



## Configuring Controllers

This chapter describes the Optics Controller and Coherent DSP Controller for the 6-port Coherent Line Card (NC55-6X200-DWDM-S). This chapter also describes the procedures used to configure the controllers.



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**Note** When you plan to replace a configured optical module with a different type of optical module, you must clear the configurations of the old module before installing the new optical module.

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**Note** When two MACsec enabled Cisco NCS 5500 routers with Coherent Line Cards are connected, there is no compatibility between Coherent Line Cards of IOS XR Release version 6.5.x (or lower) and 6.6.1 (or higher).

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## Optics Controllers

Controllers are represented in the *rack/slot/instance/port* format (*r/s/i/p*); for example, 0/3/0/1. Each port has an optics controller that is created on startup.



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

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

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### CFP2 DCO Optics Support

There are two hardware versions of the CFP DCO optics (A0 and B0). You can identify the version A0 and B0 using a show coherent driver internal location 0/0/CPU0 command and looking at "VID".

A0 = V01

B0 = V02

The CFP2 DCO version A0 optics support the following traffic types:

Traffic Type Index	Speed	Modulation	Forward Error Correction	Differential
1	100G	qpsk	15sdfec	disable
2	100G	qpsk	15sdfecde	enable
3	200G	16qam	15sdfec	disable
4	200G	8qam	15sdfec	disable

The CFP2 DCO version B0 optics support the following traffic-types:

Traffic Type Index	Speed	Modulation	Forward Error Correction	Differential
1	100G	qpsk	15sdfec	disable
2	100G	qpsk	15sdfecde	enable
3	100G	qpsk	otu7staircase	enable
4	200G	16qam	15sdfec	disable
5	200G	8qam	15sdfec	disable

The 100G/Staircase FEC traffic-type is supported with CFP2 DCO version B0 optics.

## Maintenance Mode

Coherent DSP controllers can be placed in maintenance mode. Use the **controller coherentDSP secondary-admin-state maintenance** command to place controllers in maintenance mode.

Use the **show controllers optics r/s/i/p** command to view optics parameter values, laser state, controller state, admin state, and trunk alarms on the card, and threshold values for the different optics parameters.

Use the **show controllers coherentDSP r/s/i/p** command to view the DSP controller state and alarm status and statistics.




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**Note** In maintenance mode, all alarms are suppressed and the **show alarms** command does not display alarm details. However, traffic is not affected in maintenance mode.

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**Note** The FEC is disabled for 25G and 50G optics in NC57-MPA-12L-S MPA when connected on 55A2-MOD-SE-S/-SE-H-S router, and in Line card NC57-MOD-S while verifying the FEC status using **show controllers { TwentyfiveGigE | FiftyGigE }**

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## Performance Monitoring

Performance monitoring (PM) parameters are used by service providers to gather, store, set thresholds for, and report performance data for early detection of problems. The user can retrieve both current and historical PM counters for the various controllers in 30-second, 15-minute, and 24-hour intervals.

PM for optical parameters include input signal power and transmit power, optical signal-to-noise ratio, chromatic dispersion, polarization dependent loss, second order polarization mode dispersion, differential group delay, and transmitter laser bias current.

PM for DSP parameters include:

- FEC: error corrected bits, uncorrectable blocks, pre-FEC BER (block errors ratio)
- OTN: errored seconds, severely effected seconds, unavailable seconds, failed counts

These parameters simplify troubleshooting operations and enhance data that can be collected directly from the equipment.

## How to Configure Controllers

This section contains the following procedures:

### Configuring Optics Controller

You can configure parameters such as performance monitoring, high power threshold, and wavelength for Optics controller.

