR EXEC mode.

show bundle brief

Syntax Description

This command has no keywords or arguments.

Command Default

Information for all configured bundles is displayed.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	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/RP0/CPU0:router# show bundle brief
Thu Mar  3 14:40:35.167 PST

Name   | IG       | State         | LACP | BFD |     Links     | Local b/w, |
       |          |               |      |     | act/stby/cfgd |    kbps    |
-------|----------|---------------|------|-----|---------------|------------|
BE1              - Up              On     Off         2 / 0 / 2     20000000
BE2              - Down            Off    Off         0 / 0 / 0            0
BE3              - Admin down      Off    Off         0 / 0 / 1            0
BE100            - Up              On     Off         3 / 0 / 6     30000000
```

The below table describes the fields shown in the display.

Table 16: 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).

show lacp bundle-ether

To display detailed information about Link Aggregation Control Protocol (LACP) ports and their peers, enter the **show lacp bundle** command in XR EXEC mode.

show lacp {**Bundle-Ether**} *bundle-id*

Syntax Description

Bundle-Ether *bundle-id*	(Optional) Specifies the number of the Ethernet bundle whose information you want to display. Range is 1 through 65535.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
bundle	read

Examples

This example shows how to display LACP information for a specific Ethernet Bundle:

```
RP/0/RP0/CPU0:router# show lacp Bundle-Ether 1

Wed Jun 22 20:34:58.085 UTC
State: a - Port is marked as Aggregatable.
       s - Port is Synchronized with peer.
       c - Port is marked as Collecting.
       d - Port is marked as Distributing.
       A - Device is in Active mode.
       F - Device requests PDUs from the peer at fast rate.
       D - Port is using default values for partner information.
       E - Information about partner has expired.

Bundle-Ether1

  Port          (rate)  State    Port ID       Key    System ID
  --------------------  -------- ------------- ------ ------------------------
Local
  Te0/0/0/0/0      30s  ascdA--- 0x8000,0x0006 0x0001 0x8000,ea-74-b3-bd-f4-85
   Partner         30s  ascdA--- 0x8000,0x0002 0x0001 0x8000,1c-df-0f-39-d1-05
  Te0/0/0/0/1      30s  ascdA--- 0x8000,0x0005 0x0001 0x8000,ea-74-b3-bd-f4-85
   Partner         30s  ascdA--- 0x8000,0x0001 0x0001 0x8000,1c-df-0f-39-d1-05

  Port                  Receive    Period Selection  Mux       A Churn P Churn
  --------------------  ---------- ------ ---------- --------- ------- -------
```

```
Local
  Te0/0/0/0/0           Current    Slow   Selected   Distrib   None    None
  Te0/0/0/0/1           Current    Slow   Selected   Distrib   None    None
RP/0/RP0/CPU0:vpnPE1#
```

Table 17: show lacp bundle Field Descriptions

Field	Description
Flags	Describes the possible flags that may apply to a device or port, under the “Flags” field.
State	Describes the possible flags that may apply the port state, under the “State” field.
Port	Port identifier, in the *rack/slot/module/port* notation.
State	Provides information about the state of the specified port. Possible flags are: • 0—Port is not aggregatable. • 1—Port is out of sync with peer. • 2—Port is in sync with peer. • 3—Port is collecting. • 4—Port is collecting and distributing.
Flags	Provides information about the state of the specified device or port. Possible flags are: • A—Device is in Active mode. • P—Device is in Passive mode. • S—Device requests peer to send PDUs at a slow rate. • F—Device requests peer to send PDUs at a fast rate. • D—Port is using default values for partner information. • E—Information about partner has expired.
Port ID	Port identifier, expressed in the format *N*x*nnnn*. *N* is the port priority, and *nnnn* is the port number assigned by the sending router.
Key	Two-byte number associated with the specified link and aggregator. Each port is assigned an operational key. The ability of one port to aggregate with another is summarized by this key. Ports which have the same key select the same bundled interface. The system ID, port ID and key combine to uniquely define a port within a LACP system.
System-ID	System identifier. The system ID is a LACP property of the system which is transmitted within each LACP packet together with the details of the link.

show lacp packet-capture

To display the contents of Link Aggregation Control Protocol (LACP) packets that are sent and received on an interface, use the **show lacp packet-capture** command in XR EXEC mode.

show lacp packet-capture [**decoded**] [**in** | **out**] {**HundredGigE** | **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.
HundredGigE	Displays packet information for the Hundred Gigabit Ethernet interface specified by *interface-path-id*.
TenGigE	Displays packet information for the Ten Gigabit Ethernet interface specified by *interface-path-id*.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

The default displays both in and out information.

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

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

Note In the following example, after you issue the **lacp packet-capture** command, you must wait for a reasonable amount of time for the system to capture packets that are sent and received on the interface before you issue the **show lacp packet-capture** command. Otherwise, there is no information to display.

```
RP/0/RP0/CPU0:router# lacp packet-capture HundredGigE 0/1/0/0 100
RP/0/RP0/CPU0:router# show lacp packet-capture HundredGigE 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 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

OUT  Apr 29 17:35:50.124
========================
...
```

The following example shows how to display the LACP parameters, decoded from individual packets, transmitted and received on a Gigabit Ethernet interface:

Note In the following example, after you issue the **lacp packet-capture** command, you must wait for a reasonable amount of time for the system to capture packets that are sent and received on the interface before you issue the **show lacp packet-capture** command. Otherwise, there is no information to display.

