



# Configuring the Card Mode

This chapter lists the supported configurations and the procedures to configure the card mode on the line cards.



**Note** Unless otherwise specified, “line cards” refers to 1.2T and 1.2TL line cards.

- [1.2T and 1.2TL Line Cards, on page 1](#)
- [OTN-XP Card, on page 16](#)
- [2-QDD-C Line Card, on page 81](#)

## 1.2T and 1.2TL Line Cards

The following section describes the supported configurations and procedures to configure the card modes on the line cards.

### Card Modes

The line cards support module and slice configurations.

The line cards have two trunk ports (0 and 1) and 12 client ports (2 through 13) each. You can configure the line card in two modes:

- Muxponder—In this mode, both trunk ports are configured with the same trunk rate. The client-to-trunk mapping is in a sequence.
- Muxponder slice—In this mode, each trunk port is configured independent of the other with different trunk rates. The client-to-trunk mapping is fixed. For Trunk 0, the client ports are 2 through 7. For Trunk 1, the client ports are 8 through 13.

### Sub 50G Configuration

You can configure the sub 50G or coupled mode on the line card only in the muxponder mode. The following table displays the port configuration for the supported data rates.

Trunk Data Rate (per trunk)	Total Configured Data rate	Card Support	Trunk Ports	Client Ports for Trunk 0 (100G)	Shared Client Port (50G per trunk)	Client Ports for Trunk 1 (100G)
50G	100G	1.2T, 1.2TL	0, 1	-	2	-
150G	300G	1.2T, 1.2TL	0, 1	2	3	4
250G	500G	1.2T, 1.2TL	0, 1	2, 3	4	5, 6
350G	700G	1.2T, 1.2TL	0, 1	2, 3, 4	5	6, 7, 8
450G	900G	1.2T	0, 1	2, 3, 4, 5	6	7, 8, 9, 10
550G	1.1T	1.2T	0, 1	2, 3, 4, 5, 6	7	8, 9, 10, 11, 12

From Release 7.5.2, 1.2T and 1.2TL line cards support an alternate port configuration for Sub 50G (split client port mapping) that you configure using CLI. The following table displays the port configuration for the supported data rates.

Trunk Data Rate (per trunk)	Total Configured Data rate	Card Support	Trunk Ports	Client Ports for Trunk 0 (100G)	Shared Client Port (50G per trunk)	Client Ports for Trunk 1 (100G)
50G	100G	1.2T, 1.2TL	0, 1	-	7	-
150G	300G	1.2T, 1.2TL	0, 1	2	7	8
250G	500G	1.2T, 1.2TL	0, 1	2, 3	7	8, 9
350G	700G	1.2T, 1.2TL	0, 1	2, 3, 4	7	8, 9, 10
450G	900G	1.2T	0, 1	2, 3, 4, 5	7	8, 9, 10, 11
550G	1.1T	1.2T	0, 1	2, 3, 4, 5, 6	7	8, 9, 10, 11, 12



**Note** In all x50G configurations, client traffic on the middle port is affected with ODUK-BDI and LF alarms after the **power cycle or link flap** on the trunk side. This issue is raised when the two network lanes work in coupled mode and move from low to high power. To solve this issue, create a new frame either at the near-end or far-end by performing **shut** or **no shut** of the trunk ports.

### Coupled Mode Restrictions

The following restrictions apply to the coupled mode configuration:

- Both trunk ports must be configured with the same bits-per-symbol or baud rate and must be sent over same fiber and direction.
- The chromatic dispersion must be configured to the same value for both trunk ports.

- When trunk internal loopback is configured, it must be done for both trunk ports. Configuring internal loopback on only one trunk results in traffic loss.
- Fault on a trunk port of a coupled pair may cause errors on all clients including those running only on the unaffected trunk port.

## Configure Split Client Port Mapping

**Table 1: Feature History**

Feature Name	Release Information	Description
Split Client Port Mapping	Cisco IOS XR Release 7.5.2	A new trunk port to client port mapping for sub 50G configurations is now available on the 1.2T C band, 1.2T L band, and 800G QSFP-DD Transponder line cards. In this mapping, the same shared client port is used for all Sub 50G trunk data rates, eliminating recabling while changing the data rates.

You can configure the trunk port to client port mapping for sub 50G data rates in the default mode or in the split client port mapping mode.

In the default mode, consecutive client ports carry the information. For example, on a 2-QDD-C card, if the trunk data rate per trunk is 150G, client ports 2, 3, and 4 carry the data and client port 3 is the shared client port. For a trunk data rate of 250G, client ports 2, 3, 4, 5, and 6 carry the data and client port 4 is the shared client port. However, if you configure split client port mapping, trunk port to client port mapping is fixed. The shared client port is client port 5 for 2-QDD-C card and client port 7 for 1.2T and 1.2TL cards.

To configure the split client port mapping, use the following commands.

**configure**

**hw-module location *location* mxponder**

**split-client-port-mapping**

**commit**

The following is a sample in which split-client-port-mapping is configured with a 450G trunk payload.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#split-client-port-mapping
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#end
```

To remove the split client port-mapping configuration and configure default client port mapping, use the following commands.

**configure**

**hw-module location *location* mxponder**

**no split-client-port-mapping**

## Configure Split Client Port Mapping

**commit**

The following is a sample in which split client port-mapping configuration is removed.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#no split-client-port-mapping
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#end
```

## Verifying the Port Mapping Configuration

The following is a sample output of the split client port-mapping.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 mxponder

Location:          0/1
Client Bitrate:    100GE
Trunk Bitrate:     450G
Status:            Provisioning In Progress
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port      CoherentDSP0/1/0/0
CoherentDSP0/1/0/1                          Traffic Split Percentage

HundredGigECtrlr0/1/0/2          ODU40/1/0/0/1          100
                                0
HundredGigECtrlr0/1/0/3          ODU40/1/0/0/2          100
                                0
HundredGigECtrlr0/1/0/4          ODU40/1/0/0/3          100
                                0
HundredGigECtrlr0/1/0/5          ODU40/1/0/0/4          100
                                0
HundredGigECtrlr0/1/0/7          ODU40/1/0/0/5          50
                                50
HundredGigECtrlr0/1/0/8          ODU40/1/0/1/1          0
                                100
HundredGigECtrlr0/1/0/9          ODU40/1/0/1/2          0
                                100
HundredGigECtrlr0/1/0/10         ODU40/1/0/1/3          0
                                100
HundredGigECtrlr0/1/0/11         ODU40/1/0/1/4          0
                                100
```

The following is a sample output of the default client port mapping.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 mxponder

Location:          0/1
Client Bitrate:    100GE
Trunk Bitrate:     450G
Status:            Provisioning In Progress
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port      CoherentDSP0/1/0/0
CoherentDSP0/1/0/1                          Traffic Split Percentage

HundredGigECtrlr0/1/0/2          ODU40/1/0/0/1          100
                                0
HundredGigECtrlr0/1/0/3          ODU40/1/0/0/2          100
                                0
HundredGigECtrlr0/1/0/4          ODU40/1/0/0/3          100
                                0
```

HundredGigEController0/1/0/5 0	ODU40/1/0/0/4	100
HundredGigEController0/1/0/6 50	ODU40/1/0/0/5	50
HundredGigEController0/1/0/7 100	ODU40/1/0/1/1	0
HundredGigEController0/1/0/8 100	ODU40/1/0/1/2	0
HundredGigEController0/1/0/9 100	ODU40/1/0/1/3	0
HundredGigEController0/1/0/10 100	ODU40/1/0/1/4	0

## Supported Data Rates

The following data rates are supported on the line card.

In R7.0.1, you can configure the client port to OTU4 only in the muxponder mode. In R7.1.1 and later releases, you can configure the client port to OTU4 in both the muxponder and muxponder slice modes. In muxponder slice mode, both the slices must be configured with either OTU4 or 100GE Ethernet client rates in R7.1.1. In R7.2.0, a mixed configuration of OTU4 and 100GE is supported in the muxponder slice mode. LLDP drop, L1 encryption, and AINS are not supported on the OTU4 configuration.

The following table displays the client and trunk ports that are enabled for the muxponder configuration.