To configure the Optics controller, use the following commands:

#### Before you begin

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

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

#### SUMMARY STEPS

1. **configure**
2. **controller optics** *r/s/i/p*

3. **shutdown**
4. **commit**
5. **rx-high-threshold** *rx-high*
6. **tx-high-threshold** *tx-high*
7. **no shutdown**
8. **commit**

## DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>configure</b> <b>Example:</b> RP/0/RP0/CPU0:router# configure terminal	Enters global configuration mode.
<b>Step 2</b>	<b>controller optics</b> <i>r/s/i/p</i> <b>Example:</b> RP/0/RP0/CPU0:router(config)# controller optics 0/3/0/1	Enters optics controller configuration mode.
<b>Step 3</b>	<b>shutdown</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# shutdown	Shuts down the optics controller.
<b>Step 4</b>	<b>commit</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# commit	Saves the configuration changes to the running configuration file and remains within the configuration session.
<b>Step 5</b>	<b>rx-high-threshold</b> <i>rx-high</i> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# rx-high-threshold 200	Configures the high receive power threshold. The range is -400 to 300 (in the units of 0.1 dBm).
<b>Step 6</b>	<b>tx-high-threshold</b> <i>tx-high</i> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# tx-high-threshold 300	Configures the high transmit power threshold. The range is -400 to 300 dBm (in the units of 0.1 dBm).
<b>Step 7</b>	<b>no shutdown</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# no shutdown	Removes the shutdown configuration on the optics controller.

	Command or Action	Purpose
<b>Step 8</b>	<b>commit</b> <b>Example:</b> <pre>RP/0/RP0/CPU0:router(config-Optics)# commit</pre>	Saves the configuration changes to the running configuration file and remains within the configuration session.



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

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

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

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

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

## Restrictions and Usage Guidelines for Port Modes

This section provides the restrictions and usage guidelines for the supported port modes.

Table 1: Restrictions and Usage Guidelines for Port Modes

Port Mode	Usage Guidelines	Restrictions
25Gbps	<ul style="list-style-type: none"> <li>• NCS-55A2-MOD-S</li> <li>• NCS-55A2-MOD-HD-S</li> <li>• NCS-55A2-MOD-SE-S</li> <li>• NC55A2-MOD-SE-H-S</li> <li>• NCS-55A2-MOD-HX-S</li> <li>• NCS-55A1-48Q6H</li> <li>• NCS-55A1-24Q6H-S</li> <li>• NC55-MOD-A-SE-S</li> <li>• NC55-MOD-A-S</li> <li>• NC55-32T16Q4H-A</li> <li>• N540-24Z8Q2C-M</li> <li>• N540X-ACC-SYS</li> <li>• N540-ACC-SYS</li> <li>• N540-28Z4C-SYS</li> </ul> <ul style="list-style-type: none"> <li>• The 25Gbps mode is divided into four quads (0-3). Each quad consists of the following ports: <ul style="list-style-type: none"> <li>• Quad 0 - Ports 24-27</li> <li>• Quad 1 - Ports 28-31</li> <li>• Quad 2 - Ports 32-35</li> <li>• Quad 3 - Ports 36-39</li> </ul> </li> <li>• 10Gbps mode supports both 1Gbps and 10Gbps port speed.</li> </ul>	<ul style="list-style-type: none"> <li>• 25Gbps mode is the default mode set on the quad.</li> <li>• Port speeds of 1Gbps and 10Gbps are incompatible with a 25Gbps port speed within the same quad. They cannot be configured to operate simultaneously.</li> </ul>

## Configure Port Mode Speed

Each port on the 6-port Coherent Line Card can support 100 Gbps (DWDM QPSK), 150Gbps (DWDM 8 QAM), or 200Gbps (DWDM 16 QAM) WDM signals.



**Note** You might rarely see up to five syslog messages mentioning that the recovery mechanism got triggered to recover the port. These messages are about a port in down state due to auto-negotiation mismatch with the peer port and other port-down scenarios. You can ignore such syslog messages as they will not affect the functionality of the ports.



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

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

When you configure the port-mode speed for 150Gbps (8 QAM), the port pairs belonging to a DSP are coupled. Ensure that you configure the port-mode speed on each port of the port pair that belongs to the same DSP.

To configure the port mode speed, use the following commands:

**Before you begin**

Ensure that you shut down the controller before you configure the controller or restore a saved configuration.