```
RP/0/RP0/CPU0:router# lacp packet-capture HundredGigE 0/1/0/0 100
RP/0/RP0/CPU0:router# show lacp packet-capture decoded HundredGigE 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
```

show lacp system-id

To display the local system ID used by the Link Aggregation Control Protocol (LACP), enter the **show lacp system-id** command in XR EXEC mode.

show lacp system-id

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

The System ID and details about the specific link are transmitted within each LACP packet.

Task ID

Task ID	Operations
bundle	read

Examples

The following example shows how to display the system ID used by the LACP:

```
RP/0/RP0/CPU0:router# show lacp system-id

Priority  MAC Address
--------  -----------------
  0x8000  08-00-45-3a-65-01
```

Table 18: show lacp system-id Field Descriptions

Field	Description
Priority	Priority for this system. A lower value is higher priority.
MAC Address	MAC address associated with the LACP system ID.



Management Ethernet Interface Commands

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

Note

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

This module provides command line interface (CLI) commands for configuring Management Ethernet interfaces on the Cisco NCS 5500 Series RouterCisco NCS 540 Series Router.

For detailed information about Management Ethernet interfaces concepts, configuration tasks, and examples, refer to the *Interface and Hardware Component Configuration Guide for Cisco NCS 5500 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 540 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 560 Series Routers*

- duplex (Management Ethernet), on page 279
- interface MgmtEth, on page 280
- ipv6 address autoconfig, on page 281

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** | **half**}
no duplex

Syntax Description

full	Configures the Management Ethernet interface to operate in full duplex mode.
half	Configures the Management Ethernet interface to operate in half duplex mode.

Command Default

Autonegotiates duplex operation

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to configure the Management Ethernet interface to operate in full duplex mode:

```
RP/0/RP0/CPU0:router(config)# interface mgmtEth 0/
RP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# duplex full
```

This example shows how to configure the Management Ethernet interface to operate in half duplex mode:

```
RP/0/RP0/CPU0:router(config)# interface mgmtEth 0/RP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# duplex half
```

This example shows how to return a Management Ethernet interface to autonegotiated duplex mode:

```
RP/0/RP0/CPU0:router(config)# interface mgmtEth 0/RP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# no duplex
```

interface MgmtEth

To enter interface configuration mode for the Management Ethernet interface, use the **interface MgmtEth** command in XR Config mode. To delete a Management Ethernet interface configuration, use the **no** form of this command.

interface MgmtEth *interface-path-id*
no 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 History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read, write

Examples

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

```
Router# Configure
Router(config)# interface mgmtEth 0/1/CPU0/0
Router(config-if)#
```

ipv6 address autoconfig

The **ipv6 address autoconfig** 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.

The IPv6 Stateless Address Auto Configuration (SLAAC) is used when a site is not particularly concerned with the exact addresses the hosts use, as long as they are unique and can be routed. 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. To disable auto configuration on the Management interface, use the no form of the command.

ipv6 address { *[ipv6addr]* | *[ipv6-prefix/prefix length]* | **[autoconfig] }**
no ipv6 address { *[ipv6addr]* | *[ipv6-prefix/prefix length]* | **[autoconfig] }**

Syntax Description

ipv6addr	(Optional) Specify the IPv6 address.
ipv6-prefix/prefix length	(Optional) Specify the IPv6 prefix and the prefix length preceded by a slash [/].
autoconfig	(Optional) Enable IPv6 stateless address auto configuration (SLAAC) on Management interface. **Note** The **autoconfig** option is only available for Management Interfaces.

Command Default

No default behavior or values

Command Modes

Management Interface Configuration

Command History

Release	Modification
Release 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 router will automatically configure an IPv6 link-local address on the interface, and enable the interface for IPv6 processing, and trigger IPv6 Neighbor Discovery (ND) auto configuration functionality in ND. Once the Management interface is in no shut state and **ipv6 address autoconfig** configuration is enabled, you will receive Router Advertisement (RA) on Management interface and get prefix and other information.

Task ID

Task ID	Operations
interface	read, write

Examples

The following example shows how to configure the IPv6 address based on the IPv6 prefix 2001:0DB8:c18:1::/64:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface gigabitEthernet 0/2/0/0
RP/0/RP0/CPU0:router(config-if)# ipv6 address 2001:0DB8:c18:1::/64
```

The following example shows how to enable IPv6 auto configuration on router:

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# interface mgmtEth 0/RSP0/CPU0/0
RP/0/RP0/CPU0:router(config-if)# ipv6 address autoconfig
```

Related Commands

Command	Description
interface MgmtEth, on page 280	Enters interface configuration mode for the Management Ethernet interface.



Null Interface Commands

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

Note

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

This module provides command line interface (CLI) commands for configuring null interfaces on the Cisco NCS 5500 Series RouterCisco NCS 540 Series Router.

For detailed information about Null interfaces concepts, configuration tasks, and examples, refer to the *Interface and Hardware Component Configuration Guide for Cisco NCS 5500 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 540 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 560 Series Routers*

- interface null 0, on page 285
- show controllers null interface, on page 286
- show interfaces null0, on page 287

interface null 0

To enter null0 interface configuration mode, use the **interface null 0** command in XR EXEC mode mode.

interface null 0

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

When you issue the **interface null 0** command in XR EXEC mode mode, the CLI prompt changes to "config-null0," indicating that you have entered interface configuration mode for the null interface. In the following sample output, the question mark (**?**) online help function displays all the commands available under the interface configuration mode for the null interface:

```
RP/0/RP0/CPU0:router(config)# interface null 0
RP/0/RP0/CPU0:router(config-null0)#?

