# Configure Coherent Probe

*Table 1: Feature History*

| Feature Name | Release Information | Description |
|---|---|---|
| DP04QSDD-E26-A1 support | Cisco IOS XR Release 25.4.1 | The DP04QSDD-E26-A1 pluggable supports 400G ZR coherent probe functionality on the NCS1K14-EDFA2 card. The pluggable is tunable across C band frequency range and serves as a transponder performing probe functionality. The coherent probe provides link tests before provisioning an active service on the Optical fiber.<br>Additionally, this pluggable allows PRBS monitoring on trunk ports without the need to enable maintenance mode. |
| DP01QSDD-ZT5-A1 support | Cisco IOS XR Release 25.1.1 | The DP01QSDD-ZT5-A1 QDD pluggable is a coherent probe supported for the EDFA2 card. This pluggable supports C-band with tunable frequency.<br>You can plug the coherent probe pluggable to establish a link for the first time in DWDM. |

# Coherent probe on EDFA2 card

The DP01QSDD-ZT5-A1 and DP04QSDD-E26-A1 QDD, a coherent probe that is QSFP-DD MSA-compliant and supported on the EDFA2 card, can be used as a link probe and supports all the C-band channels.

The coherent probe on the NCS1K14-EDFA2 card is provided as optics port 7.

# Supported pluggables for the EDFA2 card coherent probe port

The EDFA2 card supports QSFP-DD pluggable transceivers that generate tunable C-band frequencies. To establish an optical link for the first time, connect the pluggable to the coherent probe port.

DP01QSDD-ZT5-A1 pluggable features:

- Supports tunable C-band frequency
- Features a CoherentDSP controller on optics port 7
- Operates in ZR trunk mode only
- Provides a 100 Gigabit trunk rate
- Utilizes OFEC as the only supported Forward Error Correction (FEC)
- Enables PRBS support for CoherentDSP

DP04QSDD-E26-A1 pluggable features:

- Supports tunable C-band frequency
- Features a CoherentDSP controller on optics port 7
- Operates in ZR trunk mode only
- Provides a 400 Gigabit trunk rate
- Utilizes CFEC as the only supported Forward Error Correction (FEC)
- Enables PRBS support for CoherentDSP

# Configure coherent probe on the EDFA2 card

**Note** The **MEA** alarm is raised if the DP01QSDD-ZT5-A1 pluggable is inserted for 400G trunk rate configuration and DP04QSDD-E26-A1 pluggable is inserted for 100G trunk rate configuration.

Use this task to configure coherent probe on the EDFA2 card.

### Before you begin

Insert the DP01QSDD-ZT5-A1 or DP04QSDD-E26-A1 pluggable in the PROBE port.

### Procedure

**Step 1** Use the **hw-module location** <0/<*slot-id*>/NXR0> **mxponder-slice** <*slice-number*> command to configure the coherent probe, trunk rate, and trunk mode.

**Example:**

```
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2/NXR0 mxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 100G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-mode ZR
```

**Example:**

```
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2/NXR0 mxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-mode ZR
```

Use the **no hw-module location** <0/<*slot-id*>/NXR0> **mxponder-slice** <*slice-number*> command to remove or disable the slice configuration.

**Example:**

```
RP/0/RP0/CPU0:ios(config)#no hw-module location 0/2/NXR0 mxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

**Step 2** Commit the configuration and exit.

```
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#exit
RP/0/RP0/CPU0:ios(config)#exit
```

**Step 3** Run the command **show hw-module location** 0/<*slot-id*>/NXR0> **mxponder-slice** <*slice-number*> to verify the configuration.

**Example:**

```
RP/0/RP0/CPU0:ios#show hw-module location 0/2/NXR0 mxponder-slice 1
Tue Mar 11 01:55:20.764 IST
Location:             0/2/NXR0
Slice ID:
1
Client Bitrate:
NONE
Trunk  Bitrate:
100G
Status:
Provisioned
Client Port                     Mapper/Trunk Port          CoherentDSP0/2/0/7
                                                            Traffic Split Percentage
NONE                                  NONE                                0
```

```
RP/0/RP0/CPU0:ios#show hw-module location 0/2/NXR0 mxponder-slice 1
Tue Mar 11 01:55:20.764 IST
Location:             0/2/NXR0
Slice ID:
1
Client Bitrate:
NONE
Trunk  Bitrate:
400G
```

```
Status:
Provisioned
Client Port                     Mapper/Trunk Port          CoherentDSP0/2/0/7
                                                            Traffic Split Percentage
NONE                                  NONE                                0
```

# Verify coherent probe configurations

Ensure that coherent probe ports and slice configurations are properly provisioned and operating as expected by retrieving and reviewing status and inventory details.

Use this task to check the setup and operational state of coherent probe ports on NCS platforms. This verification helps you confirm hardware installation, provisioning, and troubleshoot potential issues using relevant show commands

### Procedure

**Step 1** Run the **show inventory** command to display physical inventory information for the coherent probe port.

**Example:**