**SUMMARY STEPS**

1. **configure**
2. **controller optics** *r/s/i/p*
3. **shutdown**
4. **commit**
5. **port-mode speed** { 100G | 150G | 200G } **mod** { 16qam | 8qam | qpsk } **fec** { 15sdfec | 15sdfecde | 25sdfec | otu7staircase } **diff** { enable | disable }
6. **no shutdown**
7. **commit**

**DETAILED STEPS**

	Command or Action	Purpose
Step 1	<b>configure</b> <b>Example:</b> RP/0/RP0/CPU0:router# <b>configure</b>	Enters global configuration mode.
Step 2	<b>controller optics</b> <i>r/s/i/p</i> <b>Example:</b> RP/0/RP0/CPU0:router(config)# <b>controller optics</b> 0/3/0/0	Enters optics controller configuration mode

	Command or Action	Purpose
<b>Step 3</b>	<b>shutdown</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>shutdown</b>	Shuts down the optics controller.
<b>Step 4</b>	<b>commit</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>commit</b>	Saves the configuration changes to the running configuration file and remains within the configuration session.
<b>Step 5</b>	<b>port-mode speed { 100G   150G   200G } mod { 16qam   8qam   qpsk } fec { 15sdfec   15sdfecde   25sdfec   otu7staircase } diff { enable   disable }</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>port-mode speed 100G mod qpsk fec 15sdfec diff</b>	Configures the port mode speed.
<b>Step 6</b>	<b>no shutdown</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>no shutdown</b>	Removes the shutdown configuration on the optics controller.
<b>Step 7</b>	<b>commit</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>commit</b>	Saves the configuration changes to the running configuration file.



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

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

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

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





**Note** On NCS-55A2-MOD-S and NC55-MOD-A-S with CFP2-DCO optics:

- During the laser-on process, you might briefly see Optical Transport Network (OTN) alarms on the console. This alarm clears when the laser-on process is complete.

```
PKT_INFRA-FM-6-FAULT_INFO : OTUK-BDI :DECLARE :CoherentDSP0/0/2/2:
PKT_INFRA-FM-6-FAULT_INFO : OTUK-BDI :CLEAR :CoherentDSP0/0/2/2:
```

- During the laser-on process, you might briefly see transient transmit power and receive power alarms on the console. These alarms are cleared when the laser-on process is complete.

```
PKT_INFRA-FM-4-FAULT_MINOR : ALARM_MINOR :LO-RXPOWER :DECLARE :Optics0/0/2/0:
PKT_INFRA-FM-4-FAULT_MINOR : ALARM_MINOR :LO-TXPOWER :DECLARE :Optics0/0/2/0:
PKT_INFRA-FM-4-FAULT_MINOR : ALARM_MINOR :HI-RXPOWER :DECLARE :Optics0/0/2/0:
```

```
PKT_INFRA-FM-4-FAULT_MINOR : ALARM_MINOR :LO-RXPOWER :CLEAR :Optics0/0/2/0:
PKT_INFRA-FM-4-FAULT_MINOR : ALARM_MINOR :HI-RXPOWER :CLEAR :Optics0/0/2/0:
PKT_INFRA-FM-4-FAULT_MINOR : ALARM_MINOR :LO-TXPOWER :CLEAR :Optics0/0/2/0:
```

- When you bring up the local optics controller, you might see repeated remote faults on the console.

```
PLATFORM-DPA-2-RX_FAULT : Interface HundredGigE0/0/2/2/0, Detected Remote Fault
PLATFORM-DPA-2-RX_FAULT : Interface HundredGigE0/0/2/2/1, Detected Remote Fault
PLATFORM-DPA-2-RX_FAULT : Interface HundredGigE0/0/2/2/0, Detected Local Fault
PLATFORM-DPA-2-RX_FAULT : Interface HundredGigE0/0/2/2/1, Detected Local Fault
PLATFORM-DPA-2-RX_FAULT : Interface HundredGigE0/0/2/2/0, Detected Remote Fault
PLATFORM-DPA-2-RX_FAULT : Interface HundredGigE0/0/2/2/1, Detected Remote Fault
```

If you need to change the port-mode speed, ensure that you remove the existing port mode speed configuration by entering the **no port-mode** command. You can then change the port mode speed.

The following example shows how to change the port mode speed to 100Gbps.