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

Task ID

Task ID	Operations
interface	read, write

Examples

This example shows how to enter null0 interface configuration mode:

```
RP/0/RP0/CPU0:router(config)# interface null 0
RP/0/RP0/CPU0:router(config-null0)#
```

show controllers null interface

To display null interface counters, use the **show controllers null interface** command in XR EXEC mode.

show controllers null interface

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operations
interface	read
sysmgr	read

Examples

The following is sample output from the **show controllers null interface** command, which displays null interface counters:

```
RP/0/RP0/CPU0:router# show controllers null interface

Null interface:
name     : Null0
handle   : 0x0800000c
```

Table 19: show controllers null interface Field Descriptions

Field	Description
name	Interface whose controller information is displayed.
handle	Number that identifies the caps node that hosts the node whose controller information is displayed.

show interfaces null0

To display null0 interfaces, use the **show interfaces null0** command with optional keywords in EXEC mode.

show interfaces null0 [**accounting rates** | **brief** | **description** | **detail**] [**location** *node-id*]

Syntax Description

accounting	Shows interface accounting option.
rates	Shows interface accounting (input/output) rates.
brief	Shows interface information in condensed format.
description	Describes interface.
detail	Shows interface information in detail.
location *node-id*	Specifies a fully qualified interface location.

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

The **show interfaces null0** command displays statistics about null interfaces. When no keywords are specified, information for all null interfaces is displayed.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows how to use the **show interfaces null0** command:

```
RP/0/RP0/CPU0:router# show interfaces null0

Null0 is up, line protocol is up
  Interface state transitions: 0
  Hardware is Null interface
  Internet address is Unknown
  MTU 1500 bytes, BW Unknown
     reliability 255/255, txload Unknown, rxload Unknown
  Encapsulation Null,  loopback not set,
  Last clearing of "show interface" counters never
  5 minute input rate 0 bits/sec, 0 packets/sec
```

```
5 minute output rate 0 bits/sec, 0 packets/sec
   0 packets input, 0 bytes, 0 total input drops
   0 drops for unrecognized upper-level protocol
   Received 0 broadcast packets, 0 multicast packets
   0 packets output, 0 bytes, 0 total output drops
   Output 0 broadcast packets, 0 multicast packets
```



Traffic Mirroring Commands

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

Note

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

This module provides command line interface (CLI) commands for traffic mirroring commands.

For detailed information about traffic mirroring concepts, configuration tasks, and examples, refer to the *Interface and Hardware Component Configuration Guide for Cisco NCS 5500 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 540 Series RoutersInterface and Hardware Component Configuration Guide for Cisco NCS 560 Series Routers*.

- acl, on page 291
- acl mpls, on page 292
- clear monitor-session counters, on page 293
- destination, on page 294
- drops, on page 298
- forward-drop rx, on page 300
- hw-module profile span-filter l2-rx-enable, on page 301
- hw-module profile span-filter l2-l3-tx-enable, on page 302
- hw-module profile tcam format, on page 304
- mirror first, on page 305
- mirror enable, on page 306
- monitor-session, on page 307
- monitor-session (interface), on page 309
- monitor session ERSPAN ACL, on page 311
- show monitor-session status, on page 313
- udf, on page 315

acl

To configure ACL-based traffic mirroring, use the **acl** command in the monitor session configuration mode. To stop ACL-based traffic mirroring, use the **no** form of this command.

acl

Command Default

No default behavior or values

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 6.1.3	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**.

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:

```
Router(config)# monitor-session tm_example
Router(config-es-acl)# 10 deny 0000.1234.5678 0000.abcd.abcd any capture
Router(config-es-acl)# exit
Router(config)# interface GigabitEthernet0/2/0/0
Router(config-if)# monitor-session tm_example direction rx-only
Router(config-if)# acl
Router(config-if)# l2transport
Router(config-if-l2)# exit
Router(config-if)# end
```

acl mpls

To mirror the MPLS traffic based on the global interface access list (ACL) defined in the **mpls access-list** configuration, use the **acl mpls** command in monitor session configuration mode.

acl mpls *acl_name*

Syntax Description

acl_name	Specifies the ACL name specified in the **mpls access-list** definition.

Command Default

None

Command Modes

Monitor session configuration mode

Command History

Release	Modification
Release 24.4.1	This command was introduced.

Usage Guidelines

No specific guidelines impact the use of this command.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example provides the monitor session to be used on the configured interface. Use the direction keyword to specify that only ingress MPLS traffic is mirrored.

```
Router(config)# interface tenGigE 0/0/0/14
Router(config-if)#monitor-session S1 ethernet direction rx-only port-level
Router(config-if-mon)#acl mpls mp
```

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 [*session-name*] [**interface** *type interface-path-id*]

Syntax Description

interface	Identifies the interface for which the counters are to be cleared.
type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
session-name	Name of the monitor session to clear.

Command Default

All stored statistics for all interfaces are cleared.

Command Modes

EXEC

Command History

Release	Modification
Release 6.1.1	This command was introduced.