```
RP/0RP0/CPU0:ios#show inventory location 0/2/NXR0
Tue Mar 11 01:41:39.512 IST
NAME: "0/2/NXR0", DESCR: "NCS 1014 EDFA terminal with equalization”
PID: NCS1K14-EDFA2     , VID: V00, SN: FCB2813B3B3
NAME: "Optics0/2/0/6", DESCR: "Cisco QSFP DD Pluggable Optical Time Domain Reflectometer"
PID: ONS-QSFP-OTDR     , VID: VES1, SN: IIF2814000Y
NAME: "Optics0/2/0/7", DESCR: "Cisco QSFP DD ZT5 Pluggable Optics Module”
PID: DP01QSDD-ZT5-A1   , VID: V01 , SN: ACA282500L2
```

```
RP/0RP0/CPU0:ios#show inventory location 0/2/NXR0
NAME: "0/2/NXR0", DESCR: "NCS 1014 EDFA terminal with equalization"
PID: NCS1K14-EDFA2     , VID: V00, SN: FCB2813B3B3

NAME: "Optics0/2/0/5", DESCR: "Cisco SFP GE 1510 OSC Pluggable Optics Module"
PID: ONS-SC-PTP-1510   , VID: V01, SN: MZH2631007X

NAME: "Optics0/2/0/7", DESCR: "Cisco QSFP DD 400G ZR S Pluggable Optics Module"
PID: DP04QSDD-E26-A1   , VID: V01 , SN: 242355007
```

**Step 2** Run the **show hw-module location** command to verify the coherent probe configuration.

**Example:**

```
RP/0/RP0/CPU0:ios#show hw-module location 0/2/NXR0 mxponder-slice 1
Tue Mar 11 01:55:20.764 IST
Location:             0/2/NXR0
Slice ID:             1
Client Bitrate:       NONE
Trunk  Bitrate:       100G
Status:               Provisioned
Client Port                     Mapper/Trunk Port          CoherentDSP0/2/0/7
                                                                    Traffic Split Percentage
NONE                                  NONE                               0
```

```
RP/0/RP0/CPU0:ios#show hw-module location 0/2/NXR0 mxponder-slice 1
Tue Mar 11 01:55:20.764 IST
Location:             0/2/NXR0
Slice ID:             1
Client Bitrate:       NONE
Trunk  Bitrate:       400G
Status:               Provisioned
Client Port                    Mapper/Trunk Port          CoherentDSP0/2/0/7
                                                                  Traffic Split Percentage
NONE                                  NONE                       0
```

**Step 3** Run the **show running-config** command to display provisioned slice and trunk port information. .

**Example:**

```
RP/0/RP0/CPU0:ios#show running-config hw-module location 0/2/NXR0
Tue Mar 11 01:55:40.705 IST
hw-module location 0/2/NXR0
 mxponder-slice 1
  trunk-mode ZR
  trunk-rate 100G
```

```
RP/0/RP0/CPU0:ios#show running-config hw-module location 0/2/NXR0
Tue Mar 11 01:55:40.705 IST
hw-module location 0/2/NXR0
 mxponder-slice 1
  trunk-mode ZR
  trunk-rate 400G
```

**Step 4** Run the **show controllers optics** *rack/slot/instance/port* command to display the optics controller status for coherent probe optics port (port 7).

**Example:**

```
RP/0/RP0/CPU0:ios#show controllers optics 0/2/0/7
Tue Mar 11 02:24:28.965 IST
 Controller State: Up
 Transport Admin State: In Service
Laser State: On
LED State: Green
Last link flapped: 00:29:45
Optics Status
         Optics Type:  QSFP-DD DWDM
          DWDM carrier Info: C BAND, MSA ITU Channel=Non-ITU, Frequency=193.4750THz,
         Wavelength=1549.515nm
         Alarm Status:
         -------------
         Detected Alarms: None
         LOS/LOL/Fault Status:
         Alarm Statistics:

         -------------
         HIGH-RX-PWR = 0            LOW-RX-PWR = 2
         HIGH-TX-PWR = 0            LOW-TX-PWR = 2
         HIGH-LBC = 0               HIGH-DGD = 0
         OOR-CD = 0                 OSNR = 2
         WVL-OOL = 0                MEA  = 0
         IMPROPER-REM = 0
         TX-POWER-PROV-MISMATCH = 0
```

```
         Laser Bias Current = 0.0 %
         Actual TX Power = -2.57 dBm
         RX Power = -4.18 dBm
         RX Signal Power = -5.35 dBm
         Frequency Offset = 25 MHz

