

Configuring Controllers

There are three types of controllers for the line card. The controllers are the optics controller, the ethernet controller, and the coherent DSP controller. This chapter describes the procedures used to configure these controllers.



Note

Unless otherwise specified, "line cards" refers to 1.2T and 1.2TL line cards.

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AINS

The Automatic-In-Service (AINS) feature allows the controller to automatically move to the automatic-in-service state after the maintenance window is completed. A soak time period is associated with the AINS state. The controller automatically moves to the In-Service state after the soak time period is completed. During the AINS maintenance window, alarms are not propagated to the EMS/NMS monitoring system.

You can configure AINS on the client ports of the card.

AINS States

State	Description
None	AINS is not enabled on the controller or the soak time period is complete.
Pending	AINS is configured on the controller. However, the soak time period has not started because either the primary state of controller is in Shutdown, Admin down, or Not ready state or the secondary state is in Maintenance state. AINS can also move to Pending state if alarms are raised during the soak time period.
Running	AINS is enabled on the controller. The primary state of the controller is Up and the secondary state is AINS.

The following table lists the AINS states.

If there are any service-affecting alarms when AINS is runring on ethernet or optics controllers, the AINS state moves to Pending state. When the alarms are cleared, the AINS state moves to Running state.

The AINS soak time period restarts when there are line card reloads, XR reloads, line card warm reloads, power cycles, or alarm conditioning.

Soak Time Period

You can configure the soak time period to be between 1 minute to 48 hours.

All alarms are suppressed during the AINS state. When the optical and ethernet alarms are raised on the port during the soak time period, the AINS state moves to Pending. These alarms are not displayed in the output of the **show alarms brief card location 0/RP0/CPU0 active** command but in the output of the **show alarms brief card location 0/RP0/CPU0 conditions** command. When all the alarms clear, the soak time period starts, and the AINS state moves to Running. When the soak time period expires, the port moves to IS state.

Configuring AINS

To configure AINS on a muxponder, use the following command:

configure

hw-module location location mxponder client-port-ains-soak hours hours minutes minutes

commit

The following is a sample in which all client ports are configured with AINS with soak time period specified to be 15 minutes.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/3 mxponder client-port-ains-soak hours 0
minutes 15
RP/0/RP0/CPU0:ios(config)#commit
```

To configure AINS on a muxponder slice, use the following command:

configure

hw-module location location mxponder-slice slice-number client-port-ains-soak hours hours minutes

commit

The following is a sample in which slice 0 client ports are configured with AINS with soak time period specified to be 40 minutes.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/3 mxponder-slice 0 client-port-ains-soak
hours 0 minutes 40
RP/0/RP0/CPU0:ios(config)#commit
```

Disabling AINS

To disable AINS on all muxponder client ports, set the hours and minutes to 0. Use the following commands:

configure

hw-module location location mxponder client-port-ains-soak hours hours minutes minutes

commit

The following is a sample in which AINS is disabled on all client ports.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/3 mxponder client-port-ains-soak hours 0
minutes 0
RP/0/RP0/CPU0:ios(config)#commit
```

To disable AINS on a muxponder slice, set the hours and minutes to 0. Use the following command:

configure

hw-module location location mxponder-slice slice-number client-port-ains-soak hours hours minutes

commit

The following is a sample in which AINS is disabled on all client ports of slice 0.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/3 mxponder-slice 0 client-port-ains-soak
hours 0 minutes 0
RP/0/RP0/CPU0:ios(config)#commit
```

Displaying the AINS Configuration

The AINS Soak field in the output indicates the current state of AINS. The current state can be None, Pending, or Running. The Total Duration field indicates the total soak time period that is configured. The Remaining Duration field indicates the soak time that remains, after which, the AINS state moves to None.

This example displays the ethernet controller statistics with AINS Soak in running state.

```
RP/0/RP0/CPU0:ios#show controller HundredGigECtrlr 0/1/0/2
Thu Feb 21 19:52:55.001 UTC
Operational data for interface HundredGigECtrlr0/1/0/2:
State:
   Administrative state: enabled
   Operational state: Up
   LED state: Green On
   Maintenance: Disabled
   AINS Soak: Running
      Total Duration: 0 hour(s) 15 minute(s)
     Remaining Duration: 0 hour(s) 5 minute(s) 37 second(s)
   Laser Squelch: Disabled
Phy:
   Media type: Not known
Autonegotiation disabled.
Operational values:
    Speed: 100Gbps
    Duplex: Full Duplex
   Flowcontrol: None
   Loopback: None (or external)
   BER monitoring:
       Not supported
    Holdoff Time: Oms
```

This example displays the ethernet controller statistics with AINS Soak in pending state.

```
RP/0/RP0/CPU0:ios#show controllers HuC 0/0/0/2
Thu Mar 12 13:52:12.129 UTC
Operational data for interface HundredGigECtrlr0/0/0/2:
State:
   Administrative state: enabled
   Operational state: Down (Reason: State undefined)
    LED state: Red On
   Maintenance: Disabled
   AINS Soak: Pending
      Total Duration: 0 hour(s) 30 minute(s)
      Remaining Duration: 0 hour(s) 30 minute(s) 0 second(s)
   Laser Squelch: Disabled
Phy:
   Media type: Not known
   Alarms:
        Current:
            Local Fault
    Statistics:
        FEC:
            Corrected Codeword Count: 0
            Uncorrected Codeword Count: 9
Autonegotiation disabled.
```

```
Operational values:

Speed: 100Gbps

Duplex: Full Duplex

Flowcontrol: None

Loopback: None (or external)

BER monitoring:

Not supported

Forward error correction: Standard (Reed-Solomon)

Holdoff Time: Oms
```

This example displays the optics controller statistics with AINS Soak in running state.

```
RP/0/RP0/CPU0:ios#show controller optics 0/1/0/3
Thu Feb 21 19:45:41.088 UTC
Controller State: Up
 Transport Admin State: Automatic In Service
 Laser State: On
 LED State: Green
 Optics Status
          Optics Type: Grey optics
          Alarm Status:
           _____
          Detected Alarms: None
          LOS/LOL/Fault Status:
          Alarm Statistics:
          _____
                                     LOW-RX-PWR = 0
LOW-TX-PWR = 0
HIGH-DGD = 0
          HIGH-RX-PWR = 0
          HIGH-TX-PWR = 0
          HIGH-LBC = 0
          OOR-CD = 0
                                       OSNR = 0
          WVL-OOL = 0
                                       MEA = 0
          IMPROPER-REM = 0
          TX-POWER-PROV-MISMATCH = 0
          Performance Monitoring: Enable
          THRESHOLD VALUES
          _____
          Parameter
                                       High Alarm Low Alarm High Warning Low Warning
          _____ ____

        Rx Power Threshold(dBm)
        4.9
        -12.0
        0.0
        0.0

        Tx Power Threshold(dBm)
        3.5
        -10.1
        0.0
        0.0

        LBC Threshold(mA)
        N/A
        N/A
        0.00
        0.00

          LBC High Threshold = 98 \%
          Polarization parameters not supported by optics
         Total TX Power = 6.39 dBm
         Total RX Power = 5.85 dBm
```

 Lane
 Laser Bias
 TX Power
 RX Power
 Output Frequency

 1
 75.0 %
 0.59 dBm
 0.63 dBm
 230.43 THz

 2
 68.6 %
 0.06 dBm
 -0.68 dBm
 230.43 THz

 3
 69.0 %
 0.26 dBm
 -0.63 dBm
 230.43 THz

 4
 69.1 %
 0.56 dBm
 -0.10 dBm
 230.43 THz

Transceiver Vendor Details

```
: QSFP28
Form Factor
                      : CISCO-FINISAR
: FTLC1152RGPL-C2
: CISCO-FINISAR
Name
Part Number
Rev Number
Serial Number
                     : FNS22150LEC
PTD
                      : QSFP-100G-CWDM4-S
VID
                       : V02
CISCO-FINISAR
Date Code(yy/mm/dd) : 18/04/11
Fiber Connector Type: LC
Sonet Application Code: Not Set
Ethernet Compliance Code: 100GBASE-CWDM4
```

Transceiver Temperature : 32 Celsius

AINS	Soak		:	Runr	ning
AINS	Timer		:	Oh,	15m
AINS	remaining	time	:	771	seconds

When the soak time expires, AINS state changes from Running to None. The Transport Admin State of optics controller changes from Automatic In Service to In Service.

RP/0/RP0/CPU0:ios# show controllers optics 0/1/0/3

Thu Feb 21 20:02:34.126 UTC

Controller State: Up

Transport Admin State: In Service

Laser State: On

LED State: Green

Optics Status

Optics Type: Grey optics

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 = 0
WVL-OOL = 0	MEA = 0

TX-POWER-PROV-MISMATCH = 0Performance Monitoring: Enable THRESHOLD VALUES _____ High Alarm Low Alarm High Warning Low Warning Parameter ----- ------ ------0.0
 Rx Power Threshold(dBm)
 4.9
 -12.0
 0.0
 0.0

 Tx Power Threshold(dBm)
 3.5
 -10.1
 0.0
 0.0

 LBC Threshold(mA)
 N/A
 N/A
 0.00
 0.00
 LBC High Threshold = 98 % Polarization parameters not supported by optics Total TX Power = 6.41 dBm Total RX Power = 5.85 dBm Laser Bias TX Power RX Power Output Frequency Lane Laser Bias ____ 74.9 % 0.60 dBm 0.63 dBm 230.43 THz 1 68.6 % 0.06 dBm -0.70 dBm 230.43 THz 2 3 69.0 % 0.30 dBm -0.63 dBm 230.43 THz 69.1 % 0.57 dBm -0.11 dBm 230.43 THz 4

Transceiver Vendor Details

IMPROPER-REM = 0

```
: QSFP28
Form Factor
                    : CISCO-FINISAR
Name
Part Number
Rev Number
                     : FTLC1152RGPL-C2
Rev Number . Close
Serial Number : FNS22150LEC
                      : CISCO-FINISAR
                     : QSFP-100G-CWDM4-S
PID
VID
                     : V02
CISCO-FINISAR
Date Code (yy/mm/dd) : 18/04/11
Fiber Connector Type: LC
Sonet Application Code: Not Set
Ethernet Compliance Code: 100GBASE-CWDM4
```

Transceiver Temperature : 32 Celsius

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

Configuring AINS on OTN-XP Card

You can configure the default AINS settings for all controllers on the OTN-XP card using the shared plane configuration. The configuration is applied to any line card that is installed in the NCS 1004. Use the following commands:

configure

ains-soak hours hours minutes minutes

commit

The following is a sample in which all the controllers on the OTN-XP card are configured with AINS with soak time period specified to be two minutes.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#ains-soak hours 0 minutes 2
RP/0/RP0/CPU0:ios(config)#commit
RP/0/RP0/CPU0:ios(config)#do show controllers optics 0/1/0/0
Tue Apr 28 11:50:15.431 UTC
Controller State: Down
Transport Admin State: Automatic In Service
Laser State: On
LED State: Red
Optics Status
         Optics Type: 100G QSFP28 LR4
         Alarm Status:
         _____
         Detected Alarms: None
         LOS/LOL/Fault Status:
         Alarm Statistics:
         _____
                                   LOW-RX-PWR = 0
         HIGH-RX-PWR = 0
         HIGH-TX-PWR = 0
                                   LOW-TX-PWR = 0
HIGH-DGD = 0
         HIGH-LBC = 0
         OOR-CD = 0
                                    OSNR = 0
         WVL-OOL = 0
                                    MEA = 0
         IMPROPER-REM = 0
         TX-POWER-PROV-MISMATCH = 0
         Performance Monitoring: Enable
         THRESHOLD VALUES
         _____
                                    High Alarm Low Alarm High Warning Low Warning
         Parameter

        Rx Power Threshold(dBm)
        4.9
        -12.0
        0.0
        0.0

        Tx Power Threshold(dBm)
        3.5
        -10.1
        0.0
        0.0

        LBC Threshold(mA)
        N/A
        N/A
        0.00
        0.00

         LBC High Threshold = 98 %
         Polarization parameters not supported by optics
        Total TX Power = 7.74 dBm
        Total RX Power = -40.00 dBm
         Lane Laser Bias TX Power RX Power Output Frequency
         ____ _____
                 67.2 % 1.85 dBm -40.00 dBm 231.39 THz
           1
                 67.9 % 1.55 dBm -40.00 dBm 230.59 THz
67.5 % 1.58 dBm -40.00 dBm 229.79 THz
           2
           3
                 66.8 % 1.89 dBm -40.00 dBm 230.25 THz
           4
```

Transceiver Vendor Details

```
Form Factor
                            : QSFP28
                            : CISCO-FINISAR
       Name
       Part Number
                             : 10-3204-01
       Rev Number
                             : B
       Serial Number
                             : FNS20510YUB
       PID
                            : ONS-QSFP28-LR4
       VID : V01
Date Code(yy/mm/dd) : 16/12/15
       Fiber Connector Type: LC
       Otn Application Code: 4I1-9D1F
       Sonet Application Code: Not Set
       Ethernet Compliance Code: 100GBASE-LR4
Transceiver Temperature : 27 Celsius
```

AINS	Soak		:	Pend	ding
AINS	Timer		:	Oh,	2m
AINS	remaining	time	:	120	seconds

To override the default AINS settings on a specific controller, use the following commands:

automatic-in-service controller optics R/S/I/P hours hours minutes minutes



Note

This configuration does not persist after an RP reload operation.

The following is a sample in which the optics controller on the OTN-XP card is configured with a soak time period of 45 minutes.

```
RP/0/RP0/CPU0:ios#automatic-in-service controller optics 0/1/0/0 hours 0 minutes 45
Tue Apr 28 11:55:15.666 UTC
RP/0/RP0/CPU0:ios#show controllers optics 0/1/0/0
Tue Apr 28 11:55:30.323 UTC
Controller State: Down
Transport Admin State: Automatic In Service
Laser State: On
LED State: Red
 Optics Status
        Optics Type: 100G QSFP28 LR4
        Alarm Status:
         -----
        Detected Alarms: None
        LOS/LOL/Fault Status:
        Alarm Statistics:
         -----
```

```
LOW-RX-PWR = 0LOW-TX-PWR = 0
        HIGH-RX-PWR = 0
       HIGH-TX-PWR = 0
        HIGH-LBC = 0
                                  HIGH-DGD = 0
        OOR-CD = 0
                                   OSNR = 0
        WVL-OOL = 0
                                   MEA = 0
        IMPROPER-REM = 0
        TX-POWER-PROV-MISMATCH = 0
        Performance Monitoring: Enable
        THRESHOLD VALUES
        _____
        Parameter
                                  High Alarm Low Alarm High Warning Low Warning
        _____ ____

        Rx Power Threshold(dBm)
        4.9
        -12.0
        0.0
        0.0

        Tx Power Threshold(dBm)
        3.5
        -10.1
        0.0
        0.0

        LBC Threshold(mA)
        N/A
        N/A
        0.00
        0.00

        LBC High Threshold = 98 %
        Polarization parameters not supported by optics
       Total TX Power = 7.74 dBm
       Total RX Power = -40.00 dBm
                          TX Power RX Power Output Frequency
        Lane Laser Bias
              ----- -----
        ____
                                                    _____
                          1.85 dBm -40.00 dBm 231.39 THz
                67.2 %
          1
          2
                67.9 % 1.55 dBm -40.00 dBm 230.59 THz
          3
                67.5 % 1.58 dBm -40.00 dBm 229.79 THz
          4
                66.8 % 1.89 dBm -40.00 dBm 230.25 THz
Transceiver Vendor Details
        Form Factor : QSFP28
Name : CISCO-FINISAR
```

```
NameCOSCOTINISARPart Number: 10-3204-01Rev Number: BSerial Number: FNS20510YUBPID: 0NS-QSFP28-LR4VID: V01Date Code (yy/mm/dd): 16/12/15Fiber Connector Type: LCOtn Application Code: 4I1-9D1FSonet Application Code: Not SetEthernet Compliance Code: 100GBASE-LR4
```

Transceiver Temperature : 27 Celsius

AINS	Soak	:	Pending
AINS	Timer	:	0h, 45m
AINS	remaining time	:	2700 seconds

FEC

Forward error correction (FEC) is a feature that is used for controlling errors during data transmission. This feature works by adding data redundancy to the transmitted message using an algorithm. This redundancy

allows the receiver to detect and correct a limited number of errors occurring anywhere in the message, instead of having to ask the transmitter to resend the message.

FEC States for Ethernet Controller

The following table lists the FEC states for the Ethernet controller.

State	Description
None	FEC is not enabled on the Ethernet controller.
Standard	Standard (Reed-Solomon) FEC is enabled on the Ethernet controller.

FEC configuration is automatically enabled for only the pluggables that support Auto-FEC. If you manually configure FEC, the manual configuration overrides the Auto-FEC.

The supported pluggables for Auto-FEC are:

- QSFP-100G-SR4-S
- QSFP-100G-CWDM4-S
- QSFP-100G-SM-SR
- QSFP-100G-AOC-1M
- QSFP-100G-AOC-3M
- QSFP-100G-AOC-10M
- QDD-400-AOC15M
- QDD-400G-FR4-S
- QSFP-100G-ER4L
- QDD-400G-DR4-S
- QDD-400G-LR8-S

The LR4 pluggable is a 1310nm long range band pluggable that does not require you to enable FEC.

The software automatically enables FEC mode on the pluggables installed in the Cisco NCS 1004. When you upgrade the software of an NCS 1004 with pluggables in the FEC disabled mode, traffic is affected.

The following sample shows the running FEC configuration on the LR4 pluggable:

```
RP/0/RP0/CPU0:ios#show controller HundredGigECtrlr 0/0/0/4
Thu Aug 8 15:41:20.857 IST
Operational data for interface HundredGigECtrlr0/0/0/4:
State:
   Administrative state: enabled
   Operational state: Up
   LED state: Green On
   Maintenance: Disabled
   AINS Soak: None
   Total Duration: 0 hour(s) 0 minute(s)
```

```
Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
Laser Squelch: Enabled
Phy:
Media type: Not known
Autonegotiation disabled.
Operational values:
Speed: 100Gbps
Duplex: Full Duplex
Flowcontrol: None
Loopback: None (or external)
BER monitoring:
Not supported
Holdoff Time: Oms
```

The following sample shows the running FEC configuration on the non LR4 pluggable:

```
RP/0/RP0/CPU0:ios#show controller HundredGigECtrlr 0/0/0/2
Thu Aug 8 15:41:56.457 IST
Operational data for interface HundredGigECtrlr0/0/0/2:
State:
   Administrative state: enabled
   Operational state: Up
   LED state: Green On
   Maintenance: Disabled
   AINS Soak: None
      Total Duration: 0 hour(s) 0 minute(s)
      Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
   Laser Squelch: Disabled
Phy:
   Media type: Not known
    Statistics:
        FEC:
            Corrected Codeword Count: 0
            Uncorrected Codeword Count: 66
Autonegotiation disabled.
Operational values:
   Speed: 100Gbps
   Duplex: Full Duplex
   Flowcontrol: None
   Loopback: None (or external)
    BER monitoring:
        Not supported
    Forward error correction: Standard (Reed-Solomon)
    Holdoff Time: Oms
```

Configuring FEC on the Ethernet Controller



The FEC configuration is not required for the supported pluggables. The configuration is required only in the case of non-Cisco qualified non-LR4 pluggables.

To configure FEC on the Ethernet controller, use the following command:

configure

controller HundredGigECtrlr R/S/I/P fec { none | standard }

commit

The following sample shows how to configure FEC on the Ethernet controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 0/1/0/10 fec standard
RP/0/RP0/CPU0:ios(config)#commit
```

The following sample shows the running FEC configuration on the Ethernet controller:

```
RP/0/RP0/CPU0:BH-SIT2#show controller HundredGigECtrlr 0/1/0/10
Tue Jul 16 15:30:30.165 IST
Operational data for interface HundredGigECtrlr0/1/0/10:
State:
    Administrative state: enabled
   Operational state: Down (Reason: State undefined)
   LED state: Red On
   Maintenance: Disabled
   AINS Soak: None
      Total Duration: 0 hour(s) 0 minute(s)
      Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
   Laser Squelch: Disabled
Phy:
    Media type: Not known
    Alarms:
        Current:
            Loss of Frequency Sync Data
    Statistics:
        FEC:
            Corrected Codeword Count: 0
            Uncorrected Codeword Count: 0
Autonegotiation disabled.
Operational values:
    Speed: 100Gbps
    Duplex: Full Duplex
   Flowcontrol: None
   Loopback: None (or external)
    BER monitoring:
       Not supported
    Forward error correction: Standard (Reed-Solomon)
    Holdoff Time: Oms
```

FEC States for CoherentDSP Controller

The following table lists the FEC states for the coherentDSP controllers.