Trunk Data Rate	Card Support	Client Data Rate (100GE, OTU4)	Trunk Ports	Client Ports
100	1.2T, 1.2TL	100GE, OTU4	0, 1	2, 3
200	1.2T, 1.2TL	100GE, OTU4	0, 1	2, 3, 4, 5
300	1.2T, 1.2TL	100GE, OTU4	0, 1	2, 3, 4, 5, 6, 7
400	1.2T, 1.2TL	100GE, OTU4	0, 1	2, 3, 4, 5, 6, 7, 8, 9
500	1.2T	100GE, OTU4	0, 1	2, 3, 4, 5, 6, 7, 8, 9, 10, 11
600	1.2T	100GE, OTU4	0, 1	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

The following table displays the client and trunk ports that are enabled for the muxponder slice 0 configuration.

Trunk Data Rate	Card Support	Client Data Rate	Trunk Ports	Client Ports
100	1.2T, 1.2TL	100GE, OTU4	0	2
200	1.2T, 1.2TL	100GE, OTU4	0	2, 3
300	1.2T, 1.2TL	100GE, OTU4	0	2, 3, 4
400	1.2T, 1.2TL	100GE, OTU4	0	2, 3, 4, 5
500	1.2T	100GE, OTU4	0	2, 3, 4, 5, 6
600	1.2T	100GE, OTU4	0	2, 3, 4, 5, 6, 7

The following table displays the client and trunk ports that are enabled for the muxponder slice 1 configuration.

Trunk Data Rate	Card Support	Client Data Rate	Trunk Ports	Client Ports
100	1.2T, 1.2TL	100GE, OTU4	1	8
200	1.2T, 1.2TL	100GE, OTU4	1	8, 9
300	1.2T, 1.2TL	100GE, OTU4	1	8, 9, 10
400	1.2T, 1.2TL	100GE, OTU4	1	8, 9, 10, 11
500	1.2T	100GE, OTU4	1	8, 9, 10, 11, 12
600	1.2T	100GE, OTU4	1	8, 9, 10, 11, 12, 13

All configurations can be accomplished by using appropriate values for client bitrate and trunk bitrate parameters of the **hw-module** command.

The following table displays the trunk parameter ranges for the 1.2T card.

Trunk Payload	FEC	Min BPS	Max BPS	Min GBd	Max GBd
50G	15%	1	1.3125	24.0207911	31.5272884
50G	27%	1	1.4453125	24.0207911	34.7175497
100G	15%	1	2.625	24.0207911	63.0545768
100G	27%	1	2.890625	24.0207911	69.4350994
150G	15%	1.3203125	3.9375	24.0207911	71.6359689
150G	27%	1.453125	4.3359375	24.0207911	71.6749413
200G	15%	1.7578125	5.25	24.0207911	71.7420962
200G	27%	2	4.40625	31.51	69.43
250G	15%	2.1953125	6	26.2727403	71.8059237
250G	27%	2.4140625	6	28.9312914	71.9068991
300G	15%	2.6328125	6	31.5272884	71.8485385
300G	27%	2.8984375	6	34.7175497	71.8681352
350G	15%	3.0703125	6	36.7818364	71.8790086
350G	27%	3.3828125	6	40.503808	71.8404724
400G	15%	3.5078125	6	42.0363845	71.9018782
400G	27%	3.8671875	6	46.2900663	71.8197392
450G	15%	3.9453125	6	47.2909326	71.9196757

Trunk Payload	FEC	Min BPS	Max BPS	Min GBd	Max GBd
450G	27%	4.34375	6	52.0763245	71.9327648
500G	15%	4.3828125	6	52.5454806	71.93392
500G	27%	4.8281250	6	57.8625828	71.9068991
550G	15%	4.8203125	6	57.8000287	71.9455787
550G	27%	5.3125	6	63.6488411	71.88575
600G	15%	5.2578125	-	-	71.9552971

The following table displays the trunk parameter ranges for the 1.2TL card.

Trunk Payload	FEC	Min BPS	Max BPS	Min GBd	Max GBd
100G	15%	1	2.625	24.0207911	63.0545768
100G	27%	1	2.890625	24.0207911	69.4350994
150G	15%	1.3203125	3.9375	24.0207911	71.6359689
150G	27%	1.453125	4.3359375	24.0207911	71.6749413
200G	15%	2	4	31.5272884	63.0545768
200G	27%	2	4.40625	31.51664088	69.43509943
250G	15%	2.1953125	4.5	35.0303204	71.8059237
250G	27%	2.4140625	4.5	38.5750552	71.9068991
300G	15%	2.6328125	4.5	42.0363845	71.8485385
300G	27%	2.8984375	4.5	46.2900662857142	71.86813526
350G	15%	3.0703125	4.5	49.0424486	71.8790086
350G	27%	3.3828125	4.5	54.0050773	71.8404724
400G	15%	3.5078125	4.5	56.0485127	71.9018782
400G	27%	3.8671875	4.5	61.72008838	71.81973921

To configure the BPS, see [Configuring the BPS, on page 13](#).

## Configuring the Card Mode

You can configure the line card in the module (muxponder) or slice configuration (muxponder slice).

To configure the card in the muxponder mode, use the following commands.

**configure**

**hw-module location *location* mxponder client-rate {100GE | OTU4}**

**hw-module location *location* mxponder trunk-rate {50G | 100G | 150G | 200G | 250G | 300G | 350G | 400G | 450G | 500G | 550G | 600G }**

**commit**

To configure the card in the muxponder slice mode, use the following commands.

**configure**

**hw-module location *location* mxponder-slice *mxponder-slice-number* client-rate { 100GE|OTU4}**

**hw-module location *location* mxponder-slice trunk-rate { 100G | 200G | 300G | 400G | 500G | 600G }**

**commit**

### Examples

The following is a sample in which the card is configured in the muxponder mode with a 550G trunk payload.

```
RP/0/RP0/CPU0:ios#config
Tue Oct 15 01:24:56.355 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder client-rate 100GE
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder trunk-rate 550G
RP/0/RP0/CPU0:ios(config)#commit
```

The following is a sample in which the card is configured in the muxponder mode with a 500G trunk payload.

```
RP/0/RP0/CPU0:ios#config
Sun Feb 24 14:09:33.989 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder client-rate OTU4
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder trunk-rate 500G
RP/0/RP0/CPU0:ios(config)#commit
```

The following is a sample in which the card is configured in the muxponder slice 0 mode with a 500G trunk payload.

```
RP/0/RP0/CPU0:ios#config
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder-slice 0 client-rate 100GE
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder-slice 0 trunk-rate 500G
RP/0/RP0/CPU0:ios(config)#commit
```

The following is a sample in which the card is configured in the muxponder slice 1 mode with a 400G trunk payload.

```
RP/0/RP0/CPU0:ios#config
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder-slice 1 client-rate 100GE
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder-slice 1 trunk-rate 400G
RP/0/RP0/CPU0:ios(config)#commit
```

The following is a sample in which the card is configured with mixed client rates in the muxponder slice mode.

```
RP/0/RP0/CPU0:ios#configure
Mon Mar 23 06:10:22.227 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder-slice 0 client-rate OTU4 trunk-rate
500G
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder-slice 1 client-rate 100GE trunk-rate
500G
RP/0/RP0/CPU0:ios(config)#commit
```

## Verifying the Card Configuration

```
RP/0/RP0/CPU0:ios#show hw-module location 0/2 muxponder
Fri Mar 15 11:48:48.344 IST

Location:          0/2
Client Bitrate:    100GE
Trunk Bitrate:     500G
Status:            Provisioned
LLDP Drop Enabled: FALSE
Client Port        Mapper/Trunk Port   CoherentDSP0/2/0/0  CoherentDSP0/2/0/1
                           Traffic Split Percentage

HundredGigECtrlr0/2/0/2 ODU40/2/0/0/1      100      0
HundredGigECtrlr0/2/0/3 ODU40/2/0/0/2      100      0
HundredGigECtrlr0/2/0/4 ODU40/2/0/0/3      100      0
HundredGigECtrlr0/2/0/5 ODU40/2/0/0/4      100      0
HundredGigECtrlr0/2/0/6 ODU40/2/0/0/5      100      0
HundredGigECtrlr0/2/0/7 ODU40/2/0/1/1      0       100
HundredGigECtrlr0/2/0/8 ODU40/2/0/1/2      0       100
HundredGigECtrlr0/2/0/9 ODU40/2/0/1/3      0       100
HundredGigECtrlr0/2/0/10 ODU40/2/0/1/4      0       100
HundredGigECtrlr0/2/0/11 ODU40/2/0/1/5      0       100
```

The following is a sample output of the coupled mode configuration where the shared client port is highlighted.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 muxponder
Tue Oct 15 01:25:57.358 UTC