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

**To modify the default 25Gpbs mode into 10Gpbs mode, perform the below configuration:**

Before Cisco IOS XR Release 7.5.1:

```
RP/0/RP0/CPU0:router(config)# hw-module quad 0 location 0/0/CPU0
RP/0/RP0/CPU0:router(config-quad-0x0)# mode 10g
```

From Cisco IOS XR Release 7.5.1:

```
RP/0/RP0/CPU0:router(config)# hw-module quad 0 location 0/0/CPU0 instance 1 mode 10g
RP/0/RP0/CPU0:router(config-quad-0x0)# mode 10g
```




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**Note** A quad number always starts from 0 to the maximum supported number. The number of quads supported varies from platform to platform and the CLI validates it. For example, the NCS 540 Series Router supports two quads (0 and 1). If you enter  $X=3$ , the CLI returns an error.

---

Here, `instance` indicates the MPA card instance. It can range from 0-5. For Cisco NCS 540 Series Routers, it is always 0. Whereas, for Cisco NCS 5500 Series Routers, the instance can be between 0-5, adding 1 for every MPA instance. The default value is 0.

Starting with Cisco IOS XR Release 24.2.1, you can configure 50Gpbs mode only on NC-57-48Q2D-S and NC-57-48Q2D-SE-S line cards.




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**Note** A quad number always starts from 0 to the maximum supported number. The number of quads supported varies from platform to platform and the CLI validates it. For example, the NCS 540 Series Router supports two quads (0 and 1). If you enter  $X=3$ , the CLI returns an error.

---

Here, `instance` indicates the MPA card instance. It can range from 0-5. For Cisco NCS 540 Series Routers, it is always 0. Whereas, for Cisco NCS 5500 Series Routers, the instance can be between 0-5, adding 1 for every MPA instance. The default value is 0.




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**Note** To revert to the default 25Gbps mode, use the `no` form of the `hw-module quad` command.

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After you configure the port-mode speed, you can configure the following interfaces:

- 100G – Each optics controller configuration creates a single 100GE port:

- **interface HundredGigE** `r/s/i/p/0` (where  $p$  = CTP2 port 0-5)

0/3/0/0/0

0/3/0/1/0

0/3/0/2/0

0/3/0/3/0

0/3/0/4/0

0/3/0/5/0

- 200G – Each optics controller configuration creates two 100GE ports:

- **interface HundredGigE** `r/s/i/p/0`, `r/s/i/p/1` (where  $p$  = CTP2 port 0-5)

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

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

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

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

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

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

- 150G (coupled) – Coupled optics controller configuration creates three 100GE port:
  - **interface HundredGigE** *r/s/i/p/0, r/s/i/p/1, r/s/i/p+1/0* (where *p* = CTP2 port: 0, 2, 4 [port *p* and *p* +1 are coupled])
    - 0/3/0/0/0, 0/3/0/0/1, 0/3/0/1/0
    - 0/3/0/2/0, 0/3/0/2/1, 0/3/0/3/0
    - 0/3/0/4/0, 0/3/0/4/1, 0/3/0/5/0

For more information, see the *Configuring Ethernet Interfaces* chapter.

## Configuring Wavelength

To configure wavelength, use the following commands:

### Before you begin

- Before configuring the wavelength, use the **show controllers optics** *r/s/i/p* **dwdm-carrier-map** command to display the wavelength and channel mapping for optics controllers.
- You must shut down the controller before you configure the controller or restore a saved configuration.

### SUMMARY STEPS

1. **configure**
2. **controller optics** *r/s/i/p*
3. **shutdown**
4. **commit**
5. **dwdm-carrier** {100MHz-grid frequency *frequency* } | {50GHz-grid [ frequency *frequency* | channel-number ] }
6. **no shutdown**
7. **commit**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>configure</b> <b>Example:</b> RP/0/RP0/CPU0:router# <b>configure</b>	Enters global configuration mode.
Step 2	<b>controller optics</b> <i>r/s/i/p</i> <b>Example:</b> RP/0/RP0/CPU0:router(config)# <b>controller optics</b> 0/3/0/1	Enters optics controller configuration mode.

	Command or Action	Purpose
<b>Step 3</b>	<b>shutdown</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>shutdown</b>	Shuts down the optics controller.
<b>Step 4</b>	<b>commit</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>commit</b>	Saves the configuration changes to the running configuration file and remains within the configuration session.
<b>Step 5</b>	<b>dwdm-carrier {100MHz-grid frequency frequency }   {50GHz-grid [ frequency frequency   channel-number ] }</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>dwdm-carrier 100MHz-grid frequency 1960875</b>	Configures the frequency on the trunk port.
<b>Step 6</b>	<b>no shutdown</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>no shutdown</b>	Removes the shutdown configuration on the optics controller.
<b>Step 7</b>	<b>commit</b> <b>Example:</b> RP/0/RP0/CPU0:router(config-Optics)# <b>commit</b>	Saves the configuration changes to the running configuration file and remains within the configuration session.