Table 1: FEC State for CoherentDSP Controllers

State	Description
EnhancedSD15	FEC Soft-Decision 15.

State	Description
EnhancedSD27	FEC Soft-Decision 27. Default.

Q-Margin Support

Q-margin is an important optical parameter that characterizes the health of an optical link. The Q-margin value is calculated based on the average bit error rate (BER) in the optical link.

Feature Name	Release Information	Description		
Enhanced Q-Margin Support	Cisco IOS XR Release 7.3.1	Enhanced Q-Margin is supported for Forward error correction (FEC) and performance monitoring on CoherentDSP Controllers for 1.2T and 1.2TL cards. This enhanced Q-margin value is calculated based on the maximum number of errors for each frame. An attribute that is called instantaneous Q-margin is displayed in the output of the show controllers coherentDSP command. The lower the delta value between the instantaneous Q-margin value with the Q-margin value, the better the FEC performance of the NCS 1004 system. The instantaneous Q-margin values thus help you to optimize the system with continuous error correction in subsea transport networks. Command modified: • show controllers coherentDSP		

Table 2: Feature History

Enhanced Q-Margin Support

From Release 7.3.1 onwards, enhanced Q-Margin is supported for Forward error correction (FEC) and performance monitoring on CoherentDSP controllers for 1.2T and 1.2TL cards. Enhanced Q-margin provides a better error free signal in the optical link. The enhanced Q-margin value is calculated based on the maximum number of errors per frame. An attribute that is called instantaneous Q-margin is displayed in the output of the **show controllers coherentDSP** command. The lower the delta value between the instantaneous Q-margin value with the Q-margin value, the better the FEC performance of the NCS 1004 system.

To view Q-margin and enhanced Q-margin values for FEC on CoherentDSP controllers, see Verifying FEC on CoherentDSP Controllers, on page 15.

To view Q-margin and enhanced Q-margin values for performance monitoring on CoherentDSP controllers, see Configuring PM Parameters.

Configuring FEC on CoherentDSP Controllers

To configure FEC on the CoherentDSP controller, use the following command:

configure

controller coherentDSP R/S/I/P

fec {EnhancedSD15 | EnhancedSD27}

commit

The following sample shows how to configure FEC on the CoherentDSP controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/0/0/0
RP/0/RP0/CPU0:ios(config-CoDSP)#fec EnhancedSD15
Tue Feb 25 11:25:52.670 UTC
WARNING! Changing FEC mode can impact traffic
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
```

Verifying FEC on CoherentDSP Controllers

The following sample shows the FEC configuration on the CoherentDSP controller:

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

Tue Feb 25 11:26:08.235 UTC

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
Bandwidth	:	50.0Gb/s
Alarm Information:		
$LOS = 1 \ LOF = 0 \ LOM = 0$		
OOF = 0 OOM = 0 AIS = 0		
$IAE = 0 BIAE = 0$ $SF_BER = 0$		
SD_BER = 0 BDI = 0 TIM = 0		
FECMISMATCH = 0 $FEC-UNC = 0$		
Detected Alarms	:	None
Bit Error Rate Information		
PREFEC BER	:	0.00E+00
POSTFEC BER	:	0.00E+00
Q-Factor	:	0.00 dB
Q-Margin	:	-5.00dB
Instantaneous Q_margin :		0 dB
TTI :		
Remote IP addr	:	0.0.0
FEC mode	:	Soft-Decision 15

AINS	Soak				
AINS	Timer				
AINS	remaining	time			

:	No	ne	
:	0h	,	Om
:	0	se	conds

Configuring FEC on OTN-XP Card

FEC is supported on the CoherentDSP controllers for the OTN-XP card and O-FEC is the default FEC option configured on the card.

From Release 7.3.1 onwards, CFP2-DCO trunk is configured with 0-FEC.



Note

The options enhanced SD15 and SD17 are not supported on the OTN-XP card.



Note CFEC is not supported on CFP2-DCO.

To configure FEC on the CoherentDSP controller for the OTN-XP card, use the following command:

configure

controller coherentDSP R/S/I/P

fec OFEC

commit

The following sample shows how to configure O-FEC option on the CoherentDSP controller for the OTN-XP card:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/0/0/0
RP/0/RP0/CPU0:ios(config-CoDSP)#fec OFEC
Tue Feb 25 11:25:52.670 UTC
WARNING! Changing FEC mode can impact traffic
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
```

Verifying FEC on OTN-XP Card

The following sample shows the FEC configuration on the CoherentDSP controller for the OTN-XP card:

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

Tue Feb 25 11:26:08.235 UTC

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
Bandwidth	: 50.0Gb/s

```
Alarm Information:
LOS = 1 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
Detected Alarms
                                               : None
Bit Error Rate Information
PREFEC BER
                                               : 0.00E+00
POSTFEC BER
                                               : 0.00E+00
Q-Factor
                                               : 0.00 dB
Q-Margin
                                               : -5.00dB
                                             : 0 dB
Instantaneous Q margin
TTT :
       Remote IP addr
                                               : 0.0.0.0
FEC mode
                                                : O-FEC
                                               : None
AINS Soak
AINS Timer
                                               : Oh, Om
AINS remaining time
                                               : 0 seconds
```

Laser Squelching

You can enable laser squelching on Ethernet controllers. When laser squelching is enabled, the laser is shut down in the event of trunk faults (LOS, LOF), and a SQUELCHED alarm is raised on the mapped client port.

To configure laser squelching on the Ethernet controllers, use the following commands:

configure

controller HundredGigECtrlr Rack/Slot/Instance/Port

laser-squelch

commit

The following is a sample where laser squelching is enabled on the Ethernet controller.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 0/1/0/10
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#laser-squelch
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

The following is a sample to view the laser squelch status on the controller.

```
RP/0/RP0/CPU0:ios#show controller HundredGigECtrlr 0/1/0/10
Fri Feb 22 15:18:47.011 UTC
Operational data for interface HundredGigECtrlr0/1/0/10:
State:
    Administrative state: enabled
    Operational state: Up
    LED state: Green On
    Maintenance: Disabled
    AINS Soak: None
    Total Duration: 0 hour(s) 0 minute(s)
    Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
Laser Squelch: Enabled
```

```
Phy:
    Media type: Not known
    Statistics:
        FEC:
            Corrected Codeword Count: 0
            Uncorrected Codeword Count: 0
Autonegotiation disabled.
Operational values:
    Speed: 100Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
    BER monitoring:
       Not supported
    Forward error correction: Standard (Reed-Solomon)
    Holdoff Time: Oms
```

Configuring Laser Squelching on OTN-XP Card

From R7.2.1 onwards, laser squelching is supported on 10GE controllers for the OTN-XP card.

From R7.3.1 onwards, laser squelching is supported on 100GE or 400GE controllers for the OTN-XP card.

Configuring Laser Squelching on 10GE Controllers

To configure laser squelching on the 10GE controllers for the OTN-XP card, use the following commands:

configure

controller tenGigECtrlr Rack/Slot/Instance/Port/Lanenumber

laser-squelch

commit

The range of *Lanenumber* is from 1 to 4.

The following is a sample where laser squelching is enabled on the 10GE controller for the OTN-XP card.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller tenGigECtrlr 0/0/0/4/1
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#laser-squelch
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

The following is a sample to view the laser squelch status on the 10GE controller.

```
P/0/RP0/CPU0:ios#show controllers tenGigECtrlr 0/0/0/4/1
Wed May 6 06:28:29.603 UTC
Operational data for interface TenGigECtrlr0/0/0/4/1:
State:
Administrative state: enabled
Operational state: Up
LED state: Green On
Maintenance: Disabled
AINS Soak: None
Total Duration: 0 hour(s) 0 minute(s)
Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
```

Laser Squelch: Enabled

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
Holdoff Time: Oms
```

Configuring Laser Squelching on 100GE Controllers

To configure laser squelching on the 100GE controllers for the OTN-XP card, use the following commands:

configure

controller HundredGigECtrlr Rack/Slot/Instance/Port

laser-squelch

commit

The following is a sample where laser squelching is enabled on the 100GE controller for the OTN-XP card.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 0/0/0/1
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#laser-squelch
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

The following is a sample to view the laser squelch status on the 100GE controller.

```
RP/0/RP0/CPU0:ios#show controller hundredGigECtrlr 0/0/0/1
Fri Jul 23 16:07:11.541 UTC
Operational data for interface HundredGigECtrlr0/0/0/1:
State:
    Administrative state: enabled
    Operational state: Up
   LED state: Green On
   Maintenance: Disabled
   AINS Soak: None
      Total Duration: 0 hour(s) 0 minute(s)
      Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
   Laser Squelch: Enabled
Phy:
   Media type: Not known
Statistics:
FEC:
Corrected Codeword Count: 134967789
Uncorrected Codeword Count: 0
Autonegotiation disabled.
Operational values:
    Speed: 100Gbps
```

```
Duplex: Full Duplex
Flowcontrol: None
Loopback: None (or external)
BER monitoring:
Not supported
Forward error correction: Standard (Reed-Solomon)
Holdoff Time: Oms
```

Configuring Laser Squelching on 400GE Controllers

To configure laser squelching on the 400GE controllers for the OTN-XP card, use the following commands:

configure

controller fourHundredGigECtrlr Rack/Slot/Instance/Port

laser-squelch

commit

The following is a sample where laser squelching is enabled on the 400GE controller for the OTN-XP card.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller fourHundredGigECtrlr 0/0/0/8
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#laser-squelch
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

The following is a sample to view the laser squelch status on the 400GE controller.

```
RP/0/RP0/CPU0:ios#show controller fourhundredGigECtrlr 0/0/0/8
Fri Jul 23 16:07:11.541 UTC
Operational data for interface fourHundredGigECtrlr0/0/0/8:
State:
   Administrative state: enabled
   Operational state: Up
   LED state: Green On
   Maintenance: Disabled
   AINS Soak: None
      Total Duration: 0 hour(s) 0 minute(s)
      Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
   Laser Squelch: Enabled
Phv:
   Media type: Not known
Statistics:
FEC:
Corrected Codeword Count: 134967789
Uncorrected Codeword Count: 0
Autonegotiation disabled.
Operational values:
   Speed: 400Gbps
    Duplex: Full Duplex
    Flowcontrol: None
   Loopback: None (or external)
   BER monitoring:
       Not supported
   Forward error correction: Standard (Reed-Solomon)
    Holdoff Time: Oms
```

Idle Insertion

When a fault occurs on the trunk port, you can hold the propagation of local faults using the idle insertion feature. This feature is enabled on the ethernet controller by configuring the hold-off timer.

When the fault occurs on the trunk, idles are inserted in the traffic stream from the trunk port to the client port for the duration of the configured holdoff-time. If the trunk port remains faulty beyond the configured holdoff-time, a local fault is transmitted towards the client device. If the trunk recovers from the fault before the holdoff-time expires, traffic resumes.

This feature can be used on customer deployments to prevent reset of client ports during a PSM switchover.

You can enable the idle insertion feature by using the following commands:

configure

controller HundredGigECtrlr Rack/Slot/Instance/Port

holdoff-time trunk-fault time-value

The range of *timevalue* is from 0 ms to 3000 ms.

The following is a sample for enabling the hold off -timer in 100GE controllers:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 0/1/0/10
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#holdoff-time trunk-fault 3000
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

To view the hold-off time that is configured on 100GE controller, use the following command:

show controllers hundredGigECtrlr Rack/Slot/Instance/Port

Example

```
RP/0/RP0/CPU0:ios#show controllers HundredGigECtrlr 0/1/0/10
Fri Feb 22 18:58:06.888 UTC
Operational data for interface HundredGigECtrlr0/1/0/10:
State:
   Administrative state: enabled
    Operational state: Up
   LED state: Green On
   Maintenance: Disabled
    AINS Soak: None
      Total Duration: 0 hour(s) 0 minute(s)
      Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
    Laser Squelch: Disabled
Phy:
   Media type: Not known
   Statistics:
        FEC:
            Corrected Codeword Count: 0
            Uncorrected Codeword Count: 0
Autonegotiation disabled.
Operational values:
    Speed: 100Gbps
    Duplex: Full Duplex
    Flowcontrol: None
    Loopback: None (or external)
```

```
BER monitoring:
    Not supported
Forward error correction: Standard (Reed-Solomon)
Holdoff Time: 3000ms
```

Enabling Idle Insertion on OTN-XP Card

From R7.2.1 onwards, you can enable the idle insertion feature on the 10GE controller for OTN-XP card.

From R7.3.1 onwards, you can enable the idle insertion feature on 100GE or 400GE controllers for the OTN-XP card.

To enable idle insertion on the 10GE controller, enter the following commands:

configure

controller tenGigECtrlr Rack/Slot/Instance/Port/Lanenumber

holdoff-time trunk-fault time-value

commit

The range of *Lanenumber* is from 1 to 4 and the range of holdoff-time trunk-fault *time-value* is from 0 to 3000 ms.

The following is a sample for enabling the idle insertion feature in 10GE controllers:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller tenGigECtrlr 0/0/0/4/1
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#holdoff-time trunk-fault 2000
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

To view the hold-off time that is configured on 10GE controllers, use the following command:

show controllers tenGigECtrlr Rack/Slot/Instance/Port/Lanenumber

Example

```
RP/0/RP0/CPU0:ios#show controllers TenGigECtrlr 0/0/0/4/1
Thu Mar 26 12:46:16.543 UTC
Operational data for interface TenGigECtrlr0/0/0/4/1:
State:
   Administrative state: enabled
   Operational state: Up
    LED state: Green On
   Maintenance: Disabled
   AINS Soak: None
      Total Duration: 0 hour(s) 0 minute(s)
      Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
   Laser Squelch: Disabled
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
Holdoff Time: 2000ms
```

Configuring Idle Insertion on 100GE Controllers

To configure idle insertion on the 100GE controllers for the OTN-XP card, use the following commands:

configure

controller HundredGigECtrlr Rack/Slot/Instance/Port

holdoff-time trunk-fault time-value

commit

The range of *timevalue* is from 0 ms to 3000 ms.

The following is a sample where idle insertion is enabled on the 100GE controller for the OTN-XP card.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 0/0/0/1
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#holdoff-time trunk-fault 3000
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

The following is a sample to view the idle insertion status on the 100GE controller.

```
RP/0/RP0/CPU0:ios#show controller hundredGigECtrlr 0/0/0/1
Fri Jul 23 16:07:11.541 UTC
Operational data for interface HundredGigECtrlr0/0/0/1:
State:
    Administrative state: enabled
    Operational state: Up
   LED state: Green On
   Maintenance: Disabled
   AINS Soak: None
      Total Duration: 0 hour(s) 0 minute(s)
      Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
   Laser Squelch: Enabled
Phy:
   Media type: Not known
Statistics:
FEC .
Corrected Codeword Count: 134967789
Uncorrected Codeword Count: 0
Autonegotiation disabled.
Operational values:
   Speed: 100Gbps
   Duplex: Full Duplex
   Flowcontrol: None
    Loopback: None (or external)
    BER monitoring:
        Not supported
        Forward error correction: Standard (Reed-Solomon)
   Holdoff Time: 3000ms
```

Configuring Idle Insertion on 400GE Controllers

To configure idle insertion on the 400GE controllers for the OTN-XP card, use the following commands:

configure

controller fourHundredGigECtrlr Rack/Slot/Instance/Port

holdoff-time trunk-fault time-value

commit

The following is a sample where idle insertion is enabled on the 400GE controller for the OTN-XP card.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller fourHundredGigECtrlr 0/0/0/10
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#holdoff-time trunk-fault 2000
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

The following is a sample to view the idle insertion status on the 400GE controller.

```
RP/0/RP0/CPU0:ios#show controller fourhundredGigECtrlr 0/0/0/10
Fri Jul 23 16:07:11.541 UTC
Operational data for interface fourHundredGigECtrlr0/0/0/10:
State:
   Administrative state: enabled
    Operational state: Up
   LED state: Green On
   Maintenance: Disabled
   AINS Soak: None
     Total Duration: 0 hour(s) 0 minute(s)
      Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
   Laser Squelch: Enabled
Phy:
   Media type: Not known
Statistics:
FEC:
Corrected Codeword Count: 134967789
Uncorrected Codeword Count: 0
Autonegotiation disabled.
Operational values:
   Speed: 400Gbps
   Duplex: Full Duplex
   Flowcontrol: None
   Loopback: None (or external)
    BER monitoring:
       Not supported
        Forward error correction: Standard (Reed-Solomon)
    Holdoff Time: 2000ms
```

LLDP Drop

Link Layer Discovery Protocol (LLDP) Snooping is enabled by default on all ethernet controllers. To verify the LLDP neighbors, use the following commands:

```
RP/0/RP0/CPU0:ios#show lldp neighbors detail
Tue Mar 12 11:49:20.819 IST
Capability codes:
        (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
       (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
_____
Local Interface: HundredGigECtrlr0/1/0/7
Chassis id: 008a.96cd.34e1
Port id: Hu0/0/0/4
Port Description - not advertised
System Name: ncs5500 node
System Description:
 6.1.4, NCS-5500
Time remaining: 116 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
Management Addresses - not advertised
Peer MAC Address: 00:8a:96:cd:34:10
_____
Local Interface: HundredGigECtrlr0/1/0/13
Chassis id: 008a.96cd.34e1
Port id: Hu0/0/0/5
Port Description - not advertised
System Name: ncs5500 node
System Description:
 6.1.4, NCS-5500
Time remaining: 90 seconds
Hold Time: 120 seconds
System Capabilities: R
Enabled Capabilities: R
Management Addresses - not advertised
Peer MAC Address: 00:8a:96:cd:34:14
Total entries displayed: 2
RP/0/RP0/CPU0:ios#show lldp neighbors
Tue Mar 12 16:17:56.713 IST
Capability codes:
        (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
        (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
Device ID
               Local Intf
                                       Hold-time Capability
                                                               Port ID
             HundredGigECtrlr0/1/0/7 120
ncs5500 node
                                                               Hu0/0/0/4
                                                 R
ncs5500 node
             HundredGigECtrlr0/1/0/13 120
                                                 R
                                                                Hu0/0/0/5
Total entries displayed: 2
```

When you enable LLDP drop on the client controller ports of the muxponder or muxponder slice, the LLDP frames drop on the ports without forwarding.

Note

LLDP on 400GE is not supported on the OTN-XP card.

Configuring LLDP Drop

You can configure the LLDP drop for a muxponder or muxponder slice. By default, the LLDP drop status is set to False. On enabling the LLDP Drop, the status is set to True.

To configure LLDP drop on a muxponder use the following command:

configure

hw-module location location mxponder drop-lldp



Note

Use the **no** form of the command to disable LLDP drop.

commit

Limitation

• When you disable LLDP globally, the LLDP gets disabled on all the interfaces.



Note By default, LLDP is enabled for NCS 1004. But when you enable and disable LLDP in the global configuration mode, LLDP gets disabled on all the interfaces.

Workaround: You must enable LLDP globally or reload the Router.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios#hw-module location 0/1 mxponder drop-lldp
RP/0/RP0/CPU0:ios#commit
```

configure

hw-module location location mxponder-slice slice-number drop-lldp



Note Use the **no** form of the command to disable LLDP drop.