Location:          0/1
Client Bitrate:    100GE
Trunk Bitrate:     550G
Status:            Provisioned
LLDP Drop Enabled: FALSE
Client Port        Mapper/Trunk Port   CoherentDSP0/1/0/0  CoherentDSP0/1/0/1
                           Traffic Split Percentage

HundredGigECtrlr0/1/0/2 ODU40/1/0/0/1      100      0
HundredGigECtrlr0/1/0/3 ODU40/1/0/0/2      100      0
HundredGigECtrlr0/1/0/4 ODU40/1/0/0/3      100      0
HundredGigECtrlr0/1/0/5 ODU40/1/0/0/4      100      0
HundredGigECtrlr0/1/0/6 ODU40/1/0/0/5      100      0
HundredGigECtrlr0/1/0/7 ODU40/1/0/0/6      50      50
HundredGigECtrlr0/1/0/8 ODU40/1/0/1/1      0       100
HundredGigECtrlr0/1/0/9 ODU40/1/0/1/2      0       100
HundredGigECtrlr0/1/0/10 ODU40/1/0/1/3      0       100
HundredGigECtrlr0/1/0/11 ODU40/1/0/1/4      0       100
HundredGigECtrlr0/1/0/12 ODU40/1/0/1/5      0       100
```

The following is a sample output of all the muxponder slice 0 configurations.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 muxponder-slice 0
Fri Mar 15 06:04:18.348 UTC

Location:          0/1
Slice ID:          0
Client Bitrate:    100GE
Trunk Bitrate:     500G
Status:            Provisioned
LLDP Drop Enabled: FALSE
Client Port        Mapper/Trunk Port   CoherentDSP0/1/0/0
                           Traffic Split Percentage
```

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HundredGigECtrlr0/1/0/2	ODU40/1/0/0/1	100
HundredGigECtrlr0/1/0/3	ODU40/1/0/0/2	100
HundredGigECtrlr0/1/0/4	ODU40/1/0/0/3	100
HundredGigECtrlr0/1/0/5	ODU40/1/0/0/4	100
HundredGigECtrlr0/1/0/6	ODU40/1/0/0/5	100

The following is a sample output of all the muxponder slice 1 configurations.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 mxponder-slice 1
Fri Mar 15 06:11:50.020 UTC

Location:          0/1
Slice ID:          1
Client Bitrate:    100GE
Trunk Bitrate:     400G
Status:            Provisioned
LLDP Drop Enabled: TRUE

Client Port        Mapper/Trunk Port      CoherentDSP0/1/0/1
                  Traffic Split Percentage

HundredGigECtrlr0/1/0/8   ODU40/1/0/1/1   100
HundredGigECtrlr0/1/0/9   ODU40/1/0/1/2   100
HundredGigECtrlr0/1/0/10  ODU40/1/0/1/3   100
HundredGigECtrlr0/1/0/11  ODU40/1/0/1/4   100
```

The following is a sample output of the muxponder slice 1 configuration with client configured as OTU4.

```
RP/0/RP0/CPU0:ios#sh hw-module location 0/0 mxponder-slice 1
Wed Mar 11 13:59:11.073 UTC

Location:          0/0
Slice ID:          1
Client Bitrate:    OTU4
Trunk Bitrate:     200G
Status:            Provisioned
Client Port        Peer/Trunk Port      CoherentDSP0/0/0/1
                  Traffic Split Percentage

OTU40/0/0/8        ODU40/0/0/1/1   100
OTU40/0/0/9        ODU40/0/0/1/2   100
```

The following is a sample to verify the mixed client rate configuration in the muxponder slice mode.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 mxponder
Mon Mar 23 06:20:22.227 UTC

Location:          0/1
Slice ID:          0
Client Bitrate:    OTU4
Trunk Bitrate:     500G
Status:            Provisioned
Client Port        Peer/Trunk Port      CoherentDSP0/1/0/0
                  Traffic Split Percentage

OTU40/1/0/2        ODU40/1/0/0/1   100
OTU40/1/0/3        ODU40/1/0/0/2   100
OTU40/1/0/4        ODU40/1/0/0/3   100
OTU40/1/0/5        ODU40/1/0/0/4   100
OTU40/1/0/6        ODU40/1/0/0/5   100

Location:          0/1
Slice ID:          1
Client Bitrate:    100GE
```

Trunk Bitrate:	500G	Mapper/Trunk Port	CoherentDSP0/1/0/1
Status:	Provisioned	Traffic Split Percentage	
LLDP Drop Enabled:	FALSE		
ARP Snoop Enabled:	FALSE		
Client Port			
HundredGigECtrlr0/1/0/8	ODU40/1/0/1/1	100	
HundredGigECtrlr0/1/0/9	ODU40/1/0/1/2	100	
HundredGigECtrlr0/1/0/10	ODU40/1/0/1/3	100	
HundredGigECtrlr0/1/0/11	ODU40/1/0/1/4	100	
HundredGigECtrlr0/1/0/12	ODU40/1/0/1/5	100	

Use the following command to clear alarm statistics on the optics or coherent DSP controller.

**clear counters controller controller-type R/S/I/P**

The following is a sample in which the alarm statistics are cleared on the coherent DSP controller.

```
RP/0/RP0/CPU0:ios#show controller coherentDSP 0/1/0/0
Tue Jun 11 05:15:12.540 UTC

Port : CoherentDSP 0/1/0/0
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

Alarm Information:
LOS = 1 LOF = 1 LOM = 0
OOF = 1 OOM = 1 AIS = 0
IAE = 0 BIAE = 0 SF_BER = 0
SD_BER = 2 BDI = 2 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0
Detected Alarms : None

Bit Error Rate Information
PREFEC BER : 8.8E-03
POSTFEC BER : 0.0E+00

TTI :
    Remote hostname : P2B8
    Remote interface : CoherentDSP 0/1/0/0
    Remote IP addr : 0.0.0.0

FEC mode : Soft-Decision 15

AINS Soak : None
AINS Timer : 0h, 0m
AINS remaining time : 0 seconds
RP/0/RP0/CPU0:ios#clear counters controller coherentDSP 0/1/0/0
Tue Jun 11 05:17:07.271 UTC
All counters are cleared
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/1/0/1
Tue Jun 11 05:20:55.199 UTC

Port : CoherentDSP 0/1/0/1
Controller State : Up
Inherited Secondary State : Normal
Configured Secondary State : Normal
Derived State : In Service
```

**Regeneration Mode**

```

Loopback mode : None
BER Thresholds : SF = 1.0E-5 SD = 1.0E-7
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 = 0 TIM = 0
FECMISMATCH = 0 FEC-UNC = 0
Detected Alarms : None

Bit Error Rate Information
PREFEC BER : 1.2E-02
POSTFEC BER : 0.0E+00

TTI :
  Remote hostname : P2B8
  Remote interface : CoherentDSP 0/1/0/1
  Remote IP addr : 0.0.0.0

FEC mode : Soft-Decision 15

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

```

## **Regeneration Mode**

In an optical transmission system, 3R regeneration helps extend the reach of the optical communication links by reamplifying, reshaping, and retiming the data pulses. Regeneration helps to correct any distortion of optical signals by converting it to an electrical signal, processing that electrical signal, and then retransmitting it again as an optical signal.

In Regeneration (Regen) mode, the OTN signal is received on a trunk port and the regenerated OTN signal is sent on the other trunk port of the line card and the other way round. In this mode, only the trunk optics controller and coherentDSP controllers are created.

### **Configuring the Card in Regen Mode**

The supported trunk rates for the different cards are:

- 1.2T card—100G to 600G in multiples of 100G
- 1.2TL card—200G to 400G in multiples of 100G
- 2-QDD-C card—200G to 400G in multiples of 100G

To configure regen mode on 1.2T, 1.2TL, and 2-QDD-C cards, use the following commands:

**configure**

**hw-module location** *location*

**regen**

**trunk-rate** *trunk-rate*

**commit**

**exit**

### Example

The following is a sample to configure the regen mode on 1.2T, 1.2TL, and 2-QDD-C line cards with the trunk-rate 300.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0
RP/0/RP0/CPU0:ios(config-hwmod)#regen
RP/0/RP0/CPU0:ios(config-regen)#trunk-rate 300
RP/0/RP0/CPU0:ios(config-regen)#commit
RP/0/RP0/CPU0:ios(config-regen)#exit
```

## Verifying the Regen Mode

The following is a sample to verify the regen mode.

**show hw-module location *location* regen**

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 regen
Mon Mar 25 09:50:42.936 UTC
```

Location:	0/0
Trunk Bitrate:	400G
Status:	Provisioned
East Port	West Port
CoherentDSP0/0/0/0	CoherentDSP0/0/0/1

The terms, East Port and West Port are used to represent OTN signal regeneration at the same layer.

