



## 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 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, on page 1](#)
- [Maintenance Mode, on page 2](#)
- [Performance Monitoring, on page 3](#)
- [How to Configure Controllers, on page 3](#)
- [Verify Controller Details, on page 13](#)

## 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.
<b>Step 8</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.



**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.

## Configuring 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** 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
<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 optics r/s/i/p</b> <b>Example:</b>  RP/0/RP0/CPU0:router(config)# <b>controller optics</b> 0/3/0/0	Enters optics controller configuration mode
<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)#
```

### What to do next

#### Configuring Port Speed on 25G ports

The 25G ports are divided into four quads (0-3). Each quad houses the following ports:

- Quad 0 - Ports 24-27
- Quad 1 - Ports 28-31
- Quad 2 - Ports 32-35
- Quad 3 - Ports 36-39

#### Limitations and Important Guidelines

- 25G is the default mode set on the quad.
- 1G and 10G cannot coexist on the same quad as 25G.
- 10G mode supports both 1G and 10G.

To configure the 25G quad ports into 10G ports, use the following command:

#### Before Release 7.5.1

```
RP/0/RP0/CPU0:router(config)# hw-module quad X location 0/0/CPU0
```

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

#### On and After Release 7.5.1:

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

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

X is the number of quads (0,1,2,3...n) supported. Each quad has a default speed of 25G. You can configure the port in 10G or revert to 25G using `no` form of the command.

Y denotes 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** 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.

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

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

	Command or Action	Purpose
	RP/0/RP0/CPU0:router(config-CoDSP)# <b>pm 15-min otn threshold es-ne</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.

## 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      FLEXP_GIDM = 0
FLEXP-MM = 0      FLEXP-LOM = 0  FLEXP-RDI = 0
FLEXP-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: QSPDD 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:

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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

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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<sup>2</sup>

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