To configure LLDP drop on a muxponder slice, use the following command:

commit

The following is a sample in which slice 0 client ports are enabled with LLDP drop.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder-slice 0 drop-lldp
RP/0/RP0/CPU0:ios(config)#commit
```

Verifying the Status of LLDP Drop

To verify the LLDP drop enabled status, use the following command.

RP/0/RP0/CPU0:ios#show hw-module location all mxponder Fri Feb 22 13:22:19.281 UTC

0/0

Location:

Client Bitrate: NONE Trunk Bitrate: NONE Status: Not Provisioned Location: 0/1 Slice ID: 0 100GE Client Bitrate: Trunk Bitrate: 500G Status: Provisioned LLDP Drop Enabled: FALSE Client Port Mapper/Trunk Port CoherentDSP0/1/0/0 Traffic Split Percentage HundredGigECtrlr0/1/0/2 ODU40/1/0/0/0 100 HundredGigECtrlr0/1/0/3 ODU40/1/0/0/1 100 HundredGigECtrlr0/1/0/4 ODU40/1/0/0/2 100 HundredGigECtrlr0/1/0/5 ODU40/1/0/0/3 100 HundredGigECtrlr0/1/0/6 ODU40/1/0/0/4 100 Location: 0/1Slice ID: 1 Client Bitrate: 100GE Trunk Bitrate: 500G Status: Provisioned LLDP Drop Enabled: FALSE Client Port Mapper/Trunk Port CoherentDSP0/1/0/1 Traffic Split Percentage HundredGigECtrlr0/1/0/8 ODU40/1/0/1/0 100 HundredGigECtrlr0/1/0/9 ODU40/1/0/1/1 100 HundredGigECtrlr0/1/0/10 ODU40/1/0/1/2 100 HundredGigECtrlr0/1/0/11 ODU40/1/0/1/3 100 ODU40/1/0/1/4 HundredGigECtrlr0/1/0/12 100 0/2 Location: Slice ID: 0 Client Bitrate: 100GE Trunk Bitrate: 500G Status: Provisioned LLDP Drop Enabled: FALSE Client Port Mapper/Trunk Port CoherentDSP0/2/0/0 Traffic Split Percentage HundredGigECtrlr0/2/0/2 ODU40/2/0/0/0 100 HundredGigECtrlr0/2/0/3 ODU40/2/0/0/1 100 HundredGigECtrlr0/2/0/4 ODU40/2/0/0/2 100 HundredGigECtrlr0/2/0/5 ODU40/2/0/0/3 100 HundredGigECtrlr0/2/0/6 ODU40/2/0/0/4 100 Location: 0/2 Slice ID: 1 Client Bitrate: 100GE Trunk Bitrate: 500G Status: Provisioned LLDP Drop Enabled: FALSE Mapper/Trunk Port Client Port CoherentDSP0/2/0/1 Traffic Split Percentage HundredGigECtrlr0/2/0/8 ODU40/2/0/1/0 100 HundredGigECtrlr0/2/0/9 ODU40/2/0/1/1 100

HundredGigECtrlr0/2/	0/10	ODU40/2/0/1/2	100
HundredGigECtrlr0/2/	0/11	ODU40/2/0/1/3	100
HundredGigECtrlr0/2/	0/12	ODU40/2/0/1/4	100
Location:	0/3		
Slice ID:	0		
Client Bitrate:	100GE		
Trunk Bitrate:	300G		
Status:	Provision	led	
LLDP Drop Enabled:	TRUE		
Client Port		Mapper/Trunk Port Traffic Split Percentage	CoherentDSP0/3/0/0
HundredGigECtrlr0/3/	0/2	ODU40/3/0/0/0	100
HundredGigECtrlr0/3/)/3	ODU40/3/0/0/1	100
HundredGigECtrlr0/3/	0/4	ODU40/3/0/0/2	100

Link Layer Discovery Protocol (LLDP) Support on Management Interface

The LLDP support on management interface feature requires a system to form LLDP neighborship over the system management interface, through which it advertises and learns LLDP neighbor information. This information about neighbors used to learn about the neighbors and in turn the topology of the devices for Operations, Administration, and Maintenance (OAM) purposes.

Advantages of LLDP

- Provides support on non-Cisco devices.
- Enables neighbor discovery between non-Cisco devices.

Limitation

• When you disable LLDP globally, the LLDP gets disabled on all the interfaces.



Note By default, LLDP is enabled for NCS 1004. But when you enable and disable LLDP in the global configuration mode, LLDP gets disabled on all the interfaces.

Workaround: You must enable LLDP globally or reload the Router.

Cisco Discovery Protocol (CDP) vs LLDP

The CDP is a device discovery protocol that runs over Layer 2. Layer 2 is also known as the data link layer that runs on all Cisco devices, such as routers, bridges, access servers, and switches. This protocol allows the network management applications to automatically discover and learn about other Cisco devices that connect to the network.

The LLDP is also a device discovery protocol that runs over Layer 2. This protocol allows the network management applications to automatically discover and learn about other non-Cisco devices that connect to the network.

Interoperability between non-Cisco devices using LLDP

LLDP is also a neighbor discovery protocol that is used by network devices to advertise information about themselves to other devices on the network. This protocol runs over the data link layer, which allows two systems running different network layer protocols to learn about each other.

With LLDP, the user can also access the information about a particular physical network connection. If the user uses a non-Cisco monitoring tool (through SNMP), LLDP helps you identify the Object Identifiers (OIDs) that the system supports. The following OIDs are supported:

- 1.0.8802.1.1.2.1.4.1.1.4
- 1.0.8802.1.1.2.1.4.1.1.5
- 1.0.8802.1.1.2.1.4.1.1.6
- 1.0.8802.1.1.2.1.4.1.1.7
- 1.0.8802.1.1.2.1.4.1.1.8
- 1.0.8802.1.1.2.1.4.1.1.9
- 1.0.8802.1.1.2.1.4.1.1.10
- 1.0.8802.1.1.2.1.4.1.1.11
- 1.0.8802.1.1.2.1.4.1.1.12

Neighbor Discovery

System advertises the LLDP TLV (Type Length Value) details over the management network using which other devices in the management network can learn about this device.

Configuring LLDP

- LLDP full stack functionality is supported on all three management interfaces supported in NCS 1004.
- You can selectively enable or disable LLDP on any of the management interfaces on demand.
- You can selectively enable or disable LLDP transmit or receive functionality at the management interface level.
- Information gathered using LLDP can be stored in the device Management Information Database (MIB) and queried with the Simple Network Management protocol (SNMP).
- LLDP operational data are available in both Command Line Interface and netconf-yang interface.

Enabling LLDP Globally

When you enable LLDP globally, all interfaces that support LLDP are automatically enabled for both transmit and receive operations.



Note You can override this default operation at the interface to disable receive or transmit operations.

The following table describes the global LLDP attributes that the user can configure:

Attribute	Default	Range	Description
Holdtime	120	0–65535	Specifies the hold time (in sec). Hold time refers to the time or duration that an LLDP device maintains the neighbor information before discarding.
Reinit	2	2–5	Delay (in sec) for LLDP initialization on any interface
Timer	30	5-65534	Specifies the rate at which LLDP packets are sent (in sec)

The following example shows the commands to configure LLDP globally. The global LLDP configuration enables LLDP on all the three management interfaces.

```
RP/0/RP0/CPU0:regen#configure terminal
RP/0/RP0/CPU0:regen(config)#lldp management enable
RP/0/RP0/CPU0:regen(config)#lldp holdtime 30
RP/0/RP0/CPU0:regen(config)#lldp reinit 2
RP/0/RP0/CPU0:regen(config)#commit
```

Verification

You can verify the LLDP configuration using the show running-config lldp command.

The output of **show running-config lldp** command is as follows:

```
RP/0/RP0/CPU0:regen#show running-config lldp
Tue Dec 10 10:36:11.567 UTC
lldp
timer 30
reinit 2
holdtime 120
management enable
!
```

You can verify the LLDP data using the **show lldp interface** and **show lldp neighbors** commands.

The output of **show lldp interface** command is as follows:

```
RP/0/RP0/CPU0:regen#show lldp interface
Thu Nov 7 08:45:22.934 UTC
MgmtEth0/RP0/CPU0/0:
    Tx: enabled
    Rx: enabled
    Tx state: IDLE
    Rx state: WAIT FOR FRAME
MgmtEth0/RP0/CPU0/1:
    Tx: enabled
    Rx: enabled
```

Table 3:

Tx state: IDLE Rx state: WAIT FOR FRAME

The output of **show lldp neighbors** command is as follows:

 MYS-130
 MgmtEth0/RP0/CPU0/1
 120
 R
 MgmtEth0/RP0/CPU0/1

where [DISABLED] shows that the LLDP is disabled on the interface MgmtEth0/RP0/CPU0/0.

Enabling LLDP per Management Interface

The following example shows the commands to configure LLDP at the management interface level.

```
RP/0/RP0/CPU0:ios(config)#interface mgmtEth 0/RP0/CPU0/X
RP/0/RP0/CPU0:ios(config-if)#lldp enable
RP/0/RP0/CPU0:ios(config-if)#commit
```

Disabling LLDP Transmit and Receive Operations

The following example shows the commands to disable the LLDP transmit operations at the specified management interface.

```
RP/0/RP0/CPU0:ios(config)#interface mgmtEth 0/RP0/CPU0/X
RP/0/RP0/CPU0:ios(config-if)#lldp transmit disable
RP/0/RP0/CPU0:ios(config-if)#commit
```

The following example shows the commands to disable the LLDP receive operations at the specified management interface.

```
RP/0/RP0/CPU0:ios(config)#interface mgmtEth 0/RP0/CPU0/X
RP/0/RP0/CPU0:ios(config-if)#lldp receive disable
RP/0/RP0/CPU0:ios(config-if)#commit
```

Debugging LLDP Issues

The following commands are used for debugging issues in the LLDP functionality.

- show lldp traffic
- debug lldp all
- debug lldp errors
- · debug lldp events
- · debug lldp packets
- debug lldp tlvs
- debug lldp trace
- debug lldp verbose

DHCP Client

Table 4: Feature History

Feature Name	Release Information	Feature Description
Dynamic Host Configuration Protocol (DHCP) Client	Cisco IOS XR Release 7.3.2	The DHCP client enables the router interfaces to dynamically acquire the IPv4 or DHCPv4 or DHCPv6 server which is used to forward the response to the correct layer 2 address. The DHCP client ensures that configuration information reaches the correct device.

The Dynamic Host Configuration Protocol (DHCP) client functionality enables the router interfaces to dynamically acquire the IPv4 or DHCPv4 or DHCPv6 server, and forwards the responses back to the correct Layer 2 address so that the correct device gets the correct configuration information.

DHCP has the ability to allocate IP addresses only for a configurable period of time, called the lease period. If the client is required to retain this IP address for a longer period beyond the lease period, the lease period must be renewed before the IP address expires. The client renews the lease based on configuration that was sent from the server. The client unicasts a REQUEST message using the IP address of the server. When a server receives the REQUEST message and responds with an ACK message. The lease period of the client is extended by the lease time configured in the ACK message. DHCP client supports DHCPv6.

DHCP Client Options

You can configure DHCPv6 client on management Ethernet interfaces. You can configure different DHCPv6 client options to differentiate between clients as required. The different DHCPv6 client options are also configured to differentiate how a DHCPv6 client communicates with a DHCPv6 server. The different DHCPv6 client options that can be configured are:

- **DUID**: If the DUID DHCPv6 client option is configured on an interface, DHCPv6 client communicates with the DHCPv6 server through the link layer address.
- **Rapid Commit:** If the Rapid Commit DHCPv6 client option is configured on an interface, DHCPv6 client can obtain configuration parameters from the DHCPv6 server through a rapid two-step exchange (solicit and reply) instead of the default four-step exchange (solicit, advertise, request, and reply).
- DHCP Options: The various other DHCPv6 options that can be configured on a DHCPv6 client are:
 - **Option 15:** Option 15 is also known as the User Class option and it is used by a DHCPv6 client to identify the type or category of users or applications it represents.
 - **Option 16:** Option 16 is also known as the Vendor ID option and it is used by a DHCPv6 a client to identify the vendor that manufactured the hardware on which the client is running.
 - **Option 23:** Option 23 is also known as the Domain name Server (DNS) option provides a list of one or more IPv6 addresses of DNS recursive name servers to which a client's DNS resolver can send DNS queries.

- **Option 24:** Option 24 is also known as the Domain List option and it specifies the domain search list that the client uses to resolve hostnames with the DNS.
- **DHCP Timers:** This option is used to set different timer value for DHCP client configurations. The various DHCP timer options are:
 - Release-timeout: It is used to set retransmission timeout value for the initial release message.
 - Req-max-rt: It is used to set the maximum retransmission timeout value for the request message.
 - Req-max-rt: It is used to set the maximum retransmission timeout value for the request message.
 - Sol-max-delay: It is used to set the maximum delay time of the first solicit message.
 - Sol-max-rt: It is used to set the maximum solicit retransmission time.
 - Sol-time-out: It is used to set the initial timeout value of the solicit message.

Enabling DHCP Client on Management Ethernet Interface

To enable DHCP client on the management Ethernet interface, use the following command:

configure

interface MgmtEth R/S/I/P

ipv6 address dhcp-client-options

duid linked-layer-address

rapid-commit

{option 16 vendor | option 15 ciscoupnnp | option 23 | option 24}

timers sol-max-delay *value* | timers sol-time-out *value* | timers req-timeout *value* | timers req-max-rt *value* | timers release-timeout *value* }

ipv6 address dhcp

commit

The following sample shows to enable DHCP client on the management Ethernet interface:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#interface MgmtEth0/0/CPU0/0
RP/0/RP0/CPU0:ios(config)#ipv6 address dhcp-client-options
RP/0/RP0/CPU0:ios(confiq-dhcpv6-client)#duid linked-layer-address
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#rapid-commit
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#option 16 vendor
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#option 15 ciscoupnnp
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#option 23
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#option 24
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#timers sol-max-delay 1
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#timers sol-time-out 1
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#timers sol-max-rt 120
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#timers req-timeout 1
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#timers req-max-rt 30
RP/0/RP0/CPU0:ios(confiq-dhcpv6-client)#timers release-timeout 1
RP/0/RP0/CPU0:ios(config-dhcpv6-client)#commit
```

Verifying DHCP Client on Management Ethernet Interface

To verify DHCP client options on the management Ethernet interface, use the **show dhcp ipv6 client** and **show dhcp ipv6 client detail** commands:

```
RP/0/0/CPU0:ios#show dhcp ipv6 client
Thu Sep 17 10:45:44.493 IST
Interface name IPv6 Address State Lease Time Rem
_____ ____
MgmtEth0/0/1/0 500:1::1a/128 BOUND 7116
RP/0/RP0/CPU0:ios#show dhcp ipv6 client detail
Thu Sep 17 10:45:48.880 IST
-----
                                 -----
Client Interface name : MgmtEth0/0/`/0
Client Interface handle : 0x4040
Client MACAddr : 0219.bc81.e750
Client State : BOUND
Client Link Local Address : fe80::19:bcff:fe81:e750
Client IPv6 Address (Dhcp) : 500:1::1a/128
Lease Remaining (in secs) : 7112
DUID : 000300010219bc81e750
Client Configuration
Timers
SOL MAX DELAY : 1 secs (00:00:01)
SOL TIMEOUT : 1 secs (00:00:01)
SOL MAX RT : 120 secs (00:02:00)
REQ TIMEOUT : 1 secs (00:00:01)
REQ MAX RT : 30 secs (00:00:30)
REL TIMEOUT : 1 secs (00:00:01)
Options
RAPID-COMMIT : True
USER-CLASS : ciscoupnnp
VENDOR-CLASS : vendor
DNS-SERVERS : True
DOMAIN-LIST : True
DUID Type : DUID LL
Server Information
Server Address : fe80::1a:19ff:fe03:99ca
Preference : 255
DUID : 000300010206826e2e00
Status : SUCCESS
IA-NA
Status : SUCCESS
TATD : 0x40400001
T1 : 3600 secs (01:00:00)
T2 : 5760 secs (01:36:00)
TA-ADDR
IA NA Address : 500:1::1a
Preferred Time : 7200 secs (02:00:00)
Valid Time : 7200 secs (02:00:00)
Flags : 0x0
      _____
```

MAC Address Snooping on Client Ports

MAC address snooping allows you to learn the MAC address of the neighbor, that is connected to the client ports. You can enable ARP snooping on all client ports and learn the MAC address of neighbors through CLI.

This feature overcomes the limitation, where LLDP (Link Layer Discovery protocol) cannot be enabled in some networks.

Limitations

- When you enable or disable MAC address snooping on any slice, few packets are dropped during configuration.
- Open config interface for enabling or disabling MAC address snooping is not supported.
- SNMP MIB is not supported for the MAC address attribute.



Note When you enable MAC address snooping on client ports, it overrides LLDP.

Configuring MAC Address Snooping on Client Ports

You can configure MAC address or ARP snoop on slice in Muxponder slice mode using the following commands.

configure

hw-module location location mxponder-slice slice-number

client-rate 100GE

 $trunk-rate\ 600G\ \{\ 100G\ |\ 150G\ |\ 200G\ |\ 250G\ |\ 300G\ |\ 350G\ |\ 400G\ |\ 450G\ |\ 500G\ |\ 550G\ |\ 600G\ \}$

arp-snoop

commit

Example

The following is a sample in which, MAC address or ARP snoop is configured on the client ports of slice 0 in Muxponder slice mode.

```
RP/0/RP0/CPU0:ios#configure
Mon Mar 16 19:30:33.933 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/3 mxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-rate 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 600G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#arp-snoop
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
Mon Mar 16 19:30:52.636 UTC
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#end
```

The following is a sample in which, MAC address or ARP snoop is configured in Muxponder mode.

```
RP/0/RP0/CPU0:ios#configure
Mon Mar 16 19:08:17.154 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder arp-snoop
RP/0/RP0/CPU0:ios(config)#commit
```

The following sample shows the output of **show controllers hundredGigEctrlr** command, before configuring MAC address or ARP snoop on client ports.

```
RP/0/RP0/CPU0:ios#show controllers hundredGigECtrlr 0/1/0/2
Mon Mar 16 19:40:37.434 UTC
Operational data for interface HundredGigECtrlr0/1/0/2:
State:
   Administrative state: enabled
   Operational state: Up
   LED state: Green On
   Maintenance: Disabled
   AINS Soak: None
      Total Duration: 0 hour(s) 0 minute(s)
     Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
   Laser Squelch: Disabled
Phy:
   Media type: Not known
Autonegotiation disabled.
Operational values:
    Speed: 100Gbps
   Duplex: Full Duplex
   Flowcontrol: None
   Loopback: None (or external)
   BER monitoring:
       Not supported
    Holdoff Time: Oms
```

Viewing Neighbor MAC Address

You can view the neighbor's physical address after enabling MAC address or ARP snoop using the following command. MAC address snoop output is enabled after ARP packets are received on the respective 100G client.

```
show controllers hundredGigEctrlr R/S/I/P
```

The following sample shows the neighbor's MAC address after configuring MAC address or ARP snoop on client ports.

```
RP/0/RP0/CPU0:ios#show controllers hundredGigECtrlr 0/1/0/2
Mon Mar 16 19:41:08.047 UTC
Operational data for interface HundredGigECtrlr0/1/0/2:
```

```
State:
```

```
Administrative state: enabled

Operational state: Up

LED state: Green On

Maintenance: Disabled

AINS Soak: None

Total Duration: 0 hour(s) 0 minute(s)

Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)

Laser Squelch: Disabled

Neighbor Address:

0010.9400.5502
```
```
Phy:
Media type: Not known
Autonegotiation disabled.
Operational values:
Speed: 100Gbps
Duplex: Full Duplex
Flowcontrol: None
```

Transmit Shutdown

Transmit shut on trunk optics controller brings down the CFP2 transmit power.

From R7.3.2 onwards, you can configure transmit shut on optics controller in the 4x100GE-MXP-DD muxponder mode.