## Configuring the BPS

You can configure the Bits per Symbol (BPS) to 3.4375 to support 300G trunk configurations on 75 GHz networks using the following commands:

**configure**

**controller optics R/S/I/P bits-per-symbol 3.4375**

**commit**

The following is a sample in which the BPS is configured to 3.4375.

```
RP/0/RP0/CPU0:ios#configure
Wed Mar 27 14:12:49.932 UTC
RP/0/RP0/CPU0:ios(config)#controller optics 0/3/0/0 bits-per-symbol 3.4375
RP/0/RP0/CPU0:ios(config)#commit
```

### Viewing BPS and Baud Rate Ranges

To view the the BPS for a specific range use the following command:

**show controller optics R/S/I/P bps-range bps-range | include data-rate | include fec-type**

```
RP/0/RP0/CPU0:ios#show controllers optics 0/3/0/0 bps-range 3 3.05 | include 300G | include
SD27
Thu Mar 28 03:01:39.751 UTC
300G           SD27           3.0000000   69.4350994
300G           SD27           3.0078125   69.2547485
300G           SD27           3.0156250   69.0753320
300G           SD27           3.0234375   68.8968428
300G           SD27           3.0312500   68.7192736
```

## Configuring the Trunk Rate for BPSK

300G	SD27	3.0390625	68.5426174
300G	SD27	3.0468750	68.3668671

To view the baud for a specific range use the following command:

**show controller optics R/S/I/P baud-rate-range baud-range | include data-rate | include fec-type**

```
RP/0/RP0/CPU0:ios#show controllers optics 0/3/0/0 baud-rate-range 43 43.4 | include 300G |
  include SD27
Thu Mar 28 03:12:36.521 UTC
 300G      SD27      4.8046875    43.3545986
 300G      SD27      4.8125000    43.2842178
 300G      SD27      4.8203125    43.2140651
 300G      SD27      4.8281250    43.1441394
 300G      SD27      4.8359375    43.0744397
 300G      SD27      4.8437500    43.0049648
```

## Configuring the Trunk Rate for BPSK

From R7.2.1 onwards, you can configure trunk rates of 50G, 100G, and 150G to support Binary Phase-Shift Keying (BPSK) modulation. The BPSK modulation enables information to be carried over radio signals more efficiently.

You can configure trunk rates for BPSK using CLI, NetConf YANG, and OC models.

The following table lists the 50G, 100G, and 150G trunk rates with the supported BPSK modulation:

Trunk Rate	BPSK Modulation
50G	1 to 1.4453125
100G	1 to 2.890625
150G	1.453125 to 4.3359375

To configure the trunk rate for BPSK modulation, enter the following commands:

**configure**

**hw-module location *location* mxponder**

**trunk-rate {50G | 100G | 150G}**

**commit**

The following example shows how to configure trunk rate to 50G:

```
RP/0/RP0/CPU0:(config)#hw-module location 0/0 mxponder
RP/0/RP0/CPU0:(config-hwmod-mxp)#trunk-rate 50G
RP/0/RP0/CPU0:(config-hwmod-mxp)#commit
```

## Viewing the BPSK Trunk Rate Ranges

To view the trunk rate configured for the BPSK modulation, use the following **show** commands:

```
RP/0/RP0/CPU0:ios (hwmod-mxp)#show hw-module location 0/0 mxponder
Tue Feb 25 11:13:41.934 UTC
```

Location:	0/0	
Client Bitrate:	100GE	
Trunk Bitrate:	50G	
Status:	Provisioned	
LLDP Drop Enabled:	FALSE	
ARP Snoop Enabled:	FALSE	
Client Port CoherentDSP0/0/0/1	Mapper/Trunk Port Traffic Split Percentage	CoherentDSP0/0/0/0
HundredGigEController0/0/0/2	ODU40/0/0/0	50

```

RP/0/RP0/CPU0:ios#show controllers optics 0/0/0/0
Thu Mar  5 07:12:55.681 UTC

Controller State: Up

Transport Admin State: In Service

Laser State: On

LED State: Green

Optics Status

    Optics Type: DWDM optics
    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 = 2
    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 = 1.97 dBm
    RX Power = 1.58 dBm
    RX Signal Power = 0.60 dBm
    Frequency Offset = 386 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
Configured Tx Power = 2.00 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 = 34.7175521851 GBd				
Bits per Symbol = 1.0000000000 bits/symbol				
Modulation Type: BPSK				
Chromatic Dispersion -9 ps/nm				
Configured CD-MIN -180000 ps/nm CD-MAX 180000 ps/nm				
Polarization Mode Dispersion = 0.0 ps				
Second Order Polarization Mode Dispersion = 125.00 ps^2				
Optical Signal to Noise Ratio = 34.60 dB				
SNR = 20.30 dB				
Polarization Dependent Loss = 0.20 dB				
Polarization Change Rate = 0.00 rad/s				
Differential Group Delay = 2.00 ps				
Filter Roll Off Factor : 0.100				
Rx VOA Fixed Ratio : 15.00 dB				
Enhanced Colorless Mode : 0				
Enhanced SOP Tolerance Mode : 0				
NLEQ Compensation Mode : 0				
Cross Polarization Gain Mode : 0				
Cross Polarization Weight Mode : 0				
Carrier Phase Recovery Window : 0				
Carrier Phase Recovery Extended Window : 0				

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

## OTN-XP Card

The following section describes the supported configurations and procedures to configure the card modes on the line card.

### LC Mode on OTN-XP Card

When you install the OTN-XP card in the Cisco NCS 1004 chassis, it is in the POWERED\_ON state. The **LCMODE is not configured for line card** alarm is present on the card and the LED status is AMBER.

```
sysadmin-vm:0_RP0# show platform
Thu Mar 26 21:38:07.305 UTC+00:00
Location Card Type          HW State    SW State    Config State
-----
0/0      NCS1K4-LC-FILLER   PRESENT    N/A         NSHUT
0/1      NCS1K4-OTN-XP     POWERED_ON  N/A         NSHUT
0/RP0    NCS1K4-CNTLR-K9   OPERATIONAL  OPERATIONAL  NSHUT
0/FT0    NCS1K4-FAN        OPERATIONAL  N/A         NSHUT
0/FT1    NCS1K4-FAN        OPERATIONAL  N/A         NSHUT
0/FT2    NCS1K4-FAN        OPERATIONAL  N/A         NSHUT
0/PM0    NCS1K4-AC-PSU     OPERATIONAL  N/A         NSHUT
0/SCO    NCS1004           OPERATIONAL  N/A         NSHUT
```

```
sysadmin-vm:0_RP0# show alarms brief system active
Thu Mar 26 21:38:34.394 UTC+00:00
```