Task ID

Task ID	Operations
interface	read

Examples

This example shows how to clear the traffic mirroring statistic counters:

```
clear monitor-session mon1 counters
```

destination

To associate a specifc destination with a traffic mirroring session, use the **destination** command in monitor session configuration mode. To remove the designated destination, use the **no** form of this command.

destination [**rx** | **tx**] { **interface** | **pseudowire** | **file** | **sflow** | **application** }
interface *type* { **erspan-session-id** *id* [{ **kbps** | **pps** }] }
file [**size** *kbytes* [**buffer-type linear**] [**format pcapng**] [**filter** *expression*]] [**always-on** [**periodic-write** *interval* [**capacity** *capacity* { **KB** | **MB** | **GB** }]]]
sflow *exporter-map-name*

Syntax Description

destination [**rx** | **tx**] { **interface** | **pseudowire** | **file** | **sflow** | **application** }	Destination where mirrored traffic is sent.
rx	Allows you to specify the destination for the incoming traffic (Rx).
tx	Allows you to specify the destination for the outgoing traffic (Tx).
interface *type* { **erspan-session-id** *id* }	• **interface** *type*: 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. • **erspan-session-id** *id*: Unique ERSPAN ID that is assigned to the destination session.

file [**size** *kbytes* [**buffer-type linear**] [**format pcapng**] [**filter** *expression*]] [**always-on** [**periodic-write** *interval* [**capacity** *capacity* { **KB** | **MB** | **GB** }]]]	• **size** *kbytes*: Maximum size of the file in kilobytes. If not specified, the default size is applied. • **buffer-type linear**: Buffer that operates in a linear mode. This configuration replaces the default circular mode. • **format pcapng**: Output file format for the captured packets as PCAP Next Generation (pcapng). If the format is not specified, the default format is pcap. • **filter** *expression*: Applies pcap filter expression to the traffic being captured. • **always-on** : Enables continuous packet capture at the specified interval when used with the **periodic-write** option. • **periodic-write** *interval*: Specifies that the captured data should be written to the disk periodically at a defined interval, when **always-on** is configured. • **capacity** *capacity*: Total storage capacity (KB/MB/GB) allocated for the continuous capture.
sflow *exporter-map-name*	Sends the mirrored traffic using the sFlow exporter map.

Command Default

- In the monitor session configuration with **file** as destination:
  - If **size** is not specified, the default size is applied.
  - If **buffer-type linear** is not configured, the default circular mode is applied.
  - If the **format pcapng** is not specified, the default format is pcap.

Command Modes

Monitor sessions configuration

Command History

Release	Modification
Release 6.1.1	This command was introduced.
Release 6.1.3	The ability to specify a GRE tunnel interface as a destination was added.
Release 25.3.1	A new keyword, **application**, was added to the **destination** keyword.

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, EFP, a GRE tunnel interface or a bundle interface. 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.

```
Router(config)# monitor-session mon1
Router (config-mon)# destination interface gigabitethernet0/0/0/15
```

This example shows how to configure a monitor session to send mirrored traffic over a pseudowire. destination.

```
Router(config)# monitor-session mon1
Router (config-mon)# destination pseudowire
```

This is an example L2VPN running configuration with pseudowire as destination.

```
monitor-session mon1 ethernet
 destination rx pseudowire
 destination tx pseudowire
!
interface Loopback0
 ipv4 address 11.11.11.11 255.255.255.255
!
interface TenGigE0/0/0/0
 ipv4 address 10.0.12.1 255.255.255.0
!
router ospf 1
 area 1
  interface Loopback0
  !
  interface TenGigE0/0/0/0
  !
 !
!
l2vpn
 xconnect group XC
  p2p rx
   monitor-session mon1 rx
   neighbor ipv4 12.12.12.12 pw-id 100
   !
  !
  p2p tx
   monitor-session mon1 tx
   neighbor ipv4 12.12.12.12 pw-id 101
   !
  !
 !
!
mpls ldp
 router-id 11.11.11.11
 interface TenGigE0/0/0/0
 !
!
```

This example shows how to write the mirrored traffic directly into a file in an internal storage.

```
Router(config)# monitor-session mon1
Router (config-mon)# destination file
```

This example shows how to use an sFlow protocol as destination.

```
Router(config)# monitor-session mon1
Router (config-mon)# destination sflow EXP-MAP-DROP
```

This example shows how to configure a monitor session with **application** as the destination.

```
Router# configure
Router(config)# monitor-session mon1
Router (config-mon)# destination application
```

drops

To mirror Traffic Management (TM) buffer drop packets or forward-drop packets at the ingress of a router to a configured destination, use the **drops** command in XR Config mode.

```
drops [rx|tx] { traffic-management |packet-processing |unique-punt |
unique-port |filter expression }
```

Syntax Description

rx	Mirror packet drops in the Rx direction only.
tx	Mirror packet drops in the Tx direction only.
traffic-management	Mirror TM buffer drop packets in the specified direction (Rx or Tx).
packet-processing	Mirror forward-drop packets in the specified direction (Rx or Tx).
unique-punt	Monitor packets that are punted to the CPU for processing.
unique-port	Specify packet drops associated with specific port conditions.
filter *expression*	Apply pcap filter expression to the traffic being captured.

Command Default

All packet drops are mirrored.

Command Modes

XR Config mode

Command History

Release	Modification
Release 24.2.1	This command was introduced.

Usage Guidelines

The command is not available on management interface.

This configuration allows the user to easily configure mirroring all drops on the router. The user can additionally specify that only **packet-processing** and **traffic-management** drops should be mirrored, either in the rx or tx directions. The **unique-punt** and **unique-port** options indicate only the first dropped packet for a given drop-reason or interface are mirrored respectively.