Configuring Transmit Shutdown on Trunk Optics Controller

To perform transmit shutdown, enter the following commands:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller Optics R/S/I/P
RP/0/RP0/CPU0:ios(config-Optics)#transmit-shutdown
RP/0/RP0/CPU0:ios(config-Optics)#commit
RP/0/RP0/CPU0:ios(config-Optics)#exit
RP/0/RP0/CPU0:ios(config)#exit
```

The following is a sample to perform transmit shutdown on the trunk port:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller Optics 0/1/0/12
RP/0/RP0/CPU0:ios(config-Optics)#transmit-shutdown
RP/0/RP0/CPU0:ios(config-Optics)#commit
RP/0/RP0/CPU0:ios(config-Optics)#exit
RP/0/RP0/CPU0:ios(config)#exit
```

The following is a sample to perform transmit shutdown on the trunk port in the 4x100GE-MXP-DD muxponder mode:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller Optics 0/1/0/9
RP/0/RP0/CPU0:ios(config-Optics)#transmit-shutdown
RP/0/RP0/CPU0:ios(config-Optics)#commit
RP/0/RP0/CPU0:ios(config-Optics)#exit
RP/0/RP0/CPU0:ios(config)#exit
```

Verifying Transmit Shutdown on Trunk Optics Controller

```
RP/0/RP0/CPU0:ios#sh controllers optics 0/1/0/12
Fri Feb 26 21:36:16.009 UTC
Controller State: Up
Transport Admin State: In Service
Laser State: Off
```

```
LED State: Yellow
Optics Status
Optics Type: CFP2 DWDM
DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,
Wavelength=1552.524nm
Alarm Status:
 -----
Detected Alarms:
LOW-TX-PWR
LOS/LOL/Fault Status:
Alarm Statistics:
_____
HIGH-RX-PWR = 0 LOW-RX-PWR = 1
HIGH-TX-PWR = 0 LOW-TX-PWR = 1
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 = -40.00 dBm
RX Power = -1.02 dBm
RX Signal Power = -12.20 dBm
Frequency Offset = -8 MHz
Performance Monitoring: Enable
THRESHOLD VALUES
_____
Parameter High Alarm Low Alarm High Warning Low Warning
 ----- -----
                                                      ____ _____
Rx Power Threshold(dBm) 4.9 -12.0 0.0 0.0
Tx Power Threshold(dBm) 3.5 -10.1 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 CD High Threshold = 180000 ps/nm
Configured CD lower Threshold = -180000 ps/nm
Configured OSNR lower Threshold = 0.00 dB
Configured DGD Higher Threshold = 180.00 ps
Baud Rate = 63.1394691467 GBd
Bits per Symbol = 4.000000000 bits/symbol
Modulation Type: 16QAM
Chromatic Dispersion 0 ps/nm
Configured CD-MIN -26000 ps/nm CD-MAX 26000 ps/nm
Polarization Mode Dispersion = 0.0 \text{ ps}
Second Order Polarization Mode Dispersion = 16.00 ps^2
Optical Signal to Noise Ratio = 35.90 dB
SNR = 17.00 \text{ dB}
Polarization Dependent Loss = 0.70 dB
Polarization Change Rate = 0.00 rad/s
Differential Group Delay = 1.00 ps
Transceiver Vendor Details
```

L

Form Factor : CFP2 Name : CISCO-ACACIA Part Number : 10-3500-01 Rev Number : 01 Serial Number : ACA24230026 PID : ONS-CFP2D-400G-C VID : VES1 Date Code(yy/mm/dd) : 10/09/1 Fiber Connector Type: LC Otn Application Code: Not Set Sonet Application Code: Not Set Ethernet Compliance Code: Not set Transceiver Temperature : 55 Celsius AINS Soak : None AINS Timer : Oh, Om AINS remaining time : 0 seconds RP/0/RP0/CPU0:ios#show controller optics 0/1/0/9 Wed Sep 15 00:41:22.027 UTC Controller State: Up Transport Admin State: In Service Laser State: On LED State: Green Optics Status Optics Type: QSFP-DD DWDM DWDM carrier Info: C BAND, MSA ITU Channel=49, Frequency=193.70THz, Wavelength=1547.715nm Alarm Status: _____ Detected Alarms: None LOS/LOL/Fault Status: Alarm Statistics: _____ LOW-RX-PWR = 3 HIGH-RX-PWR = 0HIGH-TX-PWR = 0LOW-TX-PWR = 5 HIGH-LBC = 0HIGH-DGD = 0OOR-CD = 0OSNR = 4WVL-OOL = 0MEA = 0IMPROPER-REM = 6 TX-POWER-PROV-MISMATCH = 0 Laser Bias Current = 0.0 % Actual TX Power = -11.10 dBm RX Power = -11.56 dBm RX Signal Power = -11.62 dBm Frequency Offset = -66 MHz Performance Monitoring: Enable

THRESHOLD VALUES

0.0

0.0

Parameter High Alarm Low Alarm High Warning Low Warning Rx Power Threshold(dBm)3.0-24.5Tx Power Threshold(dBm)0.0-16.0LBC Threshold(mA)N/AN/A 0.0 0.0 -16.0 N/A N'-0.0 0.00 0.00 LBC High Threshold = 90 % Configured Tx Power = -10.00 dBm Configured CD High Threshold = 52000 ps/nm Configured CD lower Threshold = -52000 ps/nmConfigured OSNR lower Threshold = 21.10 dBConfigured DGD Higher Threshold = 67.00 ps Baud Rate = 60.1385467980 GBd Bits per Symbol = 4.000000000 bits/symbol Modulation Type: 16QAM Chromatic Dispersion 0 ps/nm Configured CD-MIN -13000 ps/nm CD-MAX 13000 ps/nm Polarization Mode Dispersion = 0.0 psSecond Order Polarization Mode Dispersion = 24.00 ps^2 Optical Signal to Noise Ratio = 35.70 dB SNR = 19.40 dBPolarization Dependent Loss = 0.20 dB Polarization Change Rate = 0.00 rad/s Differential Group Delay = 1.00 ps Transceiver Vendor Details Form Factor : QSFP-DD : CISCO-ACACIA Name Part Number Rev Number : DP04QSDD-E Rev Number : A Serial Number : ACA2524006W PID : QDD-400G-ZRP-S : V01 VID Date Code(yy/mm/dd) : 21/06/18 Fiber Connector Type: LC Otn Application Code: Not Set Sonet Application Code: Not Set Ethernet Compliance Code: Not set Transceiver Temperature : 62 Celsius AINS Soak : None

: Oh, Om

Loopback

You can configure the loopback on the CoherentDSP, FC, OTU, and Ethernet controllers to identify connection problems. The loopback can be configured only in the maintenance mode. Use the controller controller-type and the secondary-admin-state maintenance commands to place the controllers in the maintenance mode.



Note

Internal and line loopbacks are supported on the FC, OTU, and Ethernet controllers whereas only internal loopbacks are supported on the CoherentDSP controllers.

Configuring Loopback on the 1.2T Card

AINS Timer

To configure the loopback, use the following commands:

configure

controller controllertype Rack/Slot/Instance/Port

sec-admin-state maintenance

loopback [line | internal]

commit

Example 1

The following example shows how a line loopback is configured on the Ethernet controller.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 1/0/1/10 secondary-admin-state
maintenance
RP/0/RP0/CPU0:ios(config)#commit
Fri Feb 22 19:49:46.504 UTC
RP/0/RP0/CPU0:ios(config)#exit
```

The following example shows how to verify a line loopback configured on the Ethernet controller.

```
RP/0/RP0/CPU0:ios#show controller HundredGigECtrlr 0/1/0/10
Fri Feb 22 19:50:08.328 UTC
Operational data for interface HundredGigECtrlr0/1/0/10:
State:
    Administrative state: enabled
    Operational state: Up
   LED state: Green On
   Maintenance: Enabled
   AINS Soak: Pending
      Total Duration: 0 hour(s) 30 minute(s)
      Remaining Duration: 0 hour(s) 30 minute(s) 0 second(s)
    Laser Squelch: Enabled
Phy:
   Media type: Not known
   Statistics:
        FEC:
            Corrected Codeword Count: 0
            Uncorrected Codeword Count: 0
Autonegotiation disabled.
Operational values:
   Speed: 100Gbps
    Duplex: Full Duplex
   Flowcontrol: None
   Loopback: None (or external)
    BER monitoring:
       Not supported
   Forward error correction: Standard (Reed-Solomon)
    Holdoff Time: Oms
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 0/1/0/10 loopback line
RP/0/RP0/CPU0:ios(config)#commit
RP/0/RP0/CPU0:ios(config) #exit
RP/0/RP0/CPU0:ios#show controller HundredGigECtrlr 0/1/0/10
Fri Feb 22 20:01:00.521 UTC
```

```
Operational data for interface HundredGigECtrlr0/1/0/10:
State:
   Administrative state: enabled
   Operational state: Up
   LED state: Green On
   Maintenance: Enabled
   AINS Soak: Pending
      Total Duration: 0 hour(s) 30 minute(s)
      Remaining Duration: 0 hour(s) 30 minute(s) 0 second(s)
   Laser Squelch: Enabled
Phy:
   Media type: Not known
   Statistics:
        FEC:
            Corrected Codeword Count: 0
            Uncorrected Codeword Count: 6
Autonegotiation disabled.
Operational values:
    Speed: 100Gbps
   Duplex: Full Duplex
   Flowcontrol: None
   Loopback: Line
   BER monitoring:
       Not supported
    Forward error correction: Standard (Reed-Solomon)
```

Example 2

Holdoff Time: Oms

The following example shows how to verify an internal loopback configured on the coherent DSP controller.

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/0/0/0
Fri Mar 13 22:00:20.951 UTC
Port
                                                  : CoherentDSP 0/0/0/0
Controller State
                                                  : Up
Inherited Secondary State
                                                  : Normal
Configured Secondary State
                                                  : Maintenance
Derived State
                                                  : Maintenance
Loopback mode
                                                  : Internal
BER Thresholds
                                                  : SF = 1.0E-5 SD = 1.0E-7
Performance Monitoring
                                                  : Enable
Bandwidth
                                                  : 200.0Gb/s
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 = 3 \text{ TIM} = 0
\overline{\text{FECMISMATCH}} = 0 \overline{\text{FEC-UNC}} = 0
Detected Alarms
                                                   : None
Bit Error Rate Information
PREFEC BER
                                                  : 0.00E+00
POSTFEC BER
                                                  : 0.00E+00
Q-Factor
                                                   : 16.70 dB
                                                  : 0.99dB
Q-Margin
TTI :
```

	Remote	hostname	:	ios
	Remote	interface	:	CoherentDSP 0/0/0/0
	Remote	IP addr	:	0.0.0.0
FEC mod	le		:	Soft-Decision 27
AINS Sc	oak	time	:	None
AINS Ti	.mer		:	Oh, Om
AINS re	emaining		:	O seconds

Configuring Loopback on OTN-XP Card

From R7.2.1 onwards, OTN-XP card supports loopback on the OTU2, OTU2e, OTU4, 10GE, and CoherentDSP controllers.

From R7.3.2 onwards, OTN-XP card supports loopback on the 100GE and 400GE controllers.

The CoherentDSP controller supports both line and internal.

To configure the loopback on the controllers, use the following commands:

configure

controller controller type Rack/Slot/Instance/Port/Lane number

sec-admin-state maintenance

loopback [line | internal]

commit

The range of Lane number is 1-4.

Example 1

The following example shows how an internal loopback is configured on the 10GE controller.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller tenGigECtrlr 0/0/0/5/2
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#sec-admin-state maintenance
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#loopback internal
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

The following example shows how to verify an internal loopback configured on the 10GE controller.

```
RP/0/RP0/CPU0:ios#show controllers tenGigECtrlr 0/0/0/5/2
Thu Apr 23 10:47:48.020 UTC
Operational data for interface TenGigECtrlr0/0/0/5/2:
State:
    Administrative state: enabled
    Operational state: Up
    LED state: Green On
    Maintenance: Enabled
    AINS Soak: None
    Total Duration: 0 hour(s) 0 minute(s)
    Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
    Laser Squelch: Disabled
Phy:
    Media type: Not known
Autonegotiation disabled.
```

```
Operational values:

Speed: 10Gbps

Duplex: Full Duplex

Flowcontrol: None

Loopback: Internal

Inter-packet gap: standard (12)

BER monitoring:

Not supported

Holdoff Time: Oms
```

Example 2

The following example shows how a line loopback is configured on the OTU2e controller.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller otu2e 0/0/0/11/3
RP/0/RP0/CPU0:ios(config-otu2e)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-otu2e)#loopback line
RP/0/RP0/CPU0:ios(config-otu2e)#commit
Thu Apr 23 10:55:19.319 UTC
RP/0/RP0/CPU0:ios(config-otu2e)#end
```

The following example shows how to verify a line loopback configured on the OTU2e controller.

```
RP/0/RP0/CPU0:ios#show controllers otu2e 0/0/0/11/3
Thu Apr 23 10:55:28.014 UTC
Port
                                                  : OTU2E 0/0/0/11/3
Controller State
                                                 : Up
Inherited Secondary State
                                                  : Normal
Configured Secondary State
                                                  : Maintenance
Derived State
                                                 : Maintenance
Loopback mode
                                                 : Line
                                                 : SF = 1.0E-5 SD = 1.0E-7
BER Thresholds
Performance Monitoring
                                                 : Enable
Bandwidth
                                                  : 10.0Gb/s
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
\overline{\text{FECMISMATCH}} = 0 \overline{\text{FEC-UNC}} = 0
Detected Alarms
                                                  : None
Bit Error Rate Information
PREFEC BER
                                                  : 0.00E+00
POSTFEC BER
                                                  : 0.00E+00
TTI :
        Remote hostname
                                                  : ios
                                                  : OTU2E 0/0/0/11/3
        Remote interface
        Remote IP addr
                                                  : 0.0.0.0
FEC mode
                                                  : STANDARD
AINS Soak
                                                  : None
AINS Timer
                                                  : Oh, Om
AINS remaining time
                                                  : 0 seconds
```

Example 3

The following example shows how an internal loopback is configured on the OTU2 controller.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller otu2 0/0/0/5/1
RP/0/RP0/CPU0:ios(config-otu2)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-otu2)#loopback internal
RP/0/RP0/CPU0:ios(config-otu2)#commit
Thu Apr 23 11:01:00.562 UTC
RP/0/RP0/CPU0:ios(config-otu2)#end
```

The following example shows how to verify an internal loopback configured on the OTU2 controller.

```
RP/0/RP0/CPU0:ios#show controllers otU2 0/0/0/5/1
Thu Apr 23 11:01:04.126 UTC
Port
                                                  : OTU2 0/0/0/5/1
Controller State
                                                  : Up
Inherited Secondary State
                                                  : Normal
Configured Secondary State
                                                 : Maintenance
Derived State
                                                  : Maintenance
Loopback mode
                                                  : Internal
BER Thresholds
                                                  : SF = 1.0E-5 SD = 1.0E-7
Performance Monitoring
                                                  : Enable
Bandwidth
                                                  : 10.0Gb/s
Alarm Information:
LOS = 0 LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0 SF BER = 0
SD BER = 0 BDI = 0 TIM = 0
\overline{\text{FECMISMATCH}} = 0 \overline{\text{FEC-UNC}} = 0
Detected Alarms
                                                  : None
Bit Error Rate Information
PREFEC BER
                                                  : 0.00E+00
POSTFEC BER
                                                  : 0.00E+00
TTI :
        Remote hostname
                                                  : SM-TRC SAPI-SECSM-TRC DA
        Remote IP addr
                                                  : 209.165.200.229
FEC mode
                                                  : STANDARD
AINS Soak
                                                  : None
AINS Timer
                                                  : Oh, Om
AINS remaining time
                                                  : 0 seconds
```

Example 4

The following example shows how an internal loopback is configured on the OTU4 controller.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller otu4 0/0/0/0
RP/0/RP0/CPU0:ios(config-otu4)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-otu4)#loopback internal
RP/0/RP0/CPU0:ios(config-otu4)#commit
Thu Apr 23 11:05:22.429 UTC
RP/0/RP0/CPU0:ios(config-otu4)#end
```

The following example shows how to verify an internal loopback configured on the OTU4 controller.

```
RP/0/RP0/CPU0:ios#show controllers otu4 0/0/0/0
Thu Apr 23 11:05:30.281 UTC
                                                 : OTU4 0/0/0/0
Port
Controller State
                                                 : Up
Inherited Secondary State
                                                 : Normal
Configured Secondary State
                                                 : Maintenance
Derived State
                                                 : Maintenance
Loopback mode
                                                 : Internal
                                                 : SF = 1.0E-5 SD = 1.0E-7
BER Thresholds
Performance Monitoring
                                                 : Enable
Bandwidth
                                                  : 100.0Gb/s
Alarm Information:
LOS = 1 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
Detected Alarms
                                                  : None
Bit Error Rate Information
PREFEC BER
                                                  : 0.00E+00
POSTFEC BER
                                                  : 0.00E+00
TTT :
        Remote hostname
                                                  : ios
                                                  : OTU4 0/0/0/0
        Remote interface
        Remote IP addr
                                                 : 0.0.0.0
FEC mode
                                                  : STANDARD
AINS Soak
                                                  : None
AINS Timer
                                                  : Oh, Om
AINS remaining time
                                                  : 0 seconds
```

Example: Loopback Configuration in 4X100G MXP on 100GE Controller

The following example shows how the client internal loopback is configured on the 100GE controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 0/2/0/1
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#sec-admin-state maintenance
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#loopback internal
RP/0/RP0/CPU0:ios(config-otu4)#commit
Thu Sep 23 11:05:22.429 UTC
RP/0/RP0/CPU0:ios(config-otu4)#end
```

The following example shows how the client line loopback is configured on the 100GE controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller HundredGigECtrlr 0/2/0/1
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#sec-admin-state maintenance
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#loopback line
RP/0/RP0/CPU0:ios(config-otu4)#commit
Thu Sep 23 11:05:22.429 UTC
RP/0/RP0/CPU0:ios(config-otu4)#end
```

The following example shows how the trunk internal is configured on the coherentDSP controller:

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

```
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/2/0/11
RP/0/RP0/CPU0:ios(config-CoDSP)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-CoDSP)#loopback internal
RP/0/RP0/CPU0:ios(config-otu4)#commit
Thu Sep 23 11:05:22.429 UTC
RP/0/RP0/CPU0:ios(config-otu4)#end
```

The following example shows how the trunk line is configured on the coherentDSP controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/2/0/11
RP/0/RP0/CPU0:ios(config-CoDSP)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-CoDSP)#loopback line
RP/0/RP0/CPU0:ios(config-otu4)#commit
Thu Sep 23 11:05:22.429 UTC
RP/0/RP0/CPU0:ios(config-otu4)#end
```

Example: Loopback Configuration in 400G-TXP on 400GE Controller

The following example shows how the client internal loopback is configured on the 400GE controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller FourHundredGigECtrlr 0/2/0/10
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#sec-admin-state maintenance
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#loopback internal
RP/0/RP0/CPU0:ios(config-otu4)#commit
Thu Sep 23 11:05:22.429 UTC
RP/0/RP0/CPU0:ios(config-otu4)#end
```

The following example shows how the client line loopback is configured on the 100GE controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller FourHundredGigECtrlr 0/2/0/10
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#sec-admin-state maintenance
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#loopback line
RP/0/RP0/CPU0:ios(config-otu4)#commit
Thu Sep 23 11:05:22.429 UTC
RP/0/RP0/CPU0:ios(config-otu4)#end
```

The following example shows how the trunk internal is configured on the coherentDSP controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/2/0/10
RP/0/RP0/CPU0:ios(config-CoDSP)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-CoDSP)#loopback internal
RP/0/RP0/CPU0:ios(config-otu4)#commit
Thu Sep 23 11:05:22.429 UTC
RP/0/RP0/CPU0:ios(config-otu4)#end
```