```
-----
Active Alarms
-----
Location      Severity      Group          Set time      Description
-----
0             major         environ        03/26/20 20:23:11  Power Module redundancy
lost.
0             critical       environ        03/26/20 20:23:29  Fan: One or more LCs
missing, running fans at max speed.
0/1           not_alarmed   shelf          03/26/20 21:38:26  LCMODE is not configured
for line card
sysadmin-vm:0_RP0#
sysadmin-vm:0_RP0# show led location 0/1
Thu Mar 26 21:39:05.101 UTC+00:00
=====
Location  LED Name          Mode      Color
=====
0/1       0/1-STATUS LED    WORKING  AMBER
sysadmin-vm:0_RP0#
```

You must select a datapath mode by configuring the LC mode. OTN-XP does not have a default LC mode. After the LC mode is configured using the CLI, the card transitions to the OPERATIONAL state, the alarm clears, and the LED status turns to GREEN.

The LC modes supported on the OTN-XP card are:

- 10G-GREY-MXP
- 4x100G-MXP-400G-TXP
- 40x10G-4x100G-MXP
- 4x100GE-MXP-DD
- 400GE-TXP-DD
- FC-MXP
- OTUCn-REGEN



**Note** 100G-TXP LC mode is not supported.

Only one LC mode can be configured on the OTN-XP card at a time. When the LC mode is changed using the CLI, the **LCMODE changed, delete the datapath config and reload line card** alarm is present on the card and the DP FPD is in disabled state. To clear the alarm and enable the DP FPD, delete the existing datapath configuration and reload the line card to apply the new LC mode to make the card operational.

If a LC mode requires a different FPGA configuration, and the package is not available, the **OTN\_XP\_DP\_FPD\_PKG is missing, please install the package to proceed** alarm is present on the card. To clear the alarm, install the OTN\_XP\_DP\_FPD\_PKG file. After the package installation is complete, the required FPGA image is copied from the OTN\_XP\_DP\_FPD\_PKG file to the card, the card is automatically reloaded, and the card becomes operational.



**Note** The LC mode configuration is a shared plane configuration. The configuration does not enter the preconfigured state when the line card is not available.

## Configuring the LC Mode



- Note**
- Ensure the OTN\_XP\_DP\_FPD\_PKG file is installed before configuring the LC mode.
  - When you insert an OTN-XP line card having a lower FPD version, you must configure a LC mode which is supported on the software release that the line card is loaded with. You cannot upgrade the FPD of a line card if you configure a LC mode supported only in a higher software release.
  - The LC\_CPU\_MOD\_FW version on a new OTN-XP line card is 7.3.1. Support for new LC modes or features from version 7.5.1 or higher, such as OTUCn-REGEN mode in 7.5.2, is not available in this line card software. When you install an OTN-XP card for the first time in an NCS 1004 chassis with the controller card software version of 7.5.1 or higher, you must upgrade LC\_CPU\_MOD\_FW, to ensure the availability and support for the LC modes or features that are supported supported in the XR software version. You must configure an LC mode which is supported in the 7.3.1 XR software, such as 4x100G-MXP-400G-TXP, and bring the card to OPERATIONAL state to upgrade the line card software.

To configure the LC mode on the OTN-XP card, use the following commands:

**configure**

**lc-module location *location* lcmode *mode***

**commit**

### Example

To view the LC modes available on the OTN-XP card, use the following command:

```
RP/0/RP0/CPU0:ios#sh lc-module location 0/0 lcmode all
Wed Sep 29 14:41:51.487 UTC
States: A-Available R-Running C-Configured

Node Lcmode_Supported Owner Options(State) HW_Ver
-----
0/0 Yes None 10G-GREY-MXP (A) 3.0
4x100G-MXP-400G-TXP (A) 2.0
```

From Release 7.3.2 onwards, you can view the hybrid mode options that are supported on the OTN-XP card.

To view the LC modes supported on the OTN-XP card, use the following command:

```
RP/0/RP0/CPU0:ios#show lc-module location 0/3 lcmode all
Wed Aug 11 17:06:29.538 UTC
States: A-Available R-Running C-Configured

Node Lcmode_Supported Owner Options(State) HW_Ver
-----
0/3 Yes CLI 10G-GREY-MXP (A) 3.0
4x100G-MXP-400G-TXP (A) 2.0
40x10G-4x100G-MXP (A) 3.0
```

4x100GE-MXP-DD (R/C)

7.0



**Note** The 100G-TXP mode is listed when using the **show lc-module location lcmode all** command, but the configuration on 100G-TXP mode is not supported.

The following is a sample in which the OTN-XP card is configured in the 10G-GREY-MXP mode.

```
RP/0/RP0/CPU0:ios#configure
Thu Mar 26 21:40:51.495 UTC
RP/0/RP0/CPU0:ios(config)#lc-module location 0/1 lcmode 10G-GREY-MXP
RP/0/RP0/CPU0:ios(config)#commit
```

### Verifying the LC Mode Configuration

The following is a sample output of a successful 10G-GREY-MXP LC mode configuration after which the card transitions to the OPERATIONAL state, the alarm clears, and the LED status turns to GREEN.

```
RP/0/RP0/CPU0:ios(config)#do show platform
Thu Mar 26 21:41:17.206 UTC
-----  

Node          Type           State      Config state  

-----  

0/0          NCS1K4-LC-FILLER PRESENT    NSHUT  

0/1          NCS1K4-OTN-XP   OPERATIONAL NSHUT  

0/RP0/CPU0   NCS1K4-CNTLR-K9 (Active) IOS XR RUN NSHUT  

0/FT0        NCS1K4-FAN     OPERATIONAL NSHUT  

0/FT1        NCS1K4-FAN     OPERATIONAL NSHUT  

0/FT2        NCS1K4-FAN     OPERATIONAL NSHUT  

0/PM0        NCS1K4-AC-PSU  OPERATIONAL NSHUT  

0/SC0        NCS1004       OPERATIONAL NSHUT  

-----  

RP/0/RP0/CPU0:ios(config)#do show alarms brief system active
Thu Mar 26 21:41:29.641 UTC
-----  

-----  

Active Alarms  

-----  

-----  

Location      Severity     Group      Set Time      Description  

-----  

0             Major        Environ    03/26/2020 20:23:11 UTC Power Module redundancy lost.  

0             Critical     Environ    03/26/2020 20:23:29 UTC Fan: One or more LCs missing, running fans at max speed.  

-----  

RP/0/RP0/CPU0:ios(config)#end
RP/0/RP0/CPU0:ios#show lc-module location 0/1 lcmode all
Thu Mar 26 21:41:58.780 UTC
States: A-Available R-Running C-Configured
-----  

Node  Lcmode_Supported  Owner      Options(State)      HW_Ver  

-----  

0/1   Yes              CLI       10G-GREY-MXP (R/C)      3.0  

                                4x100G-MXP-400G-TXP (A)  2.0
-----  

RP/0/RP0/CPU0:ios#show lc-module location 0/1 lcmode
Thu Mar 26 21:42:18.997 UTC
-----  

Node  Lcmode_Supported  Owner      Running      Configured
```

## Configuring the LC Mode

```
-----
0/1      Yes           CLI      10G-GREY-MXP      10G-GREY-MXP
RP/0/RP0/CPU0:ios#admin
Thu Mar 26 21:42:38.525 UTC

root connected from 192.0.2.3 using ssh on sysadmin-vm:0_RP0
sysadmin-vm:0_RP0# show led location 0/1
Thu Mar 26 21:42:45.337 UTC+00:00
=====
Location  LED Name          Mode     Color
=====
0/1       0/1-STATUS LED    WORKING  GREEN
```

### Example

The following is a sample in which the LC mode is changed from 10G-GREY-MXP to the 4x100G-MXP-400G-TXP mode. In this sample, the datapath configuration is deleted and the card is reloaded to apply the new LC mode.

```
RP/0/RP0/CPU0:ios#show lc-module location all lcmode
Thu Sep 30 10:19:29.853 UTC

Node  Lcmode_Supported   Owner   Running   Configured
-----
0/0   Yes               CLI     10G-GREY-MXP  10G-GREY-MXP
0/1   No                N/A     N/A        N/A
0/2   No                N/A     N/A        N/A
0/3   No                N/A     N/A        N/A

RP/0/RP0/CPU0:ios#configure
Thu Sep 30 10:19:32.818 UTC
Current Configuration Session  Line      User      Date          Lock
00001000-000051f7-00000000  vty1    root     Wed Sep 29 15:26:00 2021
RP/0/RP0/CPU0:ios(config)#no lc-module location 0/0 lcmode 10g-GREY-MXP
RP/0/RP0/CPU0:ios(config)#commit
Thu Sep 30 10:20:34.086 UTC
RP/0/RP0/CPU0:ios(config)#do show alarms brief system active
Thu Sep 30 10:20:52.950 UTC

-----
Active Alarms
-----
Location      Severity   Group      Set Time      Description
-----
0/PM0         Major      Environ   09/29/2021 14:41:59 UTC  Power Module Output
Disabled

0            Major      Environ   09/29/2021 14:42:15 UTC  Power Module
redundancy lost.

0            Critical    Environ   09/29/2021 14:42:25 UTC  Fan: One or more
LCs missing, running fans at max speed.
```

```
0/0           NotAlarmed   Shelf          09/30/2021 10:20:34 UTC    LCMODE changed,
delete the datapath config and reload line card
```

```
RP/0/RP0/CPU0:ios#configure
Thu Sep 30 10:21:41.281 UTC
Current Configuration Session  Line      User      Date          Lock
00001000-000051f7-00000000  vty1      root      Wed Sep 29 15:26:00 2021
RP/0/RP0/CPU0:ios(config)#no hw-module location 0/0
RP/0/RP0/CPU0:ios(config)#commit
Thu Sep 30 10:21:49.982 UTC
RP/0/RP0/CPU0:ios(config)#