Task ID

Task ID	Operation
ethernet-services	read, write

Examples

This example shows how to configure a global traffic mirroring session for forward-drop packets.

```
Router(config)# interface tunnel-ip2
Router(config-if)# tunnel mode gre ipv4
Router(config-if)# tunnel source 10.10.10.10
Router(config-if)# tunnel destination 192.0.2.1
```

```
Router(config-if)# exit
Router(config)# monitor-session mon2 ethernet
Router(config-mon)# destination interface tunnel-ip2
Router(config-mon)# drops packet-processing rx
Router(config-mon)# commit
```

forward-drop rx

To mirror forward-drop packets at the ingress of a router to a configured destination, use the **forward-drop rx** command in XR Config mode.

forward-drop rx

Syntax Description

This command has no keywords or arguments.

Command Default

Mirroring forward-drop packets is disabled.

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.5.4	This command was introduced.
Release 24.2.1	This command was deprecated. Use the **drops** command to achieve the same functionality.

Usage Guidelines

The **forward-drop rx** command is not available on management interface.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to configure a global traffic mirroring session for forward-drop packets.

```
Router(config)# interface tunnel-ip 2
Router(config-if)# tunnel mode gre ipv4
Router(config-if)# tunnel source 20.20.20.20
Router(config-if)# tunnel destination 192.1.1.3
Router(config-if)!
Router(config)# monitor-session mon2 ethernet
Router(config-mon)#destination interface tunnel-ip2
Router(config-mon)#forward-drop rx
Router(config-mon)#!
```

hw-module profile span-filter l2-rx-enable

To enable SPAN filtering on Layer 2 incoming (rx) traffic, use the **hw-module profile span-filter l2-rx-enable** command in monitor session configuration mode. To remove the filtering, use the **no** form of this command.

hw-module profile span-filter l2-rx-enable

Syntax Description

span-filter	Specifies SPAN filtering.
l2-rx-enable	Enables intra-bridge layer 2 incoming (rx) traffic for filtering.

Command Default

No default behavior or values

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 7.7.1	This command was introduced.

Usage Guidelines

To activate the filtering, you must reload the chassis or all the line cards.

Examples

This example shows how to enable SPAN filtering for incoming Layer 2 interface traffic:

```
Router(config)# hw-module profile npu native-mode-enable
hw-module profile span-filter l2-rx-enable


interface Bundle-Ether1
 monitor-session mon1 ethernet direction rx-only port-level
!
interface Bundle-Ether1.1 l2transport
 encapsulation dot1q 1
 rewrite ingress tag pop 1 symmetric
!
interface Bundle-Ether1.2 l2transport
 encapsulation dot1q 2
 rewrite ingress tag pop 1 symmetric
!
l2vpn
 bridge group bg1
  bridge-domain bg1
   interface Bundle-Ether1.1
   !
   interface Bundle-Ether1.2
   !
   interface HundredGigE0/0/0/17
   !
   routed interface BVI100
   !
  !
 !
```

hw-module profile span-filter l2-l3-tx-enable

To enable SPAN filtering on Layer 2 outgoing (Tx) traffic, use the **hw-module profile span-filter l2-l3-tx-enable** command in monitor session configuration mode. To remove the filtering, use the **no** form of this command.

hw-module profile span-filter l2-l3-tx-enable

Syntax Description

span-filter	Specifies SPAN filtering.
l2-l3-tx-enable	Enables intra-bridge layer 2 outgoing (Tx) traffic for filtering.

Command Default

No default behavior or values

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 7.8.1	This command was introduced.

Usage Guidelines

To activate the filtering, you must reload the chassis or all the line cards.

Examples

This example shows how to enable SPAN filtering for outgoing Layer 2 interface traffic:

```
Router(config)# hw-module profile npu native-mode-enable
hw-module profile span-filter l2-l3-tx-enable


interface Bundle-Ether1
 monitor-session mon1 ethernet direction tx-only port-level
!
interface Bundle-Ether1.1 l2transport
 encapsulation dot1q 1
 rewrite ingress tag pop 1 symmetric
!
interface Bundle-Ether1.2 l2transport
 encapsulation dot1q 2
 rewrite ingress tag pop 1 symmetric
!
l2vpn
 bridge group bg1
  bridge-domain bg1
   interface Bundle-Ether1.1
   !
   interface Bundle-Ether1.2
   !
   interface HundredGigE0/0/0/17
   !
   routed interface BVI100
   !
  !
```

!

hw-module profile tcam format

To add UDF field definitions to the ACL key definition that is sent to the hardware, use the **hw-module profile tcam format** command in monitor session configuration mode. To remove the UDF field definitions, use the **no** form of this command.

hw-module profile tcam format access-list {**ipv4** | **ipv6**} [*acl-qualifiers*] [**udf1** *udf-name1* ... **udf8** *udf-name8*]
no hw-module profile tcam format access-list {**ipv4** | **ipv6**} [*acl-qualifiers*] [**udf1** *udf-name1* ... **udf8** *udf-name8*]

Syntax Description

access-list	Specifies the access-list format.
ipv4	Specifies the IPv4 access list.
ipv6	Specifies the IPv6 access list.
acl-qualifiers	Specifies the ACL qualifiers.
udf1 *udf-name1* ... **udf8** *udf-name8*	Specifies the UDF-defined filter. **Note** The range is from 1 to 8.

Command Default

No default behavior or values

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 6.1.3	This command was introduced.

Usage Guidelines

To activate the new IPv4 profile, you must manually reload the chassis or all the line cards.