The following example shows how the trunk line is configured on the coherentDSP controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/2/0/10
RP/0/RP0/CPU0:ios(config-CoDSP)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-CoDSP)#loopback line
RP/0/RP0/CPU0:ios(config-otu4)#commit
Thu Sep 23 11:05:22.429 UTC
RP/0/RP0/CPU0:ios(config-otu4)#end
```

Configure Loopback in Inverse Muxponder Configured on the OTN-XP Card

You can configure loopback on the coherentDSP controllers in the inverse muxponder configuration.



You must configure loopback on both trunk ports 12 and 13, otherwise traffic goes down.

The following example shows how loopback is configured on both the trunk ports:

```
RP/0/RP0/CPU0:ios#configure
Thu Sep 30 14:16:04.678 UTC
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/2/0/12
RP/0/RP0/CPU0:ios(config-CoDSP)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-CoDSP)#loopback internal
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
Thu Sep 30 14:16:19.594 UTC
RP/0/RP0/CPU0:ios(config-CoDSP)#controller coherentDSP 0/2/0/13
RP/0/RP0/CPU0:ios(config-CoDSP)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-CoDSP)#loopback internal
RP/0/RP0/CPU0:ios(config-CoDSP)#loopback internal
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
Thu Sep 30 14:16:32.390 UTC
RP/0/RP0/CPU0:ios(config-CoDSP)#
```

The following examples shows how to verify loopback configured on the OTN-XP card in the inverse muxponder configuration:

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/12
Thu Sep 30 14:17:04.411 UTC
Port
                                               : CoherentDSP 0/2/0/12
Controller State
                                               : Up
Inherited Secondary State
                                               : Normal
Configured Secondary State
                                               : Maintenance
Derived State
                                               : Maintenance
Loopback mode
                                               : Internal
BER Thresholds
                                               : SF = 1.0E-5 SD = 1.0E-7
Performance Monitoring
                                               : Enable
Bandwidth
                                               : 200.0Gb/s
Alarm Information:
LOS = 2 LOF = 0 LOM = 0
OOF = 1 OOM = 0 AIS = 1
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 = 1
FLEXO-LOF = 0
Detected Alarms
                                               : None
Bit Error Rate Information
PREFEC BER
                                               : 2.46E-08
POSTFEC BER
                                               : 0.00E+00
Q-Factor
                                                : 14.60 dB
Q-Margin
                                               : 8.30dB
TTI :
       Remote hostname
                                               : ios
       Remote interface
                                               : CoherentDSP 0/2/0/12
       Remote IP addr
                                               : 0.0.0.0
FEC mode
                                               : O_FEC
```

Flexo-Mode : Enable Flexo Details: Tx GID : 1 TX IID : 1, 2, Rx GID : 1 RX IID : 1, 2, Flexo Peers Information: Controller : CoherentDSP0_2_0_13 OTUCn rate : OTUC2 AINS Soak : None : Oh, Om AINS Timer AINS remaining time : 0 seconds RP/0/RP0/CPU0:ios#sh controllers coherentDSP 0/2/0/13 Thu Sep 30 14:17:08.140 UTC : CoherentDSP 0/2/0/13 Port Controller State : Up : Normal Inherited Secondary State Configured Secondary State : Maintenance Derived State : Maintenance Loopback mode : Internal : SF = 1.0E-5 SD = 1.0E-7 BER Thresholds Performance Monitoring : Enable : 200.0Gb/s Bandwidth Alarm Information: LOS = 1 LOF = 0 LOM = 0OOF = 0 OOM = 0 AIS = 0IAE = 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 = 1 FLEXO-LOF = 0Detected Alarms : None Bit Error Rate Information PREFEC BER : 0.00E+00 POSTFEC BER : 0.00E+00 Q-Factor : 15.70 dB Q-Margin : 9.50dB TTI : Remote IP addr : 0.0.0.0 FEC mode : O FEC Flexo-Mode : Enable Flexo Details: Tx GID : 1 TX IID : 3, 4, Rx GID : 1 RX IID : 3, 4, Flexo Peers Information: Controller : CoherentDSP0 2 0 12 OTUCn rate : OTUC2

AINS	Soak		:	None
AINS	Timer		:	Oh, Om
AINS	remaining	time	:	0 seconds

Configuring Loopback on 2-QDD-C Card

From R7.3.1 onwards, 2-QDD-C card supports loopback on the 100 and 400GE controllers.

Note On applying client-side loopbacks, traffic is looped and does not continue in the 2-QDD-C card. QSFP squelching happens on applying internal loopback.

To configure the loopback on the controllers, use the following commands.

configure

controller controllertype Rack/Slot/Instance/Port/Lanenumber

sec-admin-state maintenance

loopback [line | internal]

commit

Example

The following example shows how an internal loopback is configured on a 100GE controller.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller hundredGigECtrlr 0/0/0/5
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#sec-admin-state maintenance
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#loopback internal
RP/0/RP0/CPU0:ios(config-eth-ctrlr)#commit
```

The following example shows how to verify the internal loopback configured on a 100GE controller.

```
RP/0/RP0/CPU0:ios#show controllers hundredGigECtrlr 0/0/0/5
Thu Apr 23 10:47:48.020 UTC
Operational data for interface hundredGigECtrlr0/0/0/5:
State:
   Administrative state: enabled
   Operational state: Up
   LED state: Green On
   Maintenance: Enabled
   AINS Soak: None
     Total Duration: 0 hour(s) 0 minute(s)
     Remaining Duration: 0 hour(s) 0 minute(s) 0 second(s)
   Laser Squelch: Disabled
Phy:
    Media type: Not known
Autonegotiation disabled.
Operational values:
    Speed: 10Gbps
    Duplex: Full Duplex
   Flowcontrol: None
   Loopback: Internal
```

```
Inter-packet gap: standard (12)
BER monitoring:
Not supported
Holdoff Time: Oms
```

Restore Factory Settings

Ŋ

Note

Perform this operation only on the console port.

Invmgr successful disconnection from service

You can restore the factory settings on the NCS 1004. The entire system configuration, including usernames, passwords, and IP addresses, is removed. You can perform this operation only through the console port and not on the management interface. To restore NCS 1004 to factory settings, use the **commit replace** command. After the **commit replace** operation completes, you must perform the IOS XR reload operation.

The **commit best-effort** command merges the target configuration with the running configuration and commits only valid changes (best effort). Some configuration changes might fail due to semantic errors.

Example

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#commit replace
Tue Sep 24 09:36:59.430 UTC
This commit will replace or remove the entire running configuration. This
operation can be service affecting.
Do you wish to proceed? [no]: yes
RP/0/RP0/CPU0:ios(config)#exit
RP/0/RP0/CPU0:ios#reload
Tue Sep 24 09:38:12.881 UTC
Standby card not present or not Ready for failover. Proceed? [confirm]
Preparing system for backup. This may take a few minutes especially for large configurations.
        Status report: node0 RP0 CPU0: BACKUP INPROGRESS
        Status report: node0 RP0 CPU0: BACKUP HAS COMPLETED SUCCESSFULLY
[Done]
Proceed with reload? [confirm]
Reloading node 0/RP0/CPU0
RL: Reboot initiated with code 1, cause User initiated graceful reload reboot timeout 30
shutdown delay 0
RL: Shutdown initiated
Query the node to be reloaded
NODE IP of noded to be reloaded 192.0.2.4
sending stop hb
Cause: User initiated graceful reload
VM IP addr sent for reload 192.0.2.4
Received ack from sdrmgr for reload request.Returncode:0
successful disconnection from service
wd disconnect cb 548 CMP-WD disconnected successfully
```

```
RP/0/RP0/CPU0:ios#
Disconnecting from 'default-sdr--1' console. Continue(Y/N)?
Connecting to 'default-sdr--1' console
ÿûÿûÿûÿýbootlogd: ioctl(/dev/pts/2, TIOCCONS): Device or resource busy
/sbin/restorecon: lstat(/etc/adjtime) failed: No such file or directory
Configuring network interfaces... done.
Starting system message bus: dbus.
Starting OpenBSD Secure Shell server: sshd
sshd start/running, process 1739
Starting rpcbind daemon...done.
Starting random number generator daemonUnable to open file: /dev/tpm0
Starting system log daemon...0
Starting kernel log daemon...0
tftpd-hpa disabled in /etc/default/tftpd-hpa
Starting internet superserver: xinetd.
net.ipv4.ip forward = 1
Libvirt not initialized for container instance
Starting crond: OK
SIOCADDRT: File exists
DBG_MSG: platform type is 0
[*] ima policy have loaded, or IMA policy file does not exist
Start serial incoming on , Clearing ..
RP/0/RP0/CPU0:Sep 24 09:38:44.284 UTC: fpd-serv[256]: %PKT INFRA-FM-3-FAULT MAJOR :
ALARM MAJOR : FPD-NEED-UPGRADE : DECLARE : 0/PMO:
This (D)RP Node is not ready or active for login /configuration
. . . . . . .
. . . . . . . .
. . . . . . . .
ios con0/RP0/CPU0 is now available
Press RETURN to get started.
```

Headless Mode

During process restarts, CPU reload, or removal of CPU, the NCS 1004 operates in headless mode for up to 72 hours. During this time, traffic is not impacted, although the control plane is not up and running. Fault propagation continues to operate for failures on client and trunk ports. However, you cannot provision anything nor view operational data with a non-functional CPU. Performance monitoring data based on 15 minutes and 24 hour intervals is not supported with a non-functional CPU.

Trail Trace Identifier

The Trail trace identifier (TTI) feature helps you to identify the signal from the source to the destination within the network. You can configure the TTI sent or expected string only in ASCII string format. When the expected TTI string does not match the received TTI trace string, the controller goes down and the OTUK-TIM alarm is raised. To configure TTI on the coherent DSP controllers, use the following commands:

configure

controller coherentDSP R/S/I/P tti {sent | expected} ascii tti-string

commit



Note

The *tti-string* can have a maximum of 64 characters.

The following sample displays how to configure TTI on a coherent DSP controller with the sent and expected strings set to the same ASCII string. The state of the controller is up.

```
RP/0/RP0/CPU0:ios#config
Fri Mar 15 08:03:02.094 UTC
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/1/0/1 tti sent ascii 1234
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/1/0/1 tti expected ascii 1234
RP/0/RP0/CPU0:ios(config)#commit
Fri Mar 15 08:03:49.725 UTC
RP/0/RP0/CPU0:ios(config)#exit
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/1/0/1
Fri Mar 15 08:04:06.290 UTC
                                             : CoherentDSP 0/1/0/1
Port
Controller State
                                            : Up
Inherited Secondary State
                                            : Normal
Configured Secondary State
                                            : Normal
Derived State
                                             : In Service
Loopback mode
                                            : None
                                            : SF = 1.0E-5 SD = 1.0E-7
BER Thresholds
Performance Monitoring
                                             : Enable
Alarm Information:
LOS = 0 LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0
                     SF BER = 0
SD BER = 0 BDI = 1 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0
Detected Alarms
                                             : None
Bit Error Rate Information
PREFEC BER
                                             : 7.7E-03
POSTFEC BER
                                             : 0.0E+00
OTU TTI Sent
    OPERATOR SPECIFIC ASCII
                                            : 1234
                                             :
                                             : 313233340000000000000000000000000
    OPERATOR SPECIFIC HEX
                                             OTU TTI Received
    OPERATOR SPECIFIC ASCII
                                             : 1234
                                             : 313233340000000000000000000000000
    OPERATOR SPECIFIC HEX
                                             OTU TTI Expected
    OPERATOR SPECIFIC ASCII
                                             : 1234
    OPERATOR SPECIFIC HEX
                                            : 3132333400000000000000000000000000
                                            FEC mode
                                             : Soft-Decision 27
ATNS Soak
                                             : None
AINS Timer
                                             : 0h, 0m
AINS remaining time
                                             : 0 seconds
```

The following example shows how to configure TTI on a coherent DSP controller with the sent and expected strings set to different ASCII strings. The state of the controller goes down and the TIM alarm is raised.

```
RP/0/RP0/CPU0:ios#config
Fri Mar 15 08:54:29.780 UTC
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/1/0/1 tti sent ascii 1234
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/1/0/1 tti expected ascii 5678
RP/0/RP0/CPU0:ios(config)#commit
Fri Mar 15 08:56:12.293 UTC
RP/0/RP0/CPU0:ios(config)#exit
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/1/0/1
Fri Mar 15 08:56:33.910 UTC
                                            : CoherentDSP 0/1/0/1
Port
Controller State
                                            : Down
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 = 1 LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0 SF BER = 0
SD BER = 0 BDI = 3 TIM = 1
FECMISMATCH = 0 FEC-UNC = 0
Detected Alarms
                                            : BDI TIM
Bit Error Rate Information
PREFEC BER
                                            : 8.2E-03
POSTFEC BER
                                            : 0.0E+00
OTU TTI Sent
    OPERATOR SPECIFIC ASCII
                                            : 1234
    OPERATOR SPECIFIC HEX
                                            : 313233340000000000000000000000000
                                            OTU TTI Received
    OPERATOR SPECIFIC ASCII
                                            : 1234
                                            : 313233340000000000000000000000000
    OPERATOR SPECIFIC HEX
                                            OTU TTI Expected
    OPERATOR SPECIFIC ASCII
                                            : 5678
    OPERATOR SPECIFIC HEX
                                            : 3536373800000000000000000000000000
                                            FEC mode
                                            : Soft-Decision 27
AINS Soak
                                            : None
                                            : Oh, Om
AINS Timer
AINS remaining time
                                            : 0 seconds
```

Configure TTI on OTN-XP Card

You can configure the TTI sent or expected string in the full ASCII format, or Source Access Point Identifier (SAPI)/Destination Access Point Identifier (DAPI) format on OTU, ODU, ODU-flex, ODUCn, and coherentDSP controllers for the OTN-XP card.

From R7.3.1 onwards, coherentDSP controller supports only the full ASCII string format.

From R7.3.2 onwards, coherentDSP controller supports SAPI/DAPI string format in addition to the full ASCII string format.

You can configure TTI for the following muxponder modes:

- 10G-Grey-MXP
- 4x100G-MXP-400G-TXP

The following table lists the ASCII format that is supported on each muxponder mode for TTI:

Table 5: ASCII Format Supported on Each Muxponder Mode

Muxponder Mode	ASCII with Character String	Controller	
10G Grey	Full ASCII 64-character	OTU2, OTU2E, OTU4, ODU4, ODU2E (10G mapper)	
	SAPI ASCII 15-character	OTU2, OTU2E, OTU4, ODU4, ODU2E (10G mapper)	
	DAPI ASCII 15-character	OTU2, OTU2E, OTU4, ODU4, ODU2E (10G mapper)	
	Operator-specific ASCII 32-character	OTU2, OTU2E, OTU4, ODU4, ODU2E (10G mapper)	
4x100G-MXP-400G-TXP	Full ASCII 64-character	OTU4, coherentDSP, ODUC4, ODU4 (100G mapper), and ODU-FLEX (400G mapper)	
	SAPI ASCII 15-character	OTU4, coherentDSP, ODUC4, ODU4 (100G mapper), and ODU-FLEX (400G mapper)	
	DAPI ASCII 15-character	OTU4, coherentDSP, ODUC4, ODU4 (100G mapper), and ODU-FLEX (400G mapper)	
	Operator-specific ASCII 32-character	OTU4, coherentDSP, ODUC4, ODU4 (100G mapper), and ODU-FLEX (400G mapper)	

To configure TTI, use the following commands:

configure

controller *controller-type R/S/I/P* **tti** {**sent** | **expected**} {**ascii** | **sapi ascii** | **dapi ascii** | **operator-specific ascii** } *tti-string*

commit

Note

We recommend that you configure TTI in the SAPI/DAPI ASCII format.

The following is a sample configuration on ODU4 controller:

RP/0/RP0/CPU0:ios#show controllers odU4 0/1/0/12/7

```
RP/0/RP0/CPU0:ios#configure
Thu Sep 30 17:19:11.804 UTC
Current Configuration Session Line
                                         User
                                                   Date
                                                                            Lock
00001000-00005c15-00000000 vty0
                                                  Thu Sep 30 11:50:12 2021
                                         root
RP/0/RP0/CPU0:ios(config)#controller odU4 0/1/0/12/7 tti sent sapi ascii cisco123
RP/0/RP0/CPU0:ios(config)#controller odU4 0/1/0/12/7 tti expect sapi ascii 123cisco
RP/0/RP0/CPU0:ios(config)#controller odU4 0/1/0/12/7 tti sent dapi ascii dapistring123
RP/0/RP0/CPU0:ios(config)#controller odU4 0/1/0/12/7 tti expected dapi ascii 123stringdapi
RP/0/RP0/CPU0:ios(config)#controller odU4 0/1/0/12/7 tti sent operator-specific ascii
operation123
RP/0/RP0/CPU0:ios(config)#controller odU4 0/1/0/12/7 tti expected operator-specific ascii
123operator
RP/0/RP0/CPU0:ios(config)#commit
Thu Sep 30 17:21:49.521 UTC
RP/0/RP0/CPU0:ios(config)#end
```

The following is a sample output of the TTI configuration on the ODU4 controller:

```
Thu Sep 30 17:22:30.658 UTC
Port.
                                           : ODU4 0/1/0/12/7
Controller State
                                           : Down
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
Path Monitoring Mode
                                           : Operational
PM TIM-CA state
                                           : Disable
Alarm Information:
AIS = 3 IAE = 0 BIAE = 0
SF BER = 0
            SD BER = 0
                             BDT = 1
OCI = 0 LCK = 2 PTIM = 0
TIM = 1 CSF = 0 GFP LFD = 0
GFP LOCS = 0
            GFP LOCCS = 0 GFP UPM = 0
Detected Alarms
                                           : TIM
ODU TTI Sent
    SAPI ASCII
                                           : c i s c o 1 2 3
    SAPI HEX
                                           : 00636973636F3132330000000000000
    DAPI ASCII
                                           :dapistring123
    DAPI HEX
                                           : 0064617069737472696E673132330000
    OPERATOR SPECIFIC ASCII
                                           : operation123
    OPERATOR SPECIFIC HEX
ODU TTI Received
ODU TTI Expected
    SAPI ASCII
                                           : 1 2 3 c i s c o
```

```
SAPI HEX
                                       : 00313233636973636F0000000000000
    DAPI ASCII
                                        : 1 2 3 s t r i n g d a p i
    DAPI HEX
                                       : 00313233737472696E67646170690000
    OPERATOR SPECIFIC ASCII
                                       : 123operator
    OPERATOR SPECIFIC HEX
AINS Soak
                                       : None
AINS Timer
                                       : 0h, 0m
AINS remaining time
                                       : 0 seconds
Private Line Emulation (PLE) supported
                                       : No
```

Configure TTI on Inverse Muxponder Configuration on the OTN-XP Card

The following sample displays how to configure TTI on a coherent DSP controller port 12 on the OTN-XP in inverse muxponder configuration mode.

Note

TTI configuration is not supported on the DSP controller port 13.

```
RP/0/RP0/CPU0:ios#configure
Thu Sep 30 14:18:13.288 UTC
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/2/0/12
RP/0/RP0/CPU0:ios(config-CoDSP)#tti sent sapi ascii cisco
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
```

The following sample verifies the TTI configuration on the inverse muxponder configured on the OTN-XP Card.