RP/0/RP0/CPU0:ios#show platform
Thu Sep 30 10:22:08.482 UTC
Node          Type       State      Config state
-----
0/0           NCS1K4-OTN-XP    OPERATIONAL  NSHUT
0/2           NCS1K4-LC-FILLER PRESENT    NSHUT
0/3           NCS1K4-LC-FILLER PRESENT    NSHUT
0/RP0/CPU0    NCS1K4-CNTLR-K9(Active) IOS XR RUN  NSHUT
0/FT0          NCS1K4-FAN     OPERATIONAL  NSHUT
0/FT1          NCS1K4-FAN     OPERATIONAL  NSHUT
0/FT2          NCS1K4-FAN     OPERATIONAL  NSHUT
0/PM0          NCS1K4-AC-PSU  OPERATIONAL  NSHUT
0/SC0          NCS1004      OPERATIONAL  NSHUT
RP/0/RP0/CPU0:ios#
RP/0/RP0/CPU0:ios#admin
Thu Sep 30 10:23:55.937 UTC
Last login: Thu Sep 30 04:32:57 2021 from 192.0.2.3
root connected from 192.0.2.3 using ssh on sysadmin-vm:0_RP0
sysadmin-vm:0_RP0# hw-module location 0/0 reload
Thu Sep 30 10:24:17.938 UTC+00:00
Reloading the module will be traffic impacting if not properly drained. Continue to Reload
hardware module ? [no,yes] yes
result Card graceful reload request on 0/0 succeeded.
sysadmin-vm:0_RP0#show platform
Thu Sep 30 10:25:16.876 UTC+00:00
Location  Card Type      HW State    SW State    Config State
-----
0/0           NCS1K4-OTN-XP    POWERED_ON  N/A         NSHUT
0/2           NCS1K4-LC-FILLER PRESENT    N/A         NSHUT
0/3           NCS1K4-LC-FILLER PRESENT    N/A         NSHUT
0/RP0         NCS1K4-CNTLR-K9  OPERATIONAL OPERATIONAL NSHUT
0/FT0          NCS1K4-FAN     OPERATIONAL N/A        NSHUT
0/FT1          NCS1K4-FAN     OPERATIONAL N/A        NSHUT
0/FT2          NCS1K4-FAN     OPERATIONAL N/A        NSHUT
0/PM0          NCS1K4-2KW-AC  OPERATIONAL N/A        NSHUT
0/SC0          NCS1004-K9    OPERATIONAL N/A        NSHUT
sysadmin-vm:0_RP0#exit
RP/0/RP0/CPU0:ios#show lc-module location all lcmode
Thu Sep 30 10:29:08.183 UTC
Node      Lcmode_Supported  Owner      Running      Configured
-----
0/0      Yes                None      Not running  Not configured
0/1      No                 N/A       N/A          N/A
0/2      No                 N/A       N/A          N/A
0/3      No                 N/A       N/A          N/A
```

## Configuring the LC Mode

```

RP/0/RP0/CPU0:ios#show platform
Thu Sep 30 10:29:36.075 UTC
Node          Type           State        Config state
-----
0/0           NCS1K4-OTN-XP    POWERED_ON   NSHUT
0/2           NCS1K4-LC-FILLER PRESENT      NSHUT
0/3           NCS1K4-LC-FILLER PRESENT      NSHUT
0/RP0/CPU0    NCS1K4-CNTLR-K9 (Active) IOS XR RUN  NSHUT
0/FT0         NCS1K4-FAN      OPERATIONAL  NSHUT
0/FT1         NCS1K4-FAN      OPERATIONAL  NSHUT
0/FT2         NCS1K4-FAN      OPERATIONAL  NSHUT
0/PM0         NCS1K4-AC-PSU   OPERATIONAL  NSHUT
0/SC0         NCS1004        OPERATIONAL  NSHUT
RP/0/RP0/CPU0:ios#
RP/0/RP0/CPU0:ios#configure
Thu Sep 30 10:29:57.997 UTC
Current Configuration Session Line      User      Date           Lock
00001000-000051f7-00000000 vty1     root     Wed Sep 29 15:26:00 2021
RP/0/RP0/CPU0:ios(config)#lc-module location 0/0 lcmode 4x100G-MXP-400G-TXP
RP/0/RP0/CPU0:ios(config)#commit
Thu Sep 30 10:30:11.312 UTC
RP/0/RP0/CPU0:ios(config)#end
RP/0/RP0/CPU0:ios#show lc-module location all lcmode
Thu Sep 30 10:40:56.480 UTC

Node      Lcmode_Supported   Owner      Running           Configured
-----
0/0       Yes                CLI       4x100G-MXP-400G-TXP  4x100G-MXP-400G-TXP
0/1       No                 N/A       N/A               N/A
0/2       No                 N/A       N/A               N/A
0/3       No                 N/A       N/A               N/A

RP/0/RP0/CPU0:ios# RP/0/RP0/CPU0:ios#show platform
Thu Sep 30 10:41:25.093 UTC
Node          Type           State        Config state
-----
0/0           NCS1K4-OTN-XP    OPERATIONAL  NSHUT
0/2           NCS1K4-LC-FILLER PRESENT      NSHUT
0/3           NCS1K4-LC-FILLER PRESENT      NSHUT
0/RP0/CPU0    NCS1K4-CNTLR-K9 (Active) IOS XR RUN  NSHUT
0/FT0         NCS1K4-FAN      OPERATIONAL  NSHUT
0/FT1         NCS1K4-FAN      OPERATIONAL  NSHUT
0/FT2         NCS1K4-FAN      OPERATIONAL  NSHUT
0/PM0         NCS1K4-AC-PSU   OPERATIONAL  NSHUT
0/SC0         NCS1004        OPERATIONAL  NSHUT
RP/0/RP0/CPU0:ios#

```

### Example: 4x100GE-MXP-DD LC Mode

To view the LC modes available on the OTN-XP card, use the following command: The following is a sample in which the OTN-XP card is configured in the 4x100GE-MXP-DD mode.

```

RP/0/RP0/CPU0:ios#show lc-module location all lcmode all
Thu Sep 30 10:43:47.536 UTC
States: A-Available   R-Running   C-Configured

Node      Lcmode_Supported   Owner      Options (State)      HW_Ver
-----
0/0       Yes                CLI       100G-TXP (A)        3.0
                                         10G-GREY-MXP (A)  3.0
                                         4x100G-MXP-400G-TXP (A) 2.0
                                         40x10G-4x100G-MXP (A) 3.0

```

		<b>4x100GE-MXP-DD (R/C)</b>	<b>7.0</b>
		400GE-TXP-DD (A)	1.0
		FC-MXP (A)	4.0
		OTUCn-REGEN (A)	8.0
0/1	No	N/A	N/A
0/2	No	N/A	N/A
0/3	No	N/A	N/A

**Example: OTUCn-REGEN Mode**

The following is a sample to configure the OTUCn-REGEN mode:

```
RP/0/RP0/CPU0:ios#configure
Fri Feb  4 16:52:18.021 UTC
RP/0/RP0/CPU0:ios(config)#lc-module location 0/2 lcmode OTUCn-REGEN
RP/0/RP0/CPU0:ios(config)#commit
```

The following is a sample to verify the OTUCn-REGEN LC mode.