Examples

This example shows how to add UDF to the ACL key definitions:

```
Router(config)# hw-module profile tcam format access-list ipv4 src-addr dst-addr packet-length
precedence proto udf1 udf-test
```

mirror first

To configure partial traffic mirroring, use the **mirror first** command in monitor session configuration mode and global 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.

Note
In global configuration mode, the mirrored packet length ranges from 1 to 10000.

Command Default

The entire packet is mirrored.

Command Modes

Monitor session configuration
Global configuration

Command History

Release	Modification
Release 6.1.1	This command was introduced.
Release 7.5.2	The `mirror first` option is introduced in the global configuration mode.

Usage Guidelines

To mirror the first 64 to 128 bytes of the packet, use the **mirror first** command. 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 a packet:

```
Router(config)# interface gigabitethernet0/0/0/11
Router(config-if)# monitor-session mon1
Router(config-if-mon)# mirror first 100
```

mirror enable

To copy files or directories automatically from `/harddisk:/mirror` location in active RP to `/harddisk:/mirror` location in standby RP or RSP without user intervention or EEM scripts, use `mirror enable` command. The `mirror enable checksum` command enables MD5 checksum across active to standby RP to check integrity of the files. This command is optional. A slight delay is observed in `show mirror` command output when mirror checksum configuration is enabled.

mirror enable

Command Default

The `/harddisk:/mirror` directory is created by default, but file mirroring functionality is only enabled by executing the `mirror enable` command from configuration terminal.

Command Modes

Monitor configuration

Command History

Release	Modification
Release 7.2.1	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
```

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 { **router-id** *router-id* | **local-capture-capacity** *capacity*
monitor-session *session-name* [**ethernet** | **ipv4** | **ipv6** | **mpls-ipv4** | **mpls-ipv6**]
[**destination** [**rx** | **tx**] { **interface** | **pseudowire** | **file** | **sflow** | **application** }] [**discard class** { **0-7** }] [**traffic class** { **0-7** }] [**drops** [**rx** | **tx**] { **traffic-management** | **packet-processing** | **unique-punt** | **unique-port** | **filter** *expression* }] [**protocol-capture** [**rx** | **tx**] [**filter** *expression*]]
[**mirror first** *bytes*] [**inject-interface** { **bvi** | **bundle-ether** | **EightHundredGigE** | **FastEthernet** | **FiftyGigE** | **FortyGigE** | **FourHundredGigE** | **GigabitEthernet** | **HundredGigE** | **TenGigE** | **TwentyFiveGigE** | **TwoHundredGigE** }] [**mirror interval**]

Syntax Description

session-name	Name of the monitor session to configure.
router-id	Allows you to configure router id with a value that can range from 1 to 255.
local-capture-capacity	Specifies the maximum amount of memory on disk used to maintain periodic capture files for all sessions.
monitor-session *session-name* [**ethernet** | **ipv4** | **ipv6** | **mpls-ipv4** | **mpls-ipv6**]	Specifies the monitor session type. Ethernet is the default type if none of these session types are specified: • **ipv4** • **ipv6** • **mpls-ipv4** • **mpls-ipv6**
rx	Allows you to configure the monitor session for the incoming traffic (Rx) only.
tx	Allows you to configure the monitor session for the outgoing traffic (Tx) only.
destination	Allows you to configure the destination for the current monitor-session for incoming traffic (Rx) or outgoing traffic (Tx).
destination interface	Sends mirrored traffic to the specified interface.
destination pseudowire	Sends mirrored traffic over a pseudowire.
destination file	Stores mirrored traffic directly into a file.
destination sflow	Configures the monitoring session to send the network traffic data using the sFlow protocol.
destination application	Sends mirrored traffic to a third-party application.

discard-class	Allows you to specify the discard class value to be set on all traffic that is mirrored to the destination.
traffic-class	Allows you to specify the traffic class value to be set on all traffic that is mirrored to the destination.
protocol-capture	Configures the session to capture packets related to specific control-plane protocols.
mirror first	Specifies that only the first x bytes of a packet to be mirrored to the destination.
mirror interval	Specifies that sampling of traffic is performed on all sessions. Only the sampled packets are mirrored. Valid sampling intervals are generated one in every 2, 4, 8, 16, 32, 64, 128, 256, 512, 1k, 2k, 4k, 8k or 16k packets. **Note** Valid sampling intervals vary for different platforms.

Command Default

Ethernet is the default monitor session type.

Command Modes

Global configuration mode

Command History

Release	Modification
Release 6.1.1	This command was introduced.
Release 7.4.1	**destination rx** and **destination tx** keywords were added.
Release 25.3.1	A new keyword, **application**, was added to the **destination** keyword to specify a third-party application as the destination.

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 to be used in the traffic mirroring session using the **destination** command. The session will be non-operable until a destination is configured for the session.

Ethernet is the default monitor session type.

Inject interfaces are only supported for Ethernet monitor sessions with pseudowire destinations, and should be configured to be one of the session's source interfaces.

Examples

This example shows how to enter monitor session configuration mode:

```
Router(config)# monitor-session mon1
Router(config-mon)#
```

monitor-session (interface)

To associate a traffic mirroring session with a specific interface, use the **monitor-session** command in interface configuration mode or dynamic-template configuration mode. To remove the association between a traffic mirroring session and an interface, use the **no** form of this command.

monitor-session *session-name*
acl
port-level
destination [**rx** | **tx**] { **interface** | **pseudowire** | **nexthop** | **file** | **udp** | **sflow** | **application** }
[**destination** { **rx** | **tx** }] [**discard class** { **0-7** }] [**traffic class** { **0-7** }] [**mirror** { **first** *bytes* }] [**inject-interface** { **bvi** | **bundle-ether** | **EightHundredGigE** | **FastEthernet** | **FiftyGigE** | **FortyGigE** | **FourHundredGigE** | **GigabitEthernet** | **HundredGigE** | **TenGigE** | **TwentyFiveGigE** | **TwoHundredGigE** }] [**direction** { **rx-only** | **tx-only** *bytes* }] [**mirror-interval**]

[{ `rx` *interface* | `tx` *interface* }]

Syntax Description

session-name	Name of the monitor session to configure.
acl	Allows you to enable acl-based mirroring.
direction	Allows you to specify the direction of traffic to replicate.
ethernet	Allows you to replicate Ethernet traffic.
port-level	Specifies port-level mirroring.
mirror {first}	Specifies that only the first x bytes of a packet to be mirrored to the destination.
rx-only	Specifies that only ingress traffic is replicated.
tx-only	Specifies that only egress traffic is replicated.
rx*interface*	Specifies the ingress traffic and its destination.
tx*interface*	Specifies the egress traffic and its destination.
mirror-interval	Specifies that sampling of traffic is performed on all sessions. Only the sampled packets are mirrored. Valid sampling intervals are generated one in every 2, 4, 8, 16, 32, 64, 128, 256, 512, 1k, 2k, 4k, 8k or 16k packets.

Command Default

Replicates both ingress and egress traffic.

Command Modes

Interface configuration

Command History

Release	Modification
Release 6.1.1	This command was introduced.

Release	Modification
Release 7.4.1	The **rx***interface* and **tx***interface* keywords were added.

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 to associate this session with a specific source interface. 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.

Task ID

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

Examples

This example shows a sample configuration of the **monitor-session** command in the interface configuration mode:

```
Router# configure
Router(config)# interface gigabitethernet0/0/0/11
Router(config-if)# monitor-session mon1 port-level direction rx-only
Router(config-if-mon)mirror first 101#
```

This example shows a sample to configure separate interface destination for incoming (rx) and outgoing (tx) traffic:

```
Router# configure
Router(config)# monitor-session mon1 ethernet
Router(config-mon)# monitor-session foo ethernet destination rx interface tenGigE 0/0/0/0
Router(config-mon)# monitor-session foo ethernet destination tx interface tenGigE 0/0/0/1
Router(config-if)# end
Router(config)#
```

monitor session ERSPAN ACL

This command defines a monitor session, and enters monitor session configuration mode.

monitor-session ERSPANethernetdirection {*rx-onlyport-levelacl*}

Syntax Description

ERSPAN	Name of the session.
ethernet	Replicates Ethernet traffic.
direction	Use the direction keyword to specify that only ingress or egress traffic is mirrored. monitor-session session-name [direction { rx-only | tx-only]
rx-only	Specifies that only ingress traffic is mirrored.
port-level	Use this port level command to mirror all traffic types.
acl	The ACL that is attached in the ingress interface. • Even when the acl command is configured on the source mirroring port, if the ACL configuration command does not use the capturekeyword, 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. • All ingress traffic is mirrored.

Command Default

No default behavior or values

Command Modes

Route-policy configuration

Command History

Release	Modification
Release 6.6.1	This command was introduced.

Task ID

Task ID	Operations
route-policy	read, write

Examples

```
RP/0/RP0/CPU0: pyke-008#sh run monitor-session ERSPAN
monitor-session ERSPAN ethernet
destination interface tunnel-ip1
!

RP/0/RP0/CPU0:pyke-008#sh run int tunnel-ip 1
interface tunnel-ip1
ipv4 address 4.4.4.1 255.255.255.0
tunnel mode gre ipv4
tunnel source 20.1.1.1
```

```
tunnel destination 20.1.1.2
!
```

show monitor-session status

To display status information about configured traffic mirroring sessions, use the **show monitor-session status** command in XR EXEC mode.

show monitor-session [*session-name*] **status** [**detail**] [**errors**]

Syntax Description

session-name	Name of the monitor session to configure.
detail	Displays the full error string for any errors.
errors	Displays all sessions, but only source interfaces with errors are displayed (if no source interfaces have errors, then 'No errors' is displayed).

Command Default

No default behavior or values

Command Modes

XR EXEC mode

Command History

Release	Modification
Release 6.1.1	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:

```
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
```

This example shows the sample output for the **show monitor-session status detail** command:

```
Router show monitor-session status detail
```

```
Monitor-session foo
  Destination interface GigabitEthernet 0/0/0/0
  Source Interfaces
  -----------------
  GigabitEthernet 0/1/0/0.100:
    Direction: Both
    Status:    Operating
  GigabitEthernet 0/2/0/0.200:
    Direction: Rx
    Status:    Error: <blah>

Monitor session bar
  No destination configured
  Source Interfaces
  -----------------
  GigabitEthernet 0/3/0/0.100:
    Direction: Rx
    Status:    Not operational(no destination interface)
```

This example shows a sample output for the **show monitor-session status** command for mirror-first option:

```
Monitor-session foo mirror-first 101
Destination interface GigabitEthernet 0/0/0/0
================================================================================
Source Interface      Dir   Status
--------------------- ----  --------------------------------------------------
```

udf

To configure user-defined fields (UDFs), use the **udf** command in monitor session configuration mode. To remove the UDF field definitions, use the **no** form of this command.

udf *udf-name* **header** {**inner** | **outer**} {**l2** | **l3** | **l4**} **offset** *offset-in-bytes* **length** *length-in-bytes*
no udf *udf-name* **header** {**inner** | **outer**} {**l2** | **l3** | **l4**} **offset** *offset-in-bytes* **length** *length-in-bytes*

Syntax Description

udf-name	Name of the UDF.
header	Specifies the header.
inner	Specifies the offset base from inner header.
outer	Specifies the offset base from outer header.
l2	Specifies the offset base from Layer 2 header.
l3	Specifies the offset base from Layer 3 header.
l4	Specifies the offset base from Layer 4 header.
offset *offset-in-bytes*	Specifies the offset from the offset base, in bytes. **Note** The maximum offset is 63 bytes from the start of any header.
length *length-in-bytes*	Specifies the length from the offset, in bytes. Range: 1 to 4 bytes.

Command Default

No default behavior or values

Command Modes

Monitor session configuration

Command History

Release	Modification
Release 6.1.3	This command was introduced.

Usage Guidelines

UDFs for Layer 2 inner header is not supported.

Examples

This example shows how to confgure UDFs:

```
Router(config)# udf udf-test header outer l3 offset 4 length 4
```



Managing Router Hardware Commands

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

Note

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

This module describes the managing router hardware commands on the Cisco NCS 5500 Series RouterCisco NCS 540 Series Router.

- hw-module profile npu native-mode-enable, on page 319
- hw-module profile routing role core, on page 320
- hw-module profile tcam fib v6mcast percent, on page 321
- show environment power, on page 322

hw-module profile npu native-mode-enable

To enable the native mode on Cisco NCS 5500 series modular routers having Cisco NCS 5700 line cards, use the **hw-module profile npu native-mode-enable** command in the configuration mode.

hw-module profile npu native-mode-enable

Syntax Description

This command has no keywords or arguments.

Command Default

The command is not enabled by default.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 7.0.2	This command was introduced.

Usage Guidelines

To activate the native mode, you must manually reload the line cards using the **hw-module location all reload** command in the System Admin mode.

This example shows how to enable native mode in a NCS 5700 line card:

```
Router# config
Router(config)# hw-module profile npu native-mode-enable
Router(config)# commit
```

hw-module profile routing role core

To configure the routing role of a node as a core router, use the **hw-module profile routing role core** command in XR Config mode.

hw-module profile routing role core

Syntax Description

This command has no keywords or arguments.

Command Default

None

Command Modes

XR Config mode

Command History

Release	Modification
Release 7.3.2	This command was introduced.

Usage Guidelines

After configuring this command, you must reload the router for the configuration to take effect.

This example shows how to configure the routing role of a node as a core router.

```
Router# config
Router(config)# hw-module profile routing role core
Router(config)# commit
```

hw-module profile tcam fib v6mcast percent

On NL-based external TCAM, by default, multicast IPv6 routes are programmed in KAPS instead of external TCAM. The IPv6 multicast route scale is limited in KAPS. To increase the route scale, configure the routes in external TCAM. To increase the IPv6 multicast route scale in external TCAM, use the **hw-module profile tcam fib v6mcast percent** command in the global configuration mode.

hw-module profile tcam fib v6mcast percent *value*

Syntax Description

value	A number from 0 to 100 for the external TCAM scale allocation.

Command Default

No default behavior or values.

Command Modes

Global Configuration mode

Command History

Release	Modification
Release 6.6.1	This command was introduced.

Usage Guidelines

- After configurating this command, you must manually reload the line cards using the **hw-module location all reload** command in the System Admin mode.
- You must enable the **hw-module profile tcam fib ipv6 unicast percent <>** command before configuring the **hw-module profile tcam fib v6mcast percent <>** command.

Task ID

Task ID	Operations
system	read, write

This example shows how to increase the IPv6 multicast route scale in external TCAM.

```
Router# config
Router(config)# hw-module profile tcam fib v6mcast percent 24
Router(config)# commit
```

show environment power

To view the power supply details of the router, use the **show environment power** command in the System Admin EXEC VM mode.

show environment power

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values.

Command Modes

System Admin EXEC VM

Command History

Release	Modification
Release 6.0	This command was introduced.

Usage Guidelines

None

This example shows how to view the power supply details of the NCS 5500 router:

```
router#admin
sysadmin-vm:router#show environment power
===============================================================================
CHASSIS LEVEL POWER INFO: 0
===============================================================================
   Total output power capacity (Group 0 + Group 1) :    1100W +    1100W
   Total output power required                     :     900W
   Total power input                               :     319W
   Total power output                              :     281W

Power Group 0:
===============================================================================
   Power       Supply     ------Input----   ------Output---      Status
   Module      Type        Volts     Amps    Volts     Amps
===============================================================================
   0/PM0       1kW-AC      228.5      0.7     11.9     12.1    OK

Total of Power Group 0:        160W/  0.7A       144W/ 12.1A

Power Group 1:
===============================================================================
   Power       Supply     ------Input----   ------Output---      Status
   Module      Type        Volts     Amps    Volts     Amps
===============================================================================
   0/PM1       1kW-AC      227.0      0.7     11.9     11.5    OK

Total of Power Group 1:        159W/  0.7A       137W/ 11.5A

===============================================================================
   Location     Card Type            Power       Power       Status
                                     Allocated   Used
                                     Watts       Watts
===============================================================================
   0/RP0        NCS-5501-SE           800           -       ON
```

```
0/FT0          NCS-1RU-FAN-FW          50             -         ON
0/FT1          NCS-1RU-FAN-FW          50             -         ON
```