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/12
Thu Sep 30 14:19:05.367 UTC
```

```
Port
                                               : CoherentDSP 0/2/0/12
Controller State
                                              : Up
Inherited Secondary State
                                              : Normal
Configured Secondary State
                                              : Maintenance
Derived State
                                              : Maintenance
Loopback mode
                                              : Internal
BER Thresholds
                                              : SF = 1.0E-5 SD = 1.0E-7
Performance Monitoring
                                              : Enable
Bandwidth
                                               : 200.0Gb/s
Alarm Information:
LOS = 2 LOF = 0 LOM = 0
OOF = 1 OOM = 0 AIS = 1
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 = 1
FLEXO-LOF = 0
Detected Alarms
                                               : None
Bit Error Rate Information
PREFEC BER
                                               : 4.11E-09
POSTFEC BER
                                               : 0.00E+00
Q-Factor
                                               : 14.90 dB
Q-Margin
                                               : 8.60dB
OTU TTI Sent
    SAPI ASCII
                                               : cisco
```

```
SAPI HEX
                                                : 00636973636F00000000000000000000
    DAPI ASCII
     DAPI HEX
                                                :
     OPERATOR SPECIFIC ASCII
                                                :
     OPERATOR SPECIFIC HEX
CDCDCDCDED00DBBE2100000000000000050D9D29AD7F00007603BADC7698BADC
OTU TTI Received
    SAPI ASCII
                                                : cisco
     SAPI HEX
                                                : 00636973636F000000000000000000000
FEC mode
                                                : O FEC
Flexo-Mode
                                                : Enable
Flexo Details:
       Tx GID
                                                : 1
        TX IID
                                                : 1, 2,
                                                • 1
       Rx GTD
       RX IID
                                                : 1, 2,
Flexo Peers Information:
                                                : CoherentDSP0 2 0 13
       Controller
        OTUCn rate
                                                 : OTUC2
AINS Soak
                                                : None
AINS Timer
                                                : 0h, 0m
AINS remaining time
                                                : 0 seconds
```

Enable TIM CA on Path Monitoring Layer

You can enable Trace Identifier Mismatch (TIM) consequent action (CA) on the Path Monitoring (PM) layer using the **pm-tim-ca** command on mapper ODUs for Ethernet controller. The TTI transmit string in the SAPI/DAPI format is not configurable on ODUs that are transparent.

For example, the clients that are supported are ODU4, ODU2, and ODU2E, and lower-order ODUs such as ODU2 or ODU2E.

You can configure **pm-tim-ca** only on mapper ODUs such as ODU2E (10G mapper), ODU4 (100G mapper), and ODU-FLEX (400G mapper).

To configure **pm-tim-ca** on mapper ODU in the 4x100G-MXP-400G-TXP muxponder mode, use the following commands

configure

controller controller-type R/S/I/P

pm-tim-ca

commit

Chromatic dispersion

You can configure chromatic dispersion on optics controllers. When you configure the maximum and minimum values for chromatic dispersion for any data rate, ensure the minimum difference between the configured values is equal to or greater than 1500 ps/nm.

The following table lists the default CD search range.

Data Rate	BPS	Card Support	Default CD Search Range
200G to 500G	BPS < = 3	1.2T, 1.2TL	-10,000 to 100,000 ps/nm
	3 < BPS <= 4	1.2T, 1.2TL	-10,000 to 80,000 ps/nm
	4 < BPS <=5	1.2T	-5,000 to 20,000 ps/nm
600G	BPS=5.2578125	1.2T	-2000 to 2,000 ps/nm
400G for 400G CFP2 DCO	BPS=4	OTN-XP	-24,000 to 24,000 ps/nm
400GE for ZRP	BPS=4	OTN-XP	For CFEC, -2,400 to 2,400 ps/nm
			For OFEC, -13,000 to 13,000 ps/nm
100G	BPS <= 3	2-QDD-C	-10000 to +100000 ps/nm
200G to 300G	BPS <= 3	2-QDD-C	-10000 to +100000 ps/nm
	3> BPS =4		-10000 to +80000 ps/nm
	4> BPS =5		-5000 to +200000 ps/nm
	5> BPS =6		-5000 to +100000 ps/nm
400G	BPS = 4	2-QDD-C	-10000 to +80000 ps/nm
	4> BPS =5		-5000 to +20000 ps/nm
	5> BPS =6		-5000 to +10000 ps/nm

Note The cd-min and cd-max values must be set for BPS values that are greater than 4 in the 1.2T card.

Note

When the user provisions the cd-min and cd-max values that are outside the range through CLI, the provisioned values are accepted; however, only the actual values supported by the hardware are applied.

The following is a sample where chromatic dispersion is configured on the optics controller.

```
RP/0/RP0/CPU0:ios#configure
Mon Aug 19 19:31:42.115 UTC
RP/0/RP0/CPU0:ios(config)#controller optics 0/1/0/1
RP/0/RP0/CPU0:ios(config-Optics)#cd-max 4000
RP/0/RP0/CPU0:ios(config-Optics)#cd-min -1000
RP/0/RP0/CPU0:ios(config-Optics)#commit
Mon Aug 19 19:35:24.697 UTC
RP/0/RP0/CPU0:ios(config-Optics)#exit
RP/0/RP0/CPU0:ios(config)#exit
RP/0/RP0/CPU0:ios(config)#exit
```

```
Mon Aug 19 19:57:41.859 UTC
controller Optics0/1/0/0
transmit-power -15
dwdm-carrier 50GHz-grid itu-ch 55
enh-sop-tol-mode 1
 cross-pol-gain-mode 10
lbc-high-threshold 5
1
controller Optics0/1/0/1
description trunk power UP
cd-min -1000
cd-max 4000
 enh-colorless-mode 2
enh-sop-tol-mode 3
nleq-comp-mode 4
cross-pol-gain-mode 2
cross-pol-weight-mode 3
 cpr-win-mode 3
 cpr-ext-win-mode 8
rx-voa fixed-ratio 1200
filter-roll-off-factor 0.035
1
controller Optics0/1/0/5
 soak-time 10
I
```

Transmit Power

From Release 7.3.1 onwards, you can configure transmit power on the CFP2 DCO optics for the OTN-XP card. The value ranges from -10 to +1 dBm.

From Release 7.3.2 onwards, you can configure transmit power on the QDD ZRP optics for the OTN-XP card. The following are the value ranges for OFEC and CFEC:

FEC Types	Transmit Power (dBm)
OFEC	-13 to -9
CFEC	-10 to -6

To configure transmit power on the CFP2 DCO optics for the OTN-XP card, use the following commands:

```
RP/0/RP0/CPU0:ios#configure
Mon Aug 19 19:31:42.115 UTC
RP/0/RP0/CPU0:ios(config)#controller optics 0/1/0/12
RP/0/RP0/CPU0:ios(config-Optics)#transmit-power -1.50
RP/0/RP0/CPU0:ios(config-Optics)#commit
Mon Aug 19 19:35:24.697 UTC
RP/0/RP0/CPU0:ios(config-Optics)#exit
RP/0/RP0/CPU0:ios(config)#exit
```

The following is a sample in which transmit power of -1.50 dBm is configured on the CFP2 DCO optics for the OTN-XP card.

```
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#do show controllers optics 0/1/0/12
Mon Jan 18 19:05:26.009 UTC
```

Controller State: Down

```
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=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 = 0
WVL-OOL = 0 MEA = 0
IMPROPER-REM = 0
TX-POWER-PROV-MISMATCH = 0
Laser Bias Current = 0.0 %
Actual TX Power = -1.47 dBm
RX Power = -0.86 dBm
RX Signal Power = 0.86 dBm
Frequency Offset = 0 \text{ MHz}
Performance Monitoring: Enable
THRESHOLD VALUES
_____
Parameter High Alarm Low Alarm High Warning Low Warning
Rx Power Threshold(dBm) 4.9 -12.0 0.0 0.0
Tx Power Threshold(dBm) 3.5 -10.1 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 CD High Threshold = 180000 ps/nm
Configured CD lower Threshold = -180000 \text{ ps/nm}
Configured OSNR lower Threshold = 0.00 dB
Configured DGD Higher Threshold = 180.00 ps
Baud Rate = 63.0999984741 GBd
Bits per Symbol = 4.000000000 bits/symbol
Modulation Type: 16QAM
Chromatic Dispersion 0 ps/nm
Configured CD-MIN -26000 ps/nm CD-MAX 26000 ps/nm
Polarization Mode Dispersion = 0.0 ps
Second Order Polarization Mode Dispersion = 156.00 ps^2
Optical Signal to Noise Ratio = 35.80 dB
SNR = 10.50 dB
Polarization Dependent Loss = 0.00 dB
Polarization Change Rate = 0.00 rad/s
```

Differential Group Delay = 1.00 ps Filter Roll Off Factor : 0.000 Rx VOA Fixed Ratio : 0.00 dB Enhanced Colorless Mode : 0 Enhanced SOP Tolerance Mode : 0

Transmit Power on QDD ZRP Optics

To configure transmit power on the QDD ZRP optics for the OTN-XP card, use the following commands:

```
RP/0/RP0/CPU0:ios#configure
Mon Aug 19 19:31:42.115 UTC
RP/0/RP0/CPU0:ios(config)#controller optics 0/1/0/9
RP/0/RP0/CPU0:ios(config-Optics)#transmit-power -8
RP/0/RP0/CPU0:ios(config-Optics)#commit
Mon Aug 19 19:35:24.697 UTC
RP/0/RP0/CPU0:ios(config-Optics)#
```

The following is a sample in which transmit power of -8 dBm is configured on the QDD ZRP optics for the OTN-XP card:

```
RP/0/RP0/CPU0:ios#show controller optics 0/1/0/9
Wed Sep 15 00:36:24.383 UTC
Controller State: Up
 Transport Admin State: In Service
 Laser State: On
LED State: Green
 Optics Status
        Optics Type: QSFP-DD DWDM
        DWDM carrier Info: C BAND, MSA ITU Channel=49, Frequency=193.70THz,
        Wavelength=1547.715nm
        Alarm Status:
         _____
        Detected Alarms: None
        LOS/LOL/Fault Status:
        Alarm Statistics:
         -----
        HIGH-RX-PWR = 0
                                  LOW-RX-PWR = 1
                                 LOW-TX-PWR = 1
        HIGH-TX-PWR = 0
        HIGH-LBC = 0
                                 HIGH-DGD = 0
        OOR-CD = 0
                                  OSNR = 1
        WVL-OOL = 0
                                  MEA = 0
        IMPROPER-REM = 0
        TX-POWER-PROV-MISMATCH = 0
        Laser Bias Current = 0.0 %
        Actual TX Power = -8 dBm
        RX Power = -7.31 dBm
        RX Signal Power = -7.67 dBm
        Frequency Offset = 81 MHz
```

Performance Monitoring: Enable

THRESHOLD VALUES

Parameter	High Alarm	Low Alarm	High Warning	Low Warning
Rx Power Threshold(dBm)	3.0	-23.5	0.0	0.0
Tx Power Threshold(dBm)	0.0	-16.0	0.0	0.0
LBC Threshold(mA)	N/A	N/A	0.00	0.00

```
LBC High Threshold = 90 %
Configured Tx Power = -7.00 dBm
Configured CD High Threshold = 2400 ps/nm
Configured CD lower Threshold = -2400 \text{ ps/nm}
Configured OSNR lower Threshold = 24.00 dB
Configured DGD Higher Threshold = 40.00 ps
Baud Rate = 59.8437500000 GBd
Bits per Symbol = 4.000000000 bits/symbol
Modulation Type: 16QAM
Chromatic Dispersion 0 ps/nm
Configured CD-MIN -2400 ps/nm CD-MAX 2400 ps/nm
Polarization Mode Dispersion = 0.0 \text{ ps}
Second Order Polarization Mode Dispersion = 29.00 ps^2
Optical Signal to Noise Ratio = 36.40 dB
SNR = 17.30 \text{ dB}
Polarization Dependent Loss = 0.40 dB
Polarization Change Rate = 0.00 rad/s
Differential Group Delay = 3.00 ps
```

Transceiver Vendor Details

```
Form Factor
                              : QSFP-DD
                              : CISCO
        Name
                              : 10-3496-01
        Part Number
        Rev Number
                               : 11
        Serial Number
                              : 210153241
                              : QDD-400G-ZRP-S
        PID
        VID
                              : ES04
        Date Code(yy/mm/dd) : 20/21/01
        Fiber Connector Type: LC
        Otn Application Code: Not Set
        Sonet Application Code: Not Set
        Ethernet Compliance Code: Not set
Transceiver Temperature : 57 Celsius
AINS Soak : None
AINS Timer : Oh, Om
AINS remaining time : O seconds
```

Laser Bias Current High Threshold

You can configure the threshold of the laser bias current flowing on the phusical pluggable port on the trunk optics controller. The range is 0 to 100%

To configure the laser bias current threshold, use the following command:

configure controller optics *R/S/I/P* lbc-high-threshold *lbc-value* commit The following sample configures the high laser bias threshold on the controller optics:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller optics 0/0/0/12
RP/0/RP0/CPU0:ios(config-Optics)#lbc-high-threshold 55
RP/0/RP0/CPU0:ios(config-Optics)#commit
```

The following sample shows the high rlaser bias threshold configured on the controller optics:

```
RP/0/RP0/CPU0:ios#show controllers optics 0/0/0/12
Fri Nov 12 10:58:50.595 UTC
```

Controller State: Up

Transport Admin State: In Service

Laser State: On

LED State: Yellow

Optics Status

```
Optics Type: CFP2 DWDM
DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,
Wavelength=1552.524nm
Alarm Status:
_____
Detected Alarms:
        HIGH-RX-PWR LOW-TX-PWR
        HIGH-DGD
LOS/LOL/Fault Status:
Alarm Statistics:
_____
                            LOW-RX-PWR = 0
LOW-TX-PWR = 1
HIGH-RX-PWR = 1
HIGH-TX-PWR = 0
                            HIGH-DGD = 6
HIGH-LBC = 0
OOR-CD = 0
                            OSNR = 0
WVL-OOL = 0
                             MEA = 0
IMPROPER-REM = 1
TX-POWER-PROV-MISMATCH = 0
Laser Bias Current = 0.0 %
Actual TX Power = 0.97 dBm
RX Power = -0.53 dBm
RX Signal Power = -1.20 dBm
Frequency Offset = 63 MHz
Performance Monitoring: Enable
THRESHOLD VALUES
 -----
                            High Alarm Low Alarm High Warning Low Warning
Parameter

        Rx Power Threshold(dBm)
        -2.0
        -3.0
        0.0
        0.0

        Tx Power Threshold(dBm)
        4.0
        2.0
        0.0
        0.0

        LBC Threshold(mA)
        N/A
        N/A
        0.00
        0.00
```

LBC High Threshold = 55 % Configured Tx Power = 1.00 dBm

Configured CD High Threshold = 2400 ps/nmConfigured CD lower Threshold = -2400 ps/nm

```
Configured OSNR lower Threshold = 0.40 dB
        Configured DGD Higher Threshold = 0.30 ps
        Baud Rate = 63.1394679230 GBd
        Bits per Symbol = 3.000000000 bits/symbol
        Modulation Type: 8QAM
         Chromatic Dispersion 0 ps/nm
        Configured CD-MIN -48000 ps/nm CD-MAX 48000 ps/nm
        Polarization Mode Dispersion = 0.0 \text{ ps}
         Second Order Polarization Mode Dispersion = 29.00 ps^2
        Optical Signal to Noise Ratio = 36.10 dB
         SNR = 17.50 \text{ dB}
         Polarization Dependent Loss = 0.50 dB
        Polarization Change Rate = 0.00 rad/s
        Differential Group Delay = 1.00 ps
Transceiver Vendor Details
                               : CFP2
        Form Factor
                              : CISCO-ACACIA
        Name
        Name : CISCO-ACAC
Part Number : 10-3500-01
Pour Number : 01
        Rev Number
                               : 01
        Serial Number
                               : ACA24480037
        PTD
                                : ONS-CFP2D-400G-C
                               : VES1
        VTD
        Date Code(yy/mm/dd) : 20/11/10
        Fiber Connector Type: LC
        Otn Application Code: Not Set
         Sonet Application Code: Not Set
        Ethernet Compliance Code: Not set
Transceiver Temperature : 46 Celsius
```

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

Differential Group Delay Threshold

You can configure the threshold value for the maximum acceptable differential group delay (DGD) on the trunk optics controllers. The DGD alarm is raised if DGD exceeds this value.

The range is 0–18000 (in the units of 0.01 ps).

To configure the maximum acceptable DGD, use the following command:

configure

controller optics R/S/I/P

dgd-high-threshold dgd-value

commit

The following sample configures the minimum acceptable DGD on the controller optics:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller optics 0/0/0/12
RP/0/RP0/CPU0:ios(config-Optics)#dgd-high-threshold 30
RP/0/RP0/CPU0:ios(config-Optics)#commit
```

The following sample shows the maximum acceptable DGD configured on the controller optics:

```
RP/0/RP0/CPU0:ios#show controllers optics 0/0/0/12
Fri Nov 12 10:58:50.595 UTC
Controller State: Up
Transport Admin State: In Service
Laser State: On
LED State: Yellow
Optics Status
         Optics Type: CFP2 DWDM
         DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,
         Wavelength=1552.524nm
         Alarm Status:
         _____
         Detected Alarms:
                HIGH-RX-PWR LOW-TX-PWR
                 HIGH-DGD
         LOS/LOL/Fault Status:
         Alarm Statistics:
         _____
         HIGH-RX-PWR = 1
                                   LOW-RX-PWR = 0
         HIGH-TX-PWR = 0
                                  LOW-TX-PWR = 1
         HIGH-LBC = 0
                                   HIGH-DGD = 6
         OOR-CD = 0
                                   OSNR = 0
         WVL-OOL = 0
                                   MEA = 0
         IMPROPER-REM = 1
         TX-POWER-PROV-MISMATCH = 0
         Laser Bias Current = 0.0 %
         Actual TX Power = 0.97 dBm
         RX Power = -0.53 dBm
         RX Signal Power = -1.20 dBm
         Frequency Offset = 63 \text{ MHz}
         Performance Monitoring: Enable
         THRESHOLD VALUES
         _____
         Parameter
                                  High Alarm Low Alarm High Warning Low Warning

        Rx Power Threshold(dBm)
        -2.0
        -3.0
        0.0
        0.0

        Tx Power Threshold(dBm)
        4.0
        2.0
        0.0
        0.0

                                                2.0
N/A
                                         N/A
                                                                 0.00
                                                                              0.00
         LBC Threshold(mA)
         LBC High Threshold = 55 \%
         Configured Tx Power = 1.00 dBm
         Configured CD High Threshold = 2400 ps/nm
         Configured CD lower Threshold = -2400 \text{ ps/nm}
         Configured OSNR lower Threshold = 0.40 \text{ dB}
         Configured DGD Higher Threshold = 0.30 ps
         Baud Rate = 63.1394679230 GBd
         Bits per Symbol = 3.000000000 bits/symbol
         Modulation Type: 8QAM
         Chromatic Dispersion 0 ps/nm
         Configured CD-MIN -48000 ps/nm CD-MAX 48000 ps/nm
         Polarization Mode Dispersion = 0.0 \text{ ps}
```

```
Second Order Polarization Mode Dispersion = 29.00 ps^2
         Optical Signal to Noise Ratio = 36.10 dB
         SNR = 17.50 \text{ dB}
         Polarization Dependent Loss = 0.50 dB
         Polarization Change Rate = 0.00 rad/s
         Differential Group Delay = 1.00 ps
Transceiver Vendor Details
         Form Factor : CFP2
                              : CISCO-ACACIA
: 10-3500-01
         Name
        Rev Number
Seriol
                              : 01
         Serial Number : ACA24480037
PID : ONS-CFP2D-4
                              : ONS-CFP2D-400G-C
                              : VES1
         VID
         Date Code(yy/mm/dd)
                               : 20/11/10
         Fiber Connector Type: LC
         Otn Application Code: Not Set
         Sonet Application Code: Not Set
         Ethernet Compliance Code: Not set
Transceiver Temperature : 46 Celsius
AINS Soak
                        : None
                        : Oh, Om
AINS Timer
AINS remaining time
                        : 0 seconds
```

Optical Signal to Noise Ratio

You can configure the minimum acceptable Optical Signal to Noise ratio (OSNR) value. The OSNR alarm is raised if OSNR goes below this value.

The range is 0–4000 (in units of 0.01db).

To configure the minimum acceptable OSNR, use the following command:

configure

controller optics R/S/I/P

osnr-low-threshold osnr-value

commit

The following sample configures the minimum acceptable OSNR on the controller optics:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller optics 0/0/0/12
RP/0/RP0/CPU0:ios(config-Optics)#osnr-low-threshold 40
RP/0/RP0/CPU0:ios(config-Optics)#commit
```