```
RP/0/RP0/CPU0:ios#sh lc-module location 0/2 lcmode
Fri Feb  4 17:00:09.842 UTC
```

Node	Lcmode_Supported	Owner	Running	Configured
0/2	Yes	CLI	<b>OTUCn-REGEN</b>	<b>OTUCn-REGEN</b>

**Example: FC-MXP Mode**

The following is a sample to configure the OTN-XP card in FC-MXP mode:

```
RP/0/RP0/CPU0:ios#configure
Fri Feb  5 15:53:17.023 UTC
RP/0/RP0/CPU0:ios(config)#lc-module location 0/2 lcmode FC-MXP
RP/0/RP0/CPU0:ios(config)#commit
```

The following is a sample to verify the FC-MXP mode configured on the OTN-XP card:

```
RP/0/RP0/CPU0:ios#show lc-module location 0/2 lcmode
Fri Feb  4 16:13:32.745 UTC
```

Node	Lcmode_Supported	Owner	Running	Configured
0/2	Yes	CLI	<b>FC-MXP</b>	<b>FC-MXP</b>

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

## Regeneration Mode on OTN-XP Card

**Table 2: Feature History Table**

Feature	Release Information	Description
Regeneration Mode Support on the OTN-XP Card	Cisco IOS XR Release 7.5.2	The OTN-XP card now supports the OTUCn-REGEN LC mode for regeneration. This mode allows regeneration of the DWDM channels across trunk ports of the OTN-XP card and significantly extends the reach of the service. You can configure 200G and 400G trunk rates on the card.

The OTN-XP card supports the OTUCn-REGEN mode as a part of the LC mode for regeneration.

The OTUCn-REGEN mode supports the following features:

- Trunk rate—400G and 200G
- Modulation type:
  - 16-QAM for 400G
  - 8-QAM, 16-QAM, and QPSK for 200G
- Trunk optics—ONS-CFP2D-400G-C
- Supported features—Loopbacks, TTI, AINS

### Limitations

GCC0 is not supported on the REGEN trunks.

## Configuring Regen Mode on OTN-XP Card



**Note** You must configure the OTUCn-REGEN LC mode on the OTN-XP card before performing this configuration. See [Example: OTUCn-REGEN Mode, on page 23](#).

The following is a sample for configuring regen mode with 400G trunk rate:

```
RP/0/RP0/CPU0:ios#configure
Fri Feb 4 16:53:48.018 UTC
RP/0/RP0/CPU0:ios(config)#
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 regen
RP/0/RP0/CPU0:ios(config-regen)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-regen)#commit
Fri Feb 4 16:54:05.920 UTC
```

The following is a sample to verify the 400G trunk rate configured in the regen mode.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/2 regen
Fri Feb 4 16:58:51.716 UTC
```

```

Location:          0/2
Trunk Bitrate:    400G
Status:            Provisioned
East Port          West Port
-----
CoherentDSP0/2/0/12   CoherentDSP0/2/0/13

```

The following is a sample for configuring regen mode with 200G trunk rate:

```

RP/0/RP0/CPU0:ios#configure
Fri Feb  4 16:53:48.018 UTC
RP/0/RP0/CPU0:ios(config)#
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 regen
RP/0/RP0/CPU0:ios(config-regen)#trunk-rate 200G
RP/0/RP0/CPU0:ios(config-regen)#commit
Fri Feb  4 16:54:05.920 UTC

```

If you want to change the modulation format for the 200G trunk rate, see [Configuring 8QAM Modulation for 200G Muxponder Mode, on page 58](#).

The following is a sample to verify the 200G trunk rate configured in the regen mode.

```

RP/0/RP0/CPU0:ios#show hw-module location 0/2 regen
Fri Feb  4 16:58:51.716 UTC

Location:          0/2
Trunk Bitrate:    200G
Status:            Provisioned
East Port          West Port
-----
CoherentDSP0/2/0/12   CoherentDSP0/2/0/13

```

## FC-MXP Mode on OTN-XP Card

**Table 3: Feature History Table**

Feature	Release Information	Description
FC-MXP Mode Support on the OTN-XP Card	Cisco IOS XR Release 7.5.2	The OTN-XP card now supports FC-MXP LC mode for Fiber Channel (FC) support. You can configure 16G FC with 400G trunk rate.

From Release 7.5.2 onwards, the OTN-XP card supports FC-MXP LC mode for Fiber Channel (FC) support. You can configure 16G FC with 400G trunk rate on both the slices.

FC Mode	Supported Slices	Slice 0 Ports	Slice 1 Ports	Client Payloads	Trunk Rate	Client Optics	Trunk Optics	Modulation Type
16G FC-MXP	Slice 0 and Slice 1	Clients: 1, 6, 7, 9, 10, 11 and Trunk: 12	Clients: 0, 2, 3, 4, 5, 8 and Trunk: 13	16G FC	400G (OTUC4) on both the slices	ONS-QC-16GFC-SW	ONS-CFP2D-400G-C	16-QAM

The FC-MXP mode supports the following features:

- Loopback
- PRBS
- AINS
- Laser squelch

The FC-MXP mode supports the following alarms:

- SIGLOSS—Signal Loss
- SYNCLOSS—Loss of Synchronization
- NOS—Not-Operational Primitive Sequence

#### **Limitations:**

- GCC0 and GCC1 are not supported.
- Local Fault and Remote Fault Ethernet alarms are not supported.

## Configuring the OTN-XP Card in 16G FC Muxponder Mode




---

**Note** You must configure the FC-MXP LC mode on the OTN-XP card before performing this configuration. See [Example: FC-MXP Mode, on page 23](#).

---

To configure the OTN-XP card in 16G FC-MXP mode, use the following commands:

**configure**

**hw-module location *location* mxponder-slice *mxponder-slice-number***

**trunk-rate 400G**

**client-port-rate *client-port-number* lane *lane-number* client-type fc16**

**commit**

#### **Example:**

The following is a sample to configure 16G FC muxponder mode on slice 0 of the OTN-XP card:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 3 client-type fc16
```

```

RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 10 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 10 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 10 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 10 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
Fri Feb 4 16:06:59.967 UTC
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#

```

The following is a sample to verify the 16G FC muxponder mode configured on slice 0 of the OTN-XP card:

```

RP/0/RP0/CPU0:ios#show hw-module location 0/2 mxponder-slice 0
Fri Feb 4 16:15:10.984 UTC

```

Location:	0/2		
Slice ID:	0		
Client Bitrate:	<b>FC16G</b>		
Trunk Bitrate:	<b>400G</b>		
Status:	Provisioned		
Client Port	Mapper/Trunk Port	CoherentDSP	0/2/0/12
	Traffic Split Percentage		
SixteenGigFibreChanCtrlr0/2/0/1/1	ODU-FLEX0/2/0/12/1/1		100
SixteenGigFibreChanCtrlr0/2/0/1/2	ODU-FLEX0/2/0/12/1/2		100
SixteenGigFibreChanCtrlr0/2/0/1/3	ODU-FLEX0/2/0/12/1/3		100
SixteenGigFibreChanCtrlr0/2/0/1/4	ODU-FLEX0/2/0/12/1/4		100
SixteenGigFibreChanCtrlr0/2/0/6/1	ODU-FLEX0/2/0/12/6/1		100
SixteenGigFibreChanCtrlr0/2/0/6/2	ODU-FLEX0/2/0/12/6/2		100
SixteenGigFibreChanCtrlr0/2/0/6/3	ODU-FLEX0/2/0/12/6/3		100
SixteenGigFibreChanCtrlr0/2/0/6/4	ODU-FLEX0/2/0/12/6/4		100
SixteenGigFibreChanCtrlr0/2/0/7/1	ODU-FLEX0/2/0/12/7/1		100
SixteenGigFibreChanCtrlr0/2/0/7/2	ODU-FLEX0/2/0/12/7/2		100
SixteenGigFibreChanCtrlr0/2/0/7/3	ODU-FLEX0/2/0/12/7/3		100
SixteenGigFibreChanCtrlr0/2/0/7/4	ODU-FLEX0/2/0/12/7/4		100
SixteenGigFibreChanCtrlr0/2/0/9/1	ODU-FLEX0/2/0/12/9/1		100
SixteenGigFibreChanCtrlr0/2/0/9/2	ODU-FLEX0/2/0/12/9/2		100
SixteenGigFibreChanCtrlr0/2/0/9/3	ODU-FLEX0/2/0/12/9/3		100
SixteenGigFibreChanCtrlr0/2/0/9/4	ODU-FLEX0/2/0/12/9/4		100
SixteenGigFibreChanCtrlr0/2/0/10/1	ODU-FLEX0/2/0/12/10/1		100
SixteenGigFibreChanCtrlr0/2/0/10/2	ODU-FLEX0/2/0/12/10/2		100
SixteenGigFibreChanCtrlr0/2/0/10/3	ODU-FLEX0/2/0/12/10/3		100
SixteenGigFibreChanCtrlr0/2/0/10/4	ODU-FLEX0/2/0/12/10/4		100
SixteenGigFibreChanCtrlr0/2/0/11/1	ODU-FLEX0/2/0/12/11/1		100
SixteenGigFibreChanCtrlr0/2/0/11/2	ODU-FLEX0/2/0/12/11/2		100
SixteenGigFibreChanCtrlr0/2/0/11/3	ODU-FLEX0/2/0/12/11/3		100
SixteenGigFibreChanCtrlr0/2/0/11/4	ODU-FLEX0/2/0/12/11/4		100

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

The following is a sample to configure 16G FC muxponder mode on slice 1 of the OTN-XP card:

```

RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 3 client-type fc16

```

## Configuring the OTN-XP Card in 16G FC Muxponder Mode

