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.

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).

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.

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)

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.

✎

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.

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**
Step 1	**configure** **Example:** `RP/0/RP0/CPU0:router# configure terminal`	Enters global configuration mode.

Step 2	**controller optics** *r*/*s*/*i*/*p*
	
	Example:
	
	`RP/0/RP0/CPU0:router(config)# controller optics`
	`0/3/0/1`
		Enters optics controller configuration mode.

Step 3	**shutdown** **Example:** `RP/0/RP0/CPU0:router(config-Optics)# shutdown`	Shuts down the optics controller.
Step 4	**commit** **Example:** `RP/0/RP0/CPU0:router(config-Optics)# commit`	Saves the configuration changes to the running configuration file and remains within the configuration session.

Step 5	**rx-high-threshold** *rx-high*
	
	Example:
	
	`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).

Step 6	**tx-high-threshold** *tx-high*
	
	Example:
	
	`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).

Step 7	**no shutdown** **Example:** `RP/0/RP0/CPU0:router(config-Optics)# no shutdown`	Removes the shutdown configuration on the optics controller.

	Command or Action	Purpose
Step 8	**commit** **Example:** 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. You need to 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

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. **port-mode speed** { **100G** | **150G** | **200G** } **fec** (**15percent** | **25percent** } **diff** { **enable** | **disable** }
6. **no shutdown**
7. **commit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure** **Example:** RP/0/RP0/CPU0:router# **configure**	Enters global configuration mode.
Step 2	**controller optics** *r*/*s*/*i*/*p* **Example:** RP/0/RP0/CPU0:router(config)# **controller optics** **0/3/0/1**	Enters optics controller configuration mode
Step 3	**shutdown** **Example:** RP/0/RP0/CPU0:router(config-Optics)# **shutdown**	Shuts down the optics controller.
Step 4	**commit** **Example:** RP/0/RP0/CPU0:router(config-Optics)# **commit**	Saves the configuration changes to the running configuration file and remains within the configuration session.
Step 5	**port-mode speed** { **100G**	**150G**	**200G** } **fec** (**15percent**	**25percent** } **diff** { **enable**	**disable** } **Example:** RP/0/RP0/CPU0:router(config-Optics)# **port-mode** **speed 200G fec 15percent diff enable**	Configures the port mode speed.
Step 6	**no shutdown** **Example:** RP/0/RP0/CPU0:router(config-Optics)# **no shutdown**	Removes the shutdown configuration on the optics controller.
Step 7	**commit** **Example:** RP/0/RP0/CPU0:router(config-Optics)# **commit**	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 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 ::
```

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 is cleared 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, you must 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 fec 15percent diff enable
RP/0/RP0/CPU0:router(config-Optics)# commit
RP/0/RP0/CPU0:router(config-Optics)# no shutdown
RP/0/RP0/CPU0:router(config-Optics)# commit
RP/0/RP0/CPU0:router(config-Optics)# exit
```

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

What to do next

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-carrrier-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	**configure** **Example:** RP/0/RP0/CPU0:router# **configure**	Enters global configuration mode.
Step 2	**controller optics** *r*/*s*/*i*/*p* **Example:** RP/0/RP0/CPU0:router(config)# **controller optics 0/3/0/1**	Enters optics controller configuration mode.
Step 3	**shutdown** **Example:** RP/0/RP0/CPU0:router(config-Optics)# **shutdown**	Shuts down the optics controller.
Step 4	**commit** **Example:** RP/0/RP0/CPU0:router(config-Optics)# **commit**	Saves the configuration changes to the running configuration file and remains within the configuration session.
Step 5	**dwdm-carrier** {**100MHz-grid frequency** *frequency* }	{**50GHz-grid** [**frequency** *frequency*	*channel-number*] } **Example:** RP/0/RP0/CPU0:router(config-Optics)# **dwdm-carrier 100MHz-grid frequency 1960875**	Configures the frequency on the trunk port.
Step 6	**no shutdown** **Example:** RP/0/RP0/CPU0:router(config-Optics)# **no shutdown**	Removes the shutdown configuration on the optics controller.

	Command or Action	Purpose
Step 7	**commit** **Example:** `RP/0/RP0/CPU0:router(config-Optics)# `**`commit`**	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	**configure** **Example:** RP/0/RP0/CPU0:router# **configure**	Enters global configuration mode.
Step 2	**controller coherentDSP** *r*/*s*/*i*/*p* **Example:** RP/0/RP0/CPU0:router(config)# **controller** **coherentDSP 0/3/0/1**	Enters Coherent DSP optics controller configuration mode.
Step 3	**secondary-admin-state** *admin-state* **Example:** RP/0/RP0/CPU0:router(config-CoDSP)# **secondary-admin-state maintenance**	Configures the administrative state of the controller indicating that the controller is under maintenance.
Step 4	**commit** **Example:** RP/0/RP0/CPU0:router(config-CoDSP)# **commit**	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
Step 1	**configure** **Example:**	Enters global configuration mode.

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