The following sample shows the minimum acceptable OSNR configured on the controller optics:

```
RP/0/RP0/CPU0:ios#show controllers optics 0/0/0/12
Fri Nov 12 10:58:50.595 UTC
```

Controller State: Up

Transport Admin State: In Service

```
Laser State: On
LED State: Yellow
Optics Status
         Optics Type: CFP2 DWDM
         DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,
         Wavelength=1552.524nm
         Alarm Status:
         _____
         Detected Alarms:
                 HIGH-RX-PWR LOW-TX-PWR
                 HIGH-DGD
         LOS/LOL/Fault Status:
         Alarm Statistics:
         _____
                                    LOW-RX-PWR = 0
LOW-TX-PWR = 1
         HIGH-RX-PWR = 1
         HIGH-TX-PWR = 0
                                    HIGH-DGD = 6
         HIGH-LBC = 0
         OOR-CD = 0
                                    OSNR = 0
         WVL-OOL = 0
                                     MEA = 0
         TMPROPER-REM = 1
         TX-POWER-PROV-MISMATCH = 0
         Laser Bias Current = 0.0 %
         Actual TX Power = 0.97 dBm
         RX Power = -0.53 dBm
         RX Signal Power = -1.20 dBm
         Frequency Offset = 63 MHz
         Performance Monitoring: Enable
         THRESHOLD VALUES
          _____
         Parameter
                                    High Alarm Low Alarm High Warning Low Warning

        Rx Power Threshold(dBm)
        -2.0
        -3.0
        0.0

        Tx Power Threshold(dBm)
        4.0
        2.0
        0.0

        LBC Threshold(mA)
        N/A
        N/A
        0.00

                                                                                  0.0
                                                                                   0.0
                                                                                  0.00
         LBC High Threshold = 55 %
         Configured Tx Power = 1.00 dBm
         Configured CD High Threshold = 2400 ps/nm
         Configured CD lower Threshold = -2400 \text{ ps/nm}
         Configured OSNR lower Threshold = 0.40 dB
         Configured DGD Higher Threshold = 0.30 ps
         Baud Rate = 63.1394679230 GBd
         Bits per Symbol = 3.000000000 bits/symbol
         Modulation Type: 8QAM
         Chromatic Dispersion 0 ps/nm
         Configured CD-MIN -48000 ps/nm CD-MAX 48000 ps/nm
         Polarization Mode Dispersion = 0.0 \text{ ps}
         Second Order Polarization Mode Dispersion = 29.00 ps^2
         Optical Signal to Noise Ratio = 36.10 dB
         SNR = 17.50 \text{ dB}
         Polarization Dependent Loss = 0.50 dB
         Polarization Change Rate = 0.00 rad/s
         Differential Group Delay = 1.00 ps
```

```
Transceiver Vendor Details
          Form Factor : CFP2
Name : CISCO-ACACIA
          Part Number: 10-3500-01Rev Number: 01Serial Number: ACA24480037PID: ONS-CFP2D-4
                                   : 01
: ACA24480037
                                   : ONS-CFP2D-400G-C
                                   : VES1
          VID
          Date Code (yy/mm/dd) : 20/11/10
          Fiber Connector Type: LC
          Otn Application Code: Not Set
          Sonet Application Code: Not Set
          Ethernet Compliance Code: Not set
Transceiver Temperature : 46 Celsius
AINS Soak
AINS Timer
                           : None
AINS Timer : Oh, Om
AINS remaining time : O seconds
```

Chromatic Dispersion Threshold

You can configure the minimum and maximum acceptable chromatic dispersion for the trunk optics controllers. The CD alarm is raised if the chromatic dispersion goes below the minimum or exceeds the maximum value.

The following is a sample of configuring the minimum and maximum chromatic dispersion threshold:

To configure the maximum nd minimum acceptable CD, use the following command:

configure

controller optics R/S/I/P

cd-high-threshold cd-high

cd-low-threshold cd-low

commit

The following sample configures the maximum and minimum acceptable CD on the controller optics:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller optics 0/0/0/12
RP/0/RP0/CPU0:ios(config-Optics)#cd-high-threshold 2400
RP/0/RP0/CPU0:ios(config-Optics)#cd-low-threshold -2400
RP/0/RP0/CPU0:ios(config-Optics)#commit
```

The following sample shows the maximum and minimum acceptable CD configured on the controller optics:

```
RP/0/RP0/CPU0:ios#show controllers optics 0/0/0/12
Fri Nov 12 10:58:50.595 UTC
Controller State: Up
Transport Admin State: In Service
Laser State: On
LED State: Yellow
```

```
Optics Status
         Optics Type: CFP2 DWDM
         DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,
         Wavelength=1552.524nm
         Alarm Status:
            _____
         Detected Alarms:
                 HIGH-RX-PWR LOW-TX-PWR
                  HIGH-DGD
         LOS/LOL/Fault Status:
         Alarm Statistics:
         HIGH-RX-PWR = 1
                                     LOW-RX-PWR = 0
         HIGH-TX-PWR = 0
                                    LOW-TX-PWR = 1
         HIGH-LBC = 0
                                     HIGH-DGD = 6
         OOR-CD = 0
                                     OSNR = 0
         WVL-OOL = 0
                                      MEA = 0
         IMPROPER-REM = 1
         TX-POWER-PROV-MISMATCH = 0
         Laser Bias Current = 0.0 %
         Actual TX Power = 0.97 dBm
         RX Power = -0.53 dBm
         RX Signal Power = -1.20 dBm
         Frequency Offset = 63 MHz
         Performance Monitoring: Enable
         THRESHOLD VALUES
          _____
                                    High Alarm Low Alarm High Warning Low Warning
         Parameter
         _____ _____

        Rx Power Threshold(dBm)
        -2.0
        -3.0
        0.0
        0.0

        Tx Power Threshold(dBm)
        4.0
        2.0
        0.0
        0.0

        LBC Threshold(mA)
        N/A
        N/A
        0.00
        0.00

                                           N/A
         LBC High Threshold = 55 %
         Configured Tx Power = 1.00 dBm
         Configured CD High Threshold = 2400 ps/nm
         Configured CD lower Threshold = -2400 ps/nm
         Configured OSNR lower Threshold = 0.40 dB
         Configured DGD Higher Threshold = 0.30 ps
         Baud Rate = 63.1394679230 GBd
         Bits per Symbol = 3.000000000 bits/symbol
         Modulation Type: 8QAM
         Chromatic Dispersion 0 ps/nm
         Configured CD-MIN -48000 ps/nm CD-MAX 48000 ps/nm
         Polarization Mode Dispersion = 0.0 \text{ ps}
         Second Order Polarization Mode Dispersion = 29.00 ps^2
         Optical Signal to Noise Ratio = 36.10 dB
         SNR = 17.50 \text{ dB}
         Polarization Dependent Loss = 0.50 dB
         Polarization Change Rate = 0.00 rad/s
         Differential Group Delay = 1.00 ps
```

Transceiver Vendor Details

Form	Factor	:	CFP2
Name		:	CISCO-ACACIA

```
Part Number : 10-3500-01
Rev Number : 01
        Serial Number
                             : ACA24480037
        PID
                              : ONS-CFP2D-400G-C
                             : VES1
        VID
        Date Code(yy/mm/dd)
                              : 20/11/10
        Fiber Connector Type: LC
        Otn Application Code: Not Set
        Sonet Application Code: Not Set
        Ethernet Compliance Code: Not set
Transceiver Temperature : 46 Celsius
A TNO Cool
```

AINS	SUAK		•	INC	ne	
AINS	Timer		:	0h	ı, Om	
AINS	remaining	time	:	0	second	s

Receive Power Threshold

You can configure the high and low threshold of the total optical signal power of the received signal on the trunk optics controller.

The range is -400 to 300 (in the units of 0.1 dBm).

To configure the high and low receive power threshold, use the following command:

configure

controller optics R/S/I/P

rx-high-threshold rx-high

rx-low-threshold rx-low

commit

The following sample configures the high receive power threshold on the controller optics:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller optics 0/0/0/12
RP/0/RP0/CPU0:ios(config-Optics)#rx-high-threshold -20
RP/0/RP0/CPU0:ios(config-Optics)#rx-low-threshold -30
RP/0/RP0/CPU0:ios(config-Optics)#commit
```

The following sample shows the high receive power threshold configured on the controller optics:

```
RP/0/RP0/CPU0:ios#show controllers optics 0/0/0/12
Fri Nov 12 10:58:50.595 UTC
Controller State: Up
Transport Admin State: In Service
```

Laser State: On

LED State: Yellow

Optics Status

Optics Type: CFP2 DWDM DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,

```
Wavelength=1552.524nm
        Alarm Status:
        _____
        Detected Alarms:
               HIGH-RX-PWR LOW-TX-PWR
               HIGH-DGD
        LOS/LOL/Fault Status:
        Alarm Statistics:
         _____
        HIGH-RX-PWR = 1
                                LOW-RX-PWR = 0
                                LOW-TX-PWR = 1
        HIGH-TX-PWR = 0
                                HIGH-DGD = 6
        HIGH-LBC = 0
        OOR-CD = 0
                                 OSNR = 0
        WVL-OOL = 0
                                 MEA = 0
        IMPROPER-REM = 1
        TX-POWER-PROV-MISMATCH = 0
        Laser Bias Current = 0.0 %
        Actual TX Power = 0.97 dBm
        RX Power = -0.53 dBm
        RX Signal Power = -1.20 dBm
        Frequency Offset = 63 MHz
        Performance Monitoring: Enable
        THRESHOLD VALUES
         _____
        Parameter
                               High Alarm Low Alarm High Warning Low Warning
         -----
                                ----- -----
                                -2.0
                                           -3.0
2.0
N/A
                                                      0.0 0.0
0.0 0.0
0.00 0.00
        Rx Power Threshold(dBm)
        Tx Power Threshold(dBm)
                                    4.0
        LBC Threshold(mA)
                                      N/A
        LBC High Threshold = 55 %
        Configured Tx Power = 1.00 dBm
        Configured CD High Threshold = 2400 ps/nm
        Configured CD lower Threshold = -2400 \text{ ps/nm}
        Configured OSNR lower Threshold = 0.40 dB
        Configured DGD Higher Threshold = 0.30 \text{ ps}
        Baud Rate = 63.1394679230 GBd
        Bits per Symbol = 3.000000000 bits/symbol
        Modulation Type: 8QAM
        Chromatic Dispersion 0 ps/nm
        Configured CD-MIN -48000 ps/nm CD-MAX 48000 ps/nm
        Polarization Mode Dispersion = 0.0 ps
        Second Order Polarization Mode Dispersion = 29.00 ps^2
        Optical Signal to Noise Ratio = 36.10 dB
        SNR = 17.50 \text{ dB}
        Polarization Dependent Loss = 0.50 dB
        Polarization Change Rate = 0.00 rad/s
        Differential Group Delay = 1.00 ps
Transceiver Vendor Details
```

Form Factor	: CFP2
Name	: CISCO-ACACIA
Part Number	: 10-3500-01
Rev Number	: 01
Serial Number	: ACA24480037
PID	: ONS-CFP2D-400G-C
VID : VES1 Date Code (yy/mm/dd) : 20/11/10 Fiber Connector Type: LC Otn Application Code: Not Set Sonet Application Code: Not Set Ethernet Compliance Code: Not set Transceiver Temperature : 46 Celsius AINS Soak : None AINS Timer : 0h, 0m AINS remaining time : 0 seconds

Transmit Power Threshold

You can configure the high and low threshold of the total optical signal power of the transmitted signal on the trunk optics controller.

The range is -400 to 300 (in the units of 0.1 dBm).

To configure the high and low transmit power threshold, use the following command:

configure

controller optics R/S/I/P

tx-high-threshold tx-high

tx-low-threshold tx-low

commit

The following sample configures the high transmit power threshold on the controller optics:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller optics 0/0/0/12
RP/0/RP0/CPU0:ios(config-Optics)#tx-high-threshold 40
RP/0/RP0/CPU0:ios(config-Optics)#tx-low-threshold 20
RP/0/RP0/CPU0:ios(config-Optics)#commit
```

The following sample shows the high transmit power threshold configured on the controller optics:

```
RP/0/RP0/CPU0:ios#show controllers optics 0/0/0/12
Fri Nov 12 10:58:50.595 UTC
```

Controller State: Up

Transport Admin State: In Service

Laser State: On

LED State: Yellow

Optics Status

Optics Type: CFP2 DWDM DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz, Wavelength=1552.524nm

Alarm Status:

```
Detected Alarms:
                 HIGH-RX-PWR LOW-TX-PWR
                 HIGH-DGD
         LOS/LOL/Fault Status:
         Alarm Statistics:
         _____
                                   LOW-RX-PWR = 0
         HTGH-RX-PWR = 1
                                    LOW-TX-PWR = 1
HIGH-DGD = 6
         HIGH-TX-PWR = 0
         HIGH-LBC = 0
         OOR-CD = 0
                                    OSNR = 0
         WVL-OOL = 0
                                    MEA = 0
         IMPROPER-REM = 1
         TX-POWER-PROV-MISMATCH = 0
         Laser Bias Current = 0.0 %
         Actual TX Power = 0.97 dBm
         RX Power = -0.53 dBm
         RX Signal Power = -1.20 dBm
         Frequency Offset = 63 MHz
         Performance Monitoring: Enable
         THRESHOLD VALUES
         _____
                                    High Alarm Low Alarm High Warning Low Warning
         Parameter
         _____ ____

        -2.0
        -3.0
        0.0
        0.0

        4.0
        2.0
        0.0
        0.0

        N/A
        N/A
        0.00
        0.00

         Rx Power Threshold(dBm)
         Tx Power Threshold(dBm)
         LBC Threshold(mA)
         LBC High Threshold = 55 %
         Configured Tx Power = 1.00 dBm
         Configured CD High Threshold = 2400 ps/nm
         Configured CD lower Threshold = -2400 \text{ ps/nm}
         Configured OSNR lower Threshold = 0.40 \text{ dB}
         Configured DGD Higher Threshold = 0.30 ps
         Baud Rate = 63.1394679230 GBd
         Bits per Symbol = 3.000000000 bits/symbol
         Modulation Type: 8QAM
         Chromatic Dispersion 0 ps/nm
         Configured CD-MIN -48000 ps/nm CD-MAX 48000 ps/nm
         Polarization Mode Dispersion = 0.0 \text{ ps}
         Second Order Polarization Mode Dispersion = 29.00 \text{ ps}^2
         Optical Signal to Noise Ratio = 36.10 dB
         SNR = 17.50 \text{ dB}
         Polarization Dependent Loss = 0.50 \text{ dB}
         Polarization Change Rate = 0.00 rad/s
         Differential Group Delay = 1.00 ps
Transceiver Vendor Details
                               : CFP2
         Form Factor
```

Name: CISCO-ACACIAPart Number: 10-3500-01Rev Number: 01Serial Number: ACA24480037PID: ONS-CFP2D-400G-CVID: VES1Date Code (yy/mm/dd): 20/11/10Fiber Connector Type: LCOtn Application Code: Not Set