To configure a DWDM carrier with the required frequency:

```
RP/0/RP0/CPU0:router#config
RP/0/RP0/CPU0:router(config)#controller Optics0/3/0/0
RP/0/RP0/CPU0:router(config-Optics)#dwdm-carrier
RP/0/RP0/CPU0:router(config-Optics)#dwdm-carrier 100MHz-grid
RP/0/RP0/CPU0:router(config-Optics)#dwdm-carrier 100MHz-grid frequency
RP/0/RP0/CPU0:router(config-Optics)#dwdm-carrier 100MHz-grid frequency 1960625
```

The output of show run controller optics 0/3/0/0 command is:

```
RP/0/RP0/CPU0:router#show run controller optics 0/3/0/0
Wed Nov  6 13:47:33.178 UTC
controller Optics0/3/0/0
transmit-power -7
port-mode speed 100G mod qpsk fec 25sdfec diff disable
dwdm-carrier 100MHz-grid frequency 1960625
```



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

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

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

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

## Configuring Coherent DSP Controller

You can configure the administrative state for the Coherent DSP controller. To configure the Coherent DSP controller, use the following commands.



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

### SUMMARY STEPS

1. **configure**
2. **controller coherentDSP** *r/s/i/p*
3. **secondary-admin-state** *admin-state*
4. **commit**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>configure</b> <b>Example:</b> RP/0/RP0/CPU0:router# <b>configure</b>	Enters global configuration mode.
<b>Step 2</b>	<b>controller coherentDSP</b> <i>r/s/i/p</i> <b>Example:</b> RP/0/RP0/CPU0:router(config)# <b>controller coherentDSP</b> 0/3/0/1	Enters Coherent DSP optics controller configuration mode.
<b>Step 3</b>	<b>secondary-admin-state</b> <i>admin-state</i> <b>Example:</b>	Configures the administrative state of the controller indicating that the controller is under maintenance.

	Command or Action	Purpose
	RP/0/RP0/CPU0:router (config-CoDSP) # <b>secondary-admin-state maintenance</b>	
<b>Step 4</b>	<b>commit</b> <b>Example:</b>  RP/0/RP0/CPU0:router (config-CoDSP) # <b>commit</b>	Saves the configuration changes to the running configuration file and remains within the configuration session.

## Configuring Performance Monitoring

You can configure the performance monitoring parameters for the optics and Coherent DSP controllers. To configure PM parameters, use the following commands.

### SUMMARY STEPS

1. **configure**
2. **controller** { **optics** | **coherentDSP** } *r/s/i/p*
3. **pm** { **30-sec** | **15-min** | **24-hour** } { **optics** | **fec** | **otn** } [ **report** | **threshold value** ]
4. **commit**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>configure</b> <b>Example:</b>  RP/0/RP0/CPU0:router# <b>configure</b>	Enters global configuration mode.
<b>Step 2</b>	<b>controller</b> { <b>optics</b>   <b>coherentDSP</b> } <i>r/s/i/p</i> <b>Example:</b>  RP/0/RP0/CPU0:router (config) # <b>controller</b> <b>coherentDSP 0/3/0/1</b>	Enters optics or Coherent DSP controller configuration mode.
<b>Step 3</b>	<b>pm</b> { <b>30-sec</b>   <b>15-min</b>   <b>24-hour</b> } { <b>optics</b>   <b>fec</b>   <b>otn</b> } [ <b>report</b>   <b>threshold value</b> ] <b>Example:</b>  RP/0/RP0/CPU0:router (config-CoDSP) # <b>pm 15-min otn</b> <b>threshold es-ne</b>	Configures the performance monitoring parameters.
<b>Step 4</b>	<b>commit</b> <b>Example:</b>  RP/0/RP0/CPU0:router (config-CoDSP) # <b>commit</b>	Saves the configuration changes to the running configuration file and remains within the configuration session.