         Performance Monitoring: Enable
THRESHOLD VALUES
         ----------------

         Parameter                 High Alarm  Low Alarm  High Warning  Low Warning
         ------------------------  ----------  ---------  ------------  -----------
         Rx Power Threshold(dBm)          3.0      -30.0           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 = -2.50 dBm
         Configured CD High Threshold = 8600 ps/nm
         Configured CD lower Threshold = -8600 ps/nm
         Configured OSNR lower Threshold = 14.00 dB
         Configured DGD Higher Threshold = 40.00 ps
         Baud Rate =  30.0692733990 GBd
         Bits per Symbol = 2.0000000000  bits/symbol
         Modulation Type: QPSK
         Chromatic Dispersion -7 ps/nm
         Configured CD-MIN -2400 ps/nm  CD-MAX 2400 ps/nm
         Polarization Mode Dispersion = 0.0 ps
         Second Order Polarization Mode Dispersion = 176.00 ps^2
         Optical Signal to Noise Ratio = 23.50 dB
         SNR = 21.40 dB
         Polarization Dependent Loss = 0.50 dB
         Polarization Change Rate = 0.00 rad/s
         Differential Group Delay = 0.00 ps
         DAC RATE:  1x1.50
Transceiver Vendor Details

         Form Factor            : QSFP-DD
         Name                   : CISCO-ACACIA
         Part Number            : 10-3655-01
         Rev Number             : A
         Serial Number          : ACA282500L2
         PID                    : DP01QSDD-ZT5-A1
         VID                    : V01
         Firmware Version       : Major.Minor.Build
         Active                 : 70.130.21
         Inactive               : 70.130.21
         Date Code(yy/mm/dd)    : 24/05/05
         Fiber Connector Type: LC
         Otn Application Code: Not Set
         Sonet Application Code: Not Set
         Ethernet Compliance Code: Not set

 Transceiver Temperature : 34 Celsius

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


RP/0/RP0/CPU0:ios#show controllers optics 0/2/0/7
Tue Mar 11 02:24:28.965 IST
Controller State: Down

 Transport Admin State: In Service
```

```
Laser State: On

LED State: Red

Last link flapped: 00:09:45

Optics Status

        Optics Type:  QSFP-DD DWDM
        DWDM carrier Info: C BAND, MSA ITU Channel=Non-ITU, Frequency=193.4750THz,
        Wavelength=1549.515nm

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


        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 = 1
        WVL-OOL = 0                MEA  = 0
        IMPROPER-REM = 0
        TX-POWER-PROV-MISMATCH = 0
        Laser Bias Current = 0.0 %
        Actual TX Power = -9.11 dBm
        RX Power = -40.00 dBm
        RX Signal Power = -40.00 dBm
        Frequency Offset = 0 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)          4.0      -16.0           0.0          0.0
        LBC Threshold(mA)                N/A        N/A          0.00         0.00

        LBC High Threshold = 90 %
        Configured Tx Power = 0.00 dBm
        Configured CD High Threshold = 2400 ps/nm
        Configured CD lower Threshold = -2400 ps/nm
        Configured OSNR lower Threshold = 24.00 dB
        Configured DGD Higher Threshold = 40.00 ps
        Baud Rate =  59.8437500000 GBd
        Bits per Symbol = 4.0000000000  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 ps
        Second Order Polarization Mode Dispersion = 0.00 ps^2
        Optical Signal to Noise Ratio = 0.00 dB
        SNR = 0.00 dB
        Polarization Dependent Loss = 0.00 dB
        Polarization Change Rate = 0.00 rad/s
```

```
        Differential Group Delay = 0.00 ps
        DAC RATE:  1x1

 Transceiver Vendor Details

        Form Factor            : QSFP-DD
        Name                   : CISCO-ACACIA
        Part Number            : 10-3496-01
        Rev Number             : 10
        Serial Number          : 242355007
        PID                    : DP04QSDD-E26-A1
        VID                    : V01
        Firmware Version       : Major.Minor.Build
        Active                 : 71.120.8
        Inactive               : 71.110.25
        Date Code(yy/mm/dd)    : 24/06/18
        Fiber Connector Type: LC
        Otn Application Code: Not Set
        Sonet Application Code: Not Set
        Ethernet Compliance Code: Not set

 Transceiver Temperature : 39 Celsius



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

**Step 5** Run the **show controllers coherentDSP** *rack/slot/instance/port* command to display coherentDSP controller status for coherent probe.