```
Sonet Application Code: Not Set
Ethernet Compliance Code: Not set
Transceiver Temperature : 46 Celsius
AINS Soak : None
AINS Timer : 0h, 0m
AINS remaining time : 0 seconds
```

Frequency

You can configure the frequency on trunk ports of the line card.

The following table lists the frequency range with grid spacing supported on the line card:

Line Card	Frequency Range (THz)	Default Frequency (THz)	Grid Spacing
1.2T	191.25 to 196.1	193.1	50GHz and 100MHz
1.2TL 1	186.1 to 190.85	188.5	100MHz
OTN-XP CFP2 trunk	191.275 to 196.125	193.1	50GHz and 100MHz
OTN-XP QDD ZRP	191.275 to 196.125	193.70	6.25GHz, 50GHz, and 100MHz
2-QDD-C	191.15 to 196.1	193.1	50GHz and 100MHz

¹ Only non-ITU channels are supported

To configure the wavelength, use the following commands:

configure

controller optics Rack/Slot/Instance/Port

dwdm-carrier {100MHz-grid frequency *frequency*} | {50GHz-grid [frequency *frequency*} commit

Pseudo Random Binary Sequence

Table 6: Feature History

Feature Name	Release Information	Feature Description
PRBS (Pseudo Random Binary Sequence) on ODU4	Cisco IOS XR Release 7.3.1	1.2T card supports PRBS on the ODU4 controller. This feature allows you to test whether the traffic is error free during link bring up without depending on the peer port.

The Pseudo Random Binary Sequence (PRBS) feature allows you to perform data integrity checks between the NCS1004 trunk links without enabling the actual client traffic.

You need to enable PRBS feature on both the transmitting and receiving NCS 1004 trunk ports. The transmitting trunk port generates a bit pattern and sends it to the peer NCS 1004 device. The device detects if the sent bit pattern is received.

From R7.3.1 onwards, you can configure PRBS on the NCS 1004 trunk port for the 2-QDD-C card.

You can configure NCS 1004 trunk port in any one of the following modes for PRBS on the 1.2T card:

- Source mode The NCS 1004 at trunk port generates PRBS signal on the line continuously as per the configured PRBS pattern.
- Sink mode The NCS 1004 at trunk port gets locked to the ingress signal according to the configured pattern, analyzes and reports the errors.
- Source-Sink mode The NCS 1004 at trunk port acts as both the PRBS transmitter and receiver, that is, it generates PRBS signal as per the configured pattern, and also gets locked to the ingress signal with the same pattern, and reports the errors.



Note From R7.3.1 onwards, the 1.2T card supports PRBS on ODU4.

NCS 1004 trunk port supports the following PRBS patterns:

- **PRBS31** Sequence length is from 2³¹ -1 bits.
- **PRBS23** Sequence length is from 2²3 -1 bits.
- **PRBS15** Sequence length is from 2¹⁵ -1 bits.
- **PRBS7**—Sequence length is from 2⁷ -1 bits.

Limitations of PRBS

There are following limitations with the PRBS feature:

- There is no SNMP support to fetch the PRBS status or Performance Monitoring (PM).
- TTI functionality is not supported with PRBS.

- Loopback and PRBS configurations cannot coexist on a coherentDSP controller. Loopback configuration will be rejected if PRBS is already configured.
- PRBS on ODU4 is supported only when the slice is provisioned in OTN client mode.

PRBS on OTN-XP Card

From R7.2.1 onwards, the OTN-XP card supports PRBS on the mapper optical data unit (ODU2e).



Note ODU2e PRBS is not supported for OTU2E client rates.

NCS 1004 with the OTN-XP card, supports the following PRBS mode:

- Source mode The NCS 1004 at trunk port generates PRBS signal on the line continuously as per the configured PRBS pattern.
- Sink mode The NCS 1004 at trunk port gets locked to the ingress signal according to the configured pattern, analyzes and reports the errors.
- Source-Sink mode The NCS 1004 at trunk port acts as both the PRBS transmitter and receiver, that is, it generates PRBS signal as per the configured pattern, and also gets locked to the ingress signal with the same pattern, and reports the errors.
- invertedpn31 Inverted pattern. Sequence length is from 2^31 -1 bits.

NCS 1004 trunk port supports the following PRBS patterns:

- **PRBS31** Sequence length is from 2^31 -1 bits.
- PRBS23 Sequence length is from 2²3 -1 bits.
- PRBS15 Sequence length is from 2¹⁵ -1 bits.
- PRBS7 —Sequence length is from 2^{^7} -1 bits.

Configuring Pseudo Random Binary Sequence

The secondary admin state of the coherentDSP or ODU4 controller must be set to maintenance before enabling PRBS.

To enable the PRBS on the trunk port, use the following configuration command at the coherentDSP controller:

controller coherentDSP *R/S/I/P* prbs mode {source | sink | source-sink} pattern {pn31 | pn23 | pn15 | pn7}

To enable the PRBS on the trunk port, use the following configuration command at the ODU4 controller:

 $controller odu4 \ \textit{R/S/I/P/L} \ opu \ prbs \ mode \ \{source \ | \ sink \ | \ source-sink \} \ pattern \ \{pn31 \ | \ pn23 \ | \ pn15 \ | \ pn7 \}$

When the PRBS is enabled on the trunk ports, you can view the following impacts in the corresponding client ports:

• Client traffic is dropped in the direction of source to sink as the frames are overwritten by the PRBS pattern.

• Remote fault is raised on the client ports nearer to the PRBS sink.

The following are the ODU4 PRBS combinations. The client ports must have physical loop back in all the combinations.

- Near End client and Near End trunk ODU4
- Near End client and Far End client ODU4
- Near End client and Far End trunk ODU4
- Near End trunk and Far End trunk ODU4

The following sample diagram describes the ODU4 PRBS combination for Near End client and Near End trunk.

Verifying PRBS

You can monitor the status of Pseudo Random Binary Sequence (PRBS) on the CoherentDSP or ODU4 controller using the following command:

show controllers coherentDSP | ODU4 R/S/I/P prbs-details

RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/1/0/0 prbs-details Wed Nov 6 23:12:22.464 UTC -----PRBS details-----PRBS Test : Enable PRBS Mode : Source PRBS Pattern : PN7 PRBS Status : Not Applicable _____ RP/0/RP0/CPU0:ios#show controllers ODU4 0/3/0/8 prbs-details Mon Jan 11 05:29:12.436 UTC -----PRBS details-----PRBS Test : Enable PRBS Mode : Source PRBS Pattern : PN7 PRBS Status : Not Applicable _____ RP/0/RP0/CPU0:ios#show controllers ODU4 0/3/0/1/1 prbs-details Mon Jan 11 05:27:56.370 UTC -----PRBS details-----PRBS Test : Enable PRBS Mode : Sink PRBS Pattern : PN7 PRBS Status : Locked _____

- You cannot view any details, if the PRBS is not enabled on the trunk.
- PRBS status is shown as Not Applicable, when the mode is Source.

• PRBS status is shown as **unlocked**, when the signal is not locked on the receiving side in the **Sink** or **Source-Sink** mode.

Viewing PRBS Performance Monitoring Parameters

PRBS PM parameters are not available for the controllers in Source mode. PRBS PM parameters are reset when PRBS configuration changes on the controller.

To view the PRBS PM parameters on the coherentDSP controller, use the following command:

show controllers coherentDSP | ODU4 *R/S/I/P* pm {current | history } {15-min|24-hour} prbs

The following tables describes the fields of PRBS PM parameters.

Table 7: PRBS PM Parameters

FOUND-COUNT

LOST-COUNT

PM Parameter	Description
EBC	Cumulative count of PRBS bit errors in the sampling interval (15-minute or 24-hour). PRBS bit errors are accumulated only if PRBS signal is locked.
FOUND-COUNT	Number of state transitions from signal unlocked state to signal locked state in the sampling interval. If state change is not observed in the interval, the count is 0.
LOST-COUNT	Number of state transitions from signal locked state to signal unlocked state in the sampling interval. If state change is not observed in the interval, the count is 0.
FOUND-AT-TS	Latest timestamp when the PRBS state moves from unlocked state to locked state in the sampling interval. If state change is not observed in the interval, the value is null.
CONFIG-PTRN	Configured PRBS pattern on the port.

: 1 FOUND-AT-TS : 00:51:22 Mon Jan 11 2021

: 1 LOST-AT-TS : 00:52:52 Mon Jan 11 2021

 $\rm RP/0/RP0:ios\#show$ controllers coherentDSP 0/0/0/1 pm current 15-min prbs Mon Feb 13 00:58:48.327 UTC

PRBS in the current interval [00:45:00 - 00:58:48 Mon Feb 13 2019] PRBS current bucket type : Valid EBC : 40437528165 FOUND-COUNT : 1 FOUND-AT-TS : 00:51:22 Mon Feb 13 2019 LOST-COUNT : 1 LOST-AT-TS : 00:52:52 Mon Feb 13 2019 CONFIG-PTRN : PRBS PATTERN PN31 Last clearing of "show controllers OTU" counters never RP/0/RP0:ios#show controllers ODU4 0/3/0/1/1 pm current 15-min prbs Mon Jan 11 00:58:48.327 UTC PRBS in the current interval [00:45:00 - 00:58:48 Mon Jan 11 2021] PRBS current bucket type : Valid EBC : 40437528165

CONFIG-PTRN : PRBS_PATTERN_PN7 Last clearing of "show controllers ODU" counters never

Configuring PRBS on OTN-XP Card

To configure PBRS mode on the ODU2e controller, you must configure Optical Channel Payload Unit (OPU) on the ODU2e controller followed by the PRBS mode and the pattern. The PRBS supported pattern on the OTN-XP card is invertedPN31.

From R7.3.1 onwards, you can configure PRBS on client or mapper ODU4 and ODU flex controllers.



Note ODU2e PRBS is not supported for OTU2E client rates.

To configure PRBS mode on the ODU2e controller, enter the following commands:

configure

controller odu2e | oduflex *R/S/I/P/client-port/lane-number*

secondary-admin-state maintenance

opu

prbs mode {source | sink | source-sink } pattern invertedpn31 {direction {system | line}}

end

commit

The following example shows how to configure PRBS mode as source-sink with pattern as invertedpn31:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller odu2e0/2/0/12/3/2
RP/0/RP0/CPU0:ios(config-odu2e)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-odu2e)#opu
RP/0/RP0/CPU0:ios(config-Opuk)#prbs mode source-sink pattern invertedpn31
RP/0/RP0/CPU0:ios(config-Opuk)#end
RP/0/RP0/CPU0:ios(config-odu2e)#commit
```

The following is a sample output of **show controller odu2e** command.

RP/0/RP0/CPU0(config-odu2e)#show controller odu2e 0/2/0/12/3/2 prbs-details Mon Mar 14 21:33:02.293 UTC

	PRBS	de	tails
PRBS	Test	:	Enable
PRBS	Mode	:	Source-Sink
PRBS	Pattern	:	INVERTED PN31
PRBS	Status	:	Locked
PRBS	Lock Time(in seconds)	:	1190
PRBS	Bit Errors	:	0

The following example shows how to configure PRBS mode as source-sink with pattern as invertedpn31 with direction as system:

RP/0/RP0/CPU0:ios#configure Wed Nov 11 00:38:11.789 UTC RP/0/RP0/CPU0:ios(config)#controller odu4 0/2/0/5
RP/0/RP0/CPU0:ios(config-odu4)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-odu4)#opu prbs mode source-sink pattern invertedpn31 direction
system
RP/0/RP0/CPU0:ios(config-odu4)#commit
Wed Nov 11 00:38:26.391 UTC

The following example shows how to configure PRBS mode as source-sink with pattern as invertedpn31 with direction as line:

```
RP/0/RP0/CPU0:ios#configure
Wed Nov 11 00:38:11.789 UTC
RP/0/RP0/CPU0:ios(config)#controller odu4 0/2/0/5
RP/0/RP0/CPU0:ios(config-odu4)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-odu4)#opu prbs mode source-sink pattern invertedpn31 direction
line
RP/0/RP0/CPU0:ios(config-odu4)#commit
Wed Nov 11 00:38:26.391 UTC
```

The following example shows how to configure PRBS on the mapper controller:

```
RP/0/RP0/CPU0:ios#configure
Thu Oct 7 13:17:27.267 UTC
RP/0/RP0/CPU0:ios(config)#controller odu4 0/2/0/13/8
RP/0/RP0/CPU0:ios(config-odu4)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-odu4)#opu prbs mode source-sink pattern invertedpn31
RP/0/RP0/CPU0:ios(config-odu4)#commit
```

The following example shows how to configure PRBS on the mapper controller with PRBS mode as source-sink and pattern as invertedpn31 with direction as line:

```
RP/0/RP0/CPU0:ios(config)#controller odu4 0/3/0/7
RP/0/RP0/CPU0:ios(config-odu4)#secondary-admin-state maintenance
RP/0/RP0/CPU0:ios(config-odu4)#opu prbs mode source-sink pattern invertedpn31 direction
line
RP/0/RP0/CPU0:ios(config-odu4)#commit
Tue Oct 12 13:17:07.840 UTC
```

Verifying PRBS on OTN-XP Card

You can monitor the status of PRBS on the ODU2e controller using the following command:

show controllers odu2e R/S/I/P/client-port/client-lane prbs-details

The following example displays the output of the PRBS configuration with PRBS mode as sink:

RP/0/RP0/CPU0:ios#show controllers odu2e 0/2/0/12/3/2 prbs-details

		-1	PRBS details
PRBS	Test	:	Enable
PRBS	Mode	:	Sink
PRBS	Pattern	:	INVERTED PN31
PRBS	Status	:	Locked

The following example displays the output of the PRBS configuration with PRBS mode as source-sink:

		1	PRBS details
PRBS	Test	:	Enable
PRBS	Mode	:	Source-Sink
PRBS	Pattern	:	INVERTED PN31

PRBS Status

The following example displays the output of the PRBS configuration on the mapper controller:

: Locked

The following example displays the output of the PRBS configuration on the mapper controller with PRBS mode as source-sink and pattern as invertedpn31 with direction as line:

```
RP/0/RP0/CPU0:ios#show controllers odu4 0/3/0/7 prbs-detailsTue Oct 12 13:17:22.748 UTC
Tue Oct 12 13:17:22.748 UTC
------PRBS details-----
PRBS Test : Enable
PRBS Mode : Source-Sink
PRBS Pattern : INVERTED PN31
PRBS Status : Unlocked
PRBS Direction : Line
PRBS Bit Errors : 0
```

Clearing Bit Errors and Lock Time for PRBS

Lock time is the time that is elapsed since the last PRBS lock is detected.

The following sample shows that bit errors are observed during the PRBS test:

To clear the lock time and bit errors before the PRBS test, use the clear command:

```
RP/0/RP0/CPU0:ios#clear controller odu4 0/2/0/5 prbs-details
Fri Nov 13 03:21:50.726 UTC
PRBS bit errors cleared
```

The following sample displays the bit errors and lock time are removed.

RP/0/RP0/CPU0:ios#show controllers odu4 0/2/0/5 prbs-details

```
Fri Nov 14 03:21:44.191 UTC
-----PRBS details-----
PRBS Test : Enable
PRBS Mode : Source-Sink
PRBS Pattern : INVERTED PN31
PRBS Status : Locked
PRBS Direction : Line
PRBS Lock Time(in seconds) : 2
PRBS Bit Errors : 0
```

FlexO GID and IID

In the 4x100G-MXP-400G-TXP LC mode, the OTN-XP card uses flexible OTN (flexO) interfaces on trunk ports. These flexO interfaces provide a flexible and interoperable mechanism to transport OTUCn signals by grouping standard lower rate interfaces. Each flexO interface group is identified by a flexO group identification (GID) number, which ranges 1–1,048,576. Each member of a flexO group is identified by a flexO instance identification (IID) number, which ranges 1–254.

From Release 7.3.1 onwards, flexO GID and IID configurations are supported on CoherentDSP controller for the OTN-XP card.

Configuring FlexO GID and IID

To configure flexO GID and IID on the coherentDSP controller, enter the following commands:

configure

controller coherentDSP R/S/I/P

flexo

gid <gid-no> iid <iid-no>

commit



Note You must configure the iid number based on the trunk bandwidth. You must add 1, 2, 3, and 4 iid numbers for 100G, 200G, 300G, and 400G respectively.

The following sample shows how to configure flexO GID and IID on the CoherentDSP controller:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#controller coherentDSP0/2/0/12
RP/0/RP0/CPU0:ios(config-CoDSP)#flexo
RP/0/RP0/CPU0:ios(config-CoDSP)#gid 2 iid 5,6,7,8
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
```

Verifying FlexO GID and IID

The following sample shows the flexO GID and IID configuration on the CoherentDSP controller:

RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/12

Tue Jan 12 11:26:08.235 UTC

Port : CoherentDSP 0/2/0/12 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-7Performance Monitoring : Enable Bandwidth : 400.0Gb/s Alarm Information: LOS = 0 LOF = 3 LOM = 0OOF = 3 OOM = 0 AIS = 0IAE = 0 BIAE = 0 SF BER = 0 SD BER = 0 BDI = 0 TIM = 0 FECMISMATCH = 0 FEC-UNC = 0 FLEXO GIDM = 1 FLEXO-MM = 1 FLEXO-LOM = 0 FLEXO-RDI = 3 FLEXO-LOF = 0Detected Alarms : None Bit Error Rate Information PREFEC BER : 6.43E-04 POSTFEC BER : 0.00E+00 TTI : Remote hostname : ios Remote interface : CoherentDSP 0/0/0/13 Remote IP addr : 0.0.0.0 FEC mode : O FEC Flexo-Mode : Enable Flexo Details: Tx GID : 2 TX IID : 5,6,7,8, Rx GID : 2 RX IID 5,6,7,8, AINS Soak : None AINS Timer : Oh, Om AINS remaining time : 0 seconds

Flexo Parameter Update on Inverse Muxponder Configuration on the OTN-XP Card

By default, the value of flexo parameters for the coherentDSP controllers in the 400G inverse muxponder, are as follows:

- CoherentDSP 0/0/0/12—GID is 1 and IID is 1, 2.
- CoherentDSP 0/0/0/13—GID is 1 IID is 3, 4.

The following example displays the default configurations on the transmission side:

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/0/0/13
Wed Jun 9 23:17:30.794 UTC
Port : CoherentDSP 0/0/0/13
Controller State : Admin Down
Inherited Secondary State : Normal
```

```
Configured Secondary State
                                               : Normal
Derived State
                                               : Out Of Service
Loopback mode
                                               : None
BER Thresholds
                                               : SF = 1.0E-5 SD = 1.0E-7
Performance Monitoring
                                               : Enable
Bandwidth
                                               : 200.0Gb/s
Alarm Information:
LOS = 0 LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0 SF BER = 0
SD BER = 0 BDI = 0 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0 FLEXO GIDM = 0
FLEXO-MM = 0 FLEXO-LOM = 0 FLEXO-RDI = 0
FLEXO-LOF = 0
Detected Alarms
                                               : None
Bit Error Rate Information
PREFEC BER
                                               : 0.00E+00
POSTFEC BER
                                               : 0.00E+00
                                               : 0.00 dB
O-Factor
Q-Margin
                                               : 0.00dB
TTI :
       Remote IP addr
                                               : 0.0.0.0
FEC mode
                                               : O FEC
Flexo-Mode
                                               : Enable
Flexo Details:
                                               : 1
       Tx GID
       TX IID
                                               : 3, 4,
       Rx GID
                                               : 0
       RX IID
                                               : 0, 0,
Flexo Peers Information:
       Controller
                                               : CoherentDSP0 0 0 12
       OTUCn rate
                                                : OTUC2
AINS Soak
                                               : None
AINS Timer
                                               : Oh, Om
AINS remaining time
                                               : 0 seconds
```

For 400G inverse muxponder, the flexo configuration on these coherent DSP controllers must be such that GID is the same on coherentDSP controllers on both port 12 and port 13, and IIDs are in the incremental order. In case if one of the node configurations is invalid, the Provisioning Failed alarm is raised on that particular controller. The Provisioning Failed alarm moves to the slice level in case you perform a line card reload.

The following sample configures the same IID on the coherentDSP 0/0/0/12 as that of coherentDSP 0/0/0/13 and shows the resulting Provisioning Failed alarm.

```
RP/0/RP0/CPU0:ios#configure
Wed Jun 9 23:19:28.101 UTC
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/0/0/12
RP/0/RP0/CPU0:ios(config-CoDSP)#flexo gid 1 iid 3,4
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
Wed Jun 9 23:20:08.971 UTC
RP/0/RP0/CPU0:ios(config-CoDSP)#end
RP/0/RP0/CPU0:ios#show alarms brief system active
Wed Jun 9 23:20:11.940 UTC
```

Active Alarms			
Location Severity Group	Set Time	Description	

0/0 Major Controller 06/09/202123:20:10 UTC CoherentDSP0/0/0/12-Provisioning Failed

The following sample configures incremental IIDs in the coherentDSP 0/0/0/12 and coherent DSP 0/0/0/13 and verifies that the Provisioning Failed alarms cleared:

```
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/0/0/12
RP/0/RP0/CPU0:ios(config-CoDSP)#flexo gid 1 iid 5,6
RP/0/RP0/CPU0:ios(config-CoDSP)#controller coherentDSP 0/0/0/13
RP/0/RP0/CPU0:ios(config-CoDSP)#flexo gid 1 iid 7,8
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
Wed Jun 9 23:21:06.335 UTC
RP/0/RP0/CPU0:ios(config-CoDSP)#end
```

The following sample verifies the IID configurations in the coherentDSP 0/0/0/12 and coherentDSP 0/0/0/13:

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/0/0/12
Wed Jun 9 23:21:15.321 UTC
Port
                                               : CoherentDSP 0/0/0/12
Controller State
                                              : Admin Down
Inherited Secondary State
                                              : Normal
                                              : Normal
Configured Secondary State
Derived State
                                               : Out Of Service
Loopback mode
                                               : None
BER Thresholds
                                              : SF = 1.0E-5 SD = 1.0E-7
Performance Monitoring
                                              : Enable
                                               : 200.0Gb/s
Bandwidth
Alarm Information:
LOS = 0 LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0 SF BER = 0
SD BER = 0 BDI = 0 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0 FLEXO GIDM = 0
FLEXO-MM = 0 FLEXO-LOM = 0 FLEXO-RDI = 0
FLEXO-LOF = 0
Detected Alarms
                                               : None
Bit Error Rate Information
PREFEC BER
                                               : 0.00E+00
POSTFEC BER
                                               : 0.00E+00
Q-Factor
                                               : 0.00 dB
Q-Margin
                                               : 0.00dB
TTT :
       Remote IP addr
                                               : 0.0.0.0
FEC mode
                                               : O_FEC
Flexo-Mode
                                               : Enable
```

Flexo Details: TX GTD : 1 TX IID : 5, 6, Rx GID : 0 : 0, 0, RX IID Flexo Peers Information: : CoherentDSP0 0 0 13 Controller OTUCn rate : OTUC2 AINS Soak : None AINS Timer : Oh, Om AINS remaining time : 0 seconds RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/0/0/13 Wed Jun 9 23:21:20.348 UTC : CoherentDSP 0/0/0/13 Port Controller State : Admin Down Inherited Secondary State : Normal Configured Secondary State : Normal Derived State : Out Of Service Loopback mode : None BER Thresholds : SF = 1.0E-5 SD = 1.0E-7 Performance Monitoring : Enable Bandwidth : 200.0Gb/s Alarm Information: LOS = 0 LOF = 0 LOM = 0OOF = 0 OOM = 0 AIS = 0IAE = 0 BIAE = 0 SF BER = 0 SD BER = 0 BDI = 0 TIM = 0FECMISMATCH = 0 FEC-UNC = 0 FLEXO_GIDM = 0 FLEXO-MM = 0 FLEXO-LOM = 0 FLEXO-RDI = 0 FLEXO-LOF = 0Detected Alarms : None Bit Error Rate Information PREFEC BER : 0.00E+00 POSTFEC BER : 0.00E+00 Q-Factor : 0.00 dB Q-Margin : 0.00dB TTI : Remote IP addr : 0.0.0.0 FEC mode : O FEC Flexo-Mode : Enable Flexo Details: Tx GID : 1 TX IID : 7, 8, Rx GID : 0 RX IID : 0, 0, Flexo Peers Information: Controller : CoherentDSP0 0 0 12 OTUCn rate : OTUC2 AINS Soak : None

AINS Timer

AINS remaining time	:	0 seconds
The following sample verifies that	the Provisioning Failed	alarm was cleared:
RP/0/RP0/CPU0:ios#show alarms	brief system histor	У
History Alarms		
Location Severity Group Clear Time	Set Time	Description

: 0h, 0m

0/2 Major Controller 09/30/2021 14:42:01 UTC CoherentDSP0/2/0/12 - Provisioning Failed 09/30/2021 14:42:25 UTC

Configuring Controllers