## Verify Controller Details

Execute the **show controllers coherentDSP** command to display status and configuration information for interfaces configured as coherent DSP controllers.

```
Router#show controllers coherentDSP 0/0/0/13
Thu May 27 06:56:37.505 UTC

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

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

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

Q-Margin                             : 2.70dB

OTU TTI Received
```

Execute the **show controllers optics** command to display status and configuration information about the interfaces configured as optics controller.

```
Router#show controllers optics 0/0/0/7
Controller State: Up
Transport Admin State: In Service
Laser State: On
LED State: Green
FEC State: FEC ENABLED
Optics Status
  Optics Type: QSFPDD 400G ZR
  DWDM carrier Info: C BAND, MSA ITU Channel=61, Frequency=193.10THz,
  Wavelength=1552.524nm
  Alarm Status:
  -----
  Detected Alarms: None
  LOS/LOL/Fault Status:
  Alarm Statistics:
  -----
  HIGH-RX-PWR = 0          LOW-RX-PWR = 0
  HIGH-TX-PWR = 0          LOW-TX-PWR = 0
  HIGH-LBC = 0            HIGH-DGD = 0
  OOR-CD = 0              OSNR = 55
  WVl-OOL = 0             MEA = 0
  IMPROPER-REM = 0
```

```

TX-POWER-PROV-MISMATCH = 0
Laser Bias Current = 0.0
Actual TX Power = -8.16 dBm
RX Power = -7.85 dBm
RX Signal Power = -7.55 dBm
Frequency Offset = 5 MHz
Performance Monitoring: Enable
THRESHOLD VALUES
-----
Parameter                High Alarm  Low Alarm  High Warning  Low Warning
-----
Rx Power Threshold(dBm)   1.9        -28.2     0.0          -25.0
Tx Power Threshold(dBm)   0.0        -15.0     -2.0         -16.0
LBC Threshold(mA)        0.00       0.00     0.00         0.00
Temp. Threshold(celsius) 80.00      -5.00     75.00        15.00
Voltage Threshold(volt)   3.46       3.13     3.43         3.16
LBC High Threshold = 98 %
Configured Tx Power = -6.00 dBm
Configured CD High Threshold = 80000 ps/nm
Configured CD lower Threshold = -80000 ps/nm
Configured OSNR lower Threshold = 9.00 dB
Configured DGD Higher Threshold = 80.00 ps
Baud Rate = 59.8437500000 GBd
Modulation Type: 16QAM
Chromatic Dispersion 2 ps/nm
Configured CD-MIN -2400 ps/nm CD-MAX 2400 ps/nm
Second Order Polarization Mode Dispersion = 87.00 ps^2
Optical Signal to Noise Ratio = 36.30 dB
Polarization Dependent Loss = 0.40 dB
Polarization Change Rate = 0.00 rad/s
Differential Group Delay = 2.00 ps
Temperature = 51.00 Celsius
Voltage = 3.36 V
Transceiver Vendor Details
Form Factor                : QSFP-DD
Optics type                 : QSFPDD 400G ZR
Name                       : CISCO-ACACIA
OUI Number                 : 7c.b2.5c
Part Number                 : DP04QSDD-E20-19E
Rev Number                  : 10
Serial Number               : ACA2449003P
PID                        : QDD-400G-ZR-S
VID                        : ES03
Firmware Version           : 61.12
Date Code(yy/mm/dd)       : 20/12/03

```

## Replace Optical Module

In this example, we are replacing QSFP-100G-SR4-S QSFP optics configured for 4x25 breakout with QSFP-40G-SR4 optics and configure it for 4x10 breakout.

1. Delete the optical module configuration using the **no breakout** command.

```

Router# configure
Router(config)# controller optics 0/2/0/35
Router(config-Optics)# no breakout 4x25
Router(config-Optics)# commit

```

2. Replace the QSFP-100G-SR4-S QSFP optical module with QSFP-40G-SR4 optical module.
3. Configure 4x10 breakout for QSFP-40G-SR4 optical module.



```
Router# configure  
Router(config)# controller optics 0/2/0/35  
Router(config-Optics)# breakout 4x10  
Router(config-Optics)# commit
```