**Example:**

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/7
Tue Mar 11 02:41:55.191 IST

Port                                        : CoherentDSP 0/2/0/7
Controller State                            : Up
Last link flapped                           : 00:47:11

Inherited Secondary State                   : Normal
Configured Secondary State                  : Normal
Derived State                               : In Service
Loopback mode                               : None
BER Thresholds                              : SF = 1.0E-5  SD = 1.0E-7
Performance Monitoring                      : Enable
Bandwidth                                   : 100.0Gb/s
Alarm Information:
LOS = 0 LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0
IAE = 0 BIAE = 0        SF_BER = 0
SD_BER = 0      BDI = 0 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0     FLEXO_GIDM = 0
FLEXO-MM = 0    FLEXO-LOM = 0   FLEXO-RDI = 0
FLEXO-LOF = 0
Detected Alarms                             : None

Bit Error Rate Information
PREFEC  BER                                 : 1.29E-08
POSTFEC BER                                 : 0.00E+00
Q-Factor                                    : 14.80 dB

Q-Margin                                    : 8.50 dB
```

```
OTU TTI Received

FEC mode                                          : O_FEC

Flexo-Mode                                        : Enable
Flexo Details:
        Tx GID                                    : 0
        Rx GID                                    : 0

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


RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/7
Port                                              : CoherentDSP 0/2/0/7
Controller State                                  : Down
Last link flapped                                 : 00:11:17

Inherited Secondary State                         : Normal
Configured Secondary State                        : Normal
Derived State                                     : In Service
Loopback mode                                     : None
BER Thresholds                                    : SF = 1.0E-5  SD = 1.0E-7
Performance Monitoring                            : Enable
Bandwidth                                         : 400.0Gb/s
Alarm Information:
LOS = 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     FLEXO_GIDM = 0
FLEXO-MM = 0    FLEXO-LOM = 0   FLEXO-RDI = 0
FLEXO-LOF = 0
Detected Alarms                                   : LOS

Bit Error Rate Information
PREFEC  BER                                       : 5.00E-01
POSTFEC BER                                       : 0.00E+00
Q-Factor                                          : 0.00 dB

Q-Margin                                          : 0.00 dB

OTU TTI Received

FEC mode                                          : C_FEC

Flexo-Mode                                        : Enable
Flexo Details:
        Tx GID                                    : 0
        Rx GID                                    : 0

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

# Configure PRBS on EDFA2 card

The EDFA2 card supports PRBS configuration only on Coherent Probe port.

For EDFA2 card, you can configure PRBS only for coherentDSP without setting the secondary admin state of the controllers to maintenance.

Use this task to configure PRBS without maintenance state.

**Procedure**

**Step 1** Enter the **controller coherentDSP** *R/S/I/P* command to enter the coherentDSP controller configuration mode.

**Example:**

```
RP/0/RP0/CPU0:ios(config)#controller CoherentDSP0/0/0/7
```

**Step 2** Enter the **prbs mode {source | sink | source-sink} pattern {pn31 | pn23 | pn15 | pn7}** to configure the PRBS mode and pattern.

**Example:**

```
RP/0/RP0/CPU0:ios(config-CoDSP)#prbs mode source-sink pattern pn15
```

**Step 3** Commit the changes.

**Example:**

```
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
```

# Verify PRBS

Use these steps to verify CoherentDSP controller PRBS details and performance monitoring details.

**Procedure**

**Step 1** Run the **show controllers coherentDSP** *rack/slot/instance/port* **prbs-details** command to display PRBS details configured on a coherentDSP controller.

**Example:**

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/7 prbs-details
Tue Mar 11 03:13:34.425 IST

----------------------PRBS details------------------
PRBS Test              : Enable
PRBS Mode            : Source-Sink
PRBS Pattern          : PN7
PRBS Status             : Locked
PRBS Lock Time(in seconds)        : 1403
PRBS Bit Errors                           : 0
```

```
PRBS Found Count                          : 1
PRBS Lost Count                              : 0
PRBS Configured Time                     : 11 Mar 02:50:08 (1406 seconds elapsed)
PRBS First Lock Established Time: 11 Mar 02:50:11 (1403 seconds elapsed)
Result Summary                               : PASS
```

**Step 2** Run the **show controllers coherentDSP** *rack/slot/instance/port* **pm current 30-sec|15-min|24-hours prbs**to view the PRBS performance monitoring parameters on a coherentDSP controller.

**Example:**

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/7 pm current 15-min prbs
Tue Mar 11 03:21:31.173 IST
 PRBS in the current interval [03:15:00 - 03:21:31 Tue Mar 11 2025]
 PRBS current bucket type : Valid
 EBC          : 0           Threshold : 0         TCA(enable)  : NO
 FOUND-COUNT  : 0           Threshold : 0         TCA(enable)  : NO
 LOST-COUNT   : 0           Threshold : 0         TCA(enable)  : NO
 FOUND-AT-TS  : NULL
 LOST-AT-TS   : NULL
 CONFIG-PTRN  : PRBS_PATTERN_PN7
 STATUS       : LOCKED
Last clearing of "show controllers OTU" counters neve
```