```

RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 lane 1 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 lane 2 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 lane 3 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 lane 4 client-type fc16
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
Fri Feb 4 16:06:59.967 UTC
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#

```

The following is a sample to verify the 16G FC muxponder mode configured on slice 1 of the OTN-XP card:

```

RP/0/RP0/CPU0:ios#show hw-module location 0/2 mxponder-slice 1
Fri Feb 4 16:15:10.984 UTC

```

Location:	0/2	
Slice ID:	1	
Client Bitrate:	<b>FC16G</b>	
Trunk Bitrate:	<b>400G</b>	
Status:	Provisioned	
Client Port	Mapper/Trunk Port	CoherentDSP0/2/0/13
	Traffic Split Percentage	

SixteenGigFibreChanCtrlr0/2/0/0/1	ODU-FLEX0/2/0/13/0/1	100
SixteenGigFibreChanCtrlr0/2/0/0/2	ODU-FLEX0/2/0/13/0/2	100
SixteenGigFibreChanCtrlr0/2/0/0/3	ODU-FLEX0/2/0/13/0/3	100
SixteenGigFibreChanCtrlr0/2/0/0/4	ODU-FLEX0/2/0/13/0/4	100
SixteenGigFibreChanCtrlr0/2/0/2/1	ODU-FLEX0/2/0/13/2/1	100
SixteenGigFibreChanCtrlr0/2/0/2/2	ODU-FLEX0/2/0/13/2/2	100
SixteenGigFibreChanCtrlr0/2/0/2/3	ODU-FLEX0/2/0/13/2/3	100
SixteenGigFibreChanCtrlr0/2/0/2/4	ODU-FLEX0/2/0/13/2/4	100
SixteenGigFibreChanCtrlr0/2/0/3/1	ODU-FLEX0/2/0/13/3/1	100
SixteenGigFibreChanCtrlr0/2/0/3/2	ODU-FLEX0/2/0/13/3/2	100
SixteenGigFibreChanCtrlr0/2/0/3/3	ODU-FLEX0/2/0/13/3/3	100
SixteenGigFibreChanCtrlr0/2/0/3/4	ODU-FLEX0/2/0/13/3/4	100
SixteenGigFibreChanCtrlr0/2/0/4/1	ODU-FLEX0/2/0/13/4/1	100
SixteenGigFibreChanCtrlr0/2/0/4/2	ODU-FLEX0/2/0/13/4/2	100
SixteenGigFibreChanCtrlr0/2/0/4/3	ODU-FLEX0/2/0/13/4/3	100
SixteenGigFibreChanCtrlr0/2/0/4/4	ODU-FLEX0/2/0/13/4/4	100
SixteenGigFibreChanCtrlr0/2/0/5/1	ODU-FLEX0/2/0/13/5/1	100
SixteenGigFibreChanCtrlr0/2/0/5/2	ODU-FLEX0/2/0/13/5/2	100
SixteenGigFibreChanCtrlr0/2/0/5/3	ODU-FLEX0/2/0/13/5/3	100
SixteenGigFibreChanCtrlr0/2/0/5/4	ODU-FLEX0/2/0/13/5/4	100
SixteenGigFibreChanCtrlr0/2/0/8/1	ODU-FLEX0/2/0/13/8/1	100
SixteenGigFibreChanCtrlr0/2/0/8/2	ODU-FLEX0/2/0/13/8/2	100
SixteenGigFibreChanCtrlr0/2/0/8/3	ODU-FLEX0/2/0/13/8/3	100
SixteenGigFibreChanCtrlr0/2/0/8/4	ODU-FLEX0/2/0/13/8/4	100

```

RP/0/RP0/CPU0:ios#

```

# Supported Pluggables for OTN-XP Card

The OTN-XP card supports the following trunk and client pluggables:

## Trunk Pluggables

- ONS-CFP2D-400G-C
- QDD-400G-ZRP-S
- DP04CFP2-M25-K9

**Note**

- Starting from the Release 7.5.2, DP04CFP2-M25-K9 supports 4x100 muxponder and 400G-TXP modes.

## Client Pluggables

- QSFP-100G-LR4
- QSFP-100G-FR-S
- QSFP-100G-SR4-S
- QSFP-100G-CWDM4-S
- QSFP-100G-LR4-S
- QSFP-100G-AOC
- QSFP-100G-PSM4
- QSFP-100G-DR-S
- QSFP-4x10-MLR
- QSFP-40G-SR4=
- QDD-400G-FR4-S
- QDD-400G-DR4-S
- QDD-400G-LR8-S
- ONS-QC-16GFC-SW
- DS-SFP-4X32G-SW
- QSFP-100G-LR-S
- ONS-QSFP28-LR4

See [Supported Pluggables](#), for the complete list of pluggables supported by NCS 1004.

## Muxponder Configuration on OTN-XP Card

The OTN-XP card has two trunk ports and 12 client ports. The muxponder configuration supports two slices, 0 and 1. You can configure mxponder-slice 0, mxponder-slice 1, or both. Each mxponder-slice supports 10 client interfaces.

From Release 7.3.1 onwards, the OTN-XP card supports two trunk ports for CFP2 DCO on port 12 and port 13, and 8 client ports. For configuration, see [Configuring the Muxponder Mode for 4x100G MXP, on page 39](#).

From Release 7.3.2 onwards, the OTN-XP card supports two trunk ports for QDD ZRP on port 9 and port 11, and 8 client ports. For configuration, see [Configuring the Muxponder Mode for 4x100GE-MXP-DD, on page 66](#).

From Release 7.5.1 onwards, the OTN-XP card supports two trunk ports for QDD ZRP on port 9 and port 11, and the supported operating modes are 400G-TXP-DD, 3X100GE MXP, and 2X100GE MXP. For configuration, see [Configuring the Transponder Mode for 400GE-TXP-DD, on page 74](#). The client rates 2x100GE and 3x100G are supported as part of the 4x100GE-MXP-DD mode. For configurations, see [Configuring the Muxponder Mode for 2x100GE-MXP-DD, on page 68](#) and [Configuring the Muxponder Mode for 3x100GE-MXP-DD, on page 71](#).

**Table 4: Feature History**

Feature Name	Release Information	Description
400 TXP or MXP modes with CFP2 DCO for OTN-XP Card	Cisco IOS XR Release 7.3.1	<p>On the OTN-XP card, you can configure a single 400GE or 4x100G payload that is received over the client port as a 400G signal over DWDM on the line side.</p> <p>The card improves efficiency, performance, and flexibility for customer networks allowing 400GE or 4x100G client transport over 400G WDM wavelength.</p> <p>Commands modified:</p> <ul style="list-style-type: none"> <li>• <b>controller coherentDSP</b></li> <li>• <b>show controller coherentDSP</b></li> </ul>

**Table 5: Hardware Module Configuration with Client to Trunk Mapping**

<b>Hardware Module Configuration</b>	<b>Line Card Mode</b>	<b>Client Port Rate</b>	<b>Client to Trunk Mapping</b>	<b>Trunk Rate</b>
10G Grey Muxponder	10G-GREY-MXP	OTU2, OTU2e, or 10 GE	Muxponder-slice 0—Client ports 4, 5, and 2 are mapped to the trunk port 0.  Muxponder-slice 1—Client ports 7, 6, and 11 are mapped to the trunk port 1.  Each client port consists of four lanes, 1, 2, 3, and 4. The lanes 3 and 4 can only be configured for ports 2 and 11. It is not mandatory to configure all 10 client lanes for a slice.	100G
400G-MXP	4x100G-MXP -400G-TXP	100GE, OTU4	Muxponder-slice 0—Client ports 1, 6, 7, and 10 are mapped to the trunk port 12.  Muxponder-slice 1—Client ports 0, 4, 5, and 8 are mapped to the trunk port 13.	400G
400G-TXP	4x100G-MXP -400G-TXP	400GE	Muxponder-slice 0—Client port 10 is mapped to the trunk port 12.  Muxponder-slice 1—Client port 8 is mapped to the trunk port 13.	400G
40x10G	40x10G-4x100G-MXP	OTU2, OTU2e, or 10 GE	Muxponder-slice 0—10G Client ports 0, 1, 2, 3, 4, 5, 6, 7, 9, and 11 mapped to the trunk port 12.  Each client port consists of four lanes, 1, 2, 3, and 4.	400G CFP2

<b>Hardware Module Configuration</b>	<b>Line Card Mode</b>	<b>Client Port Rate</b>	<b>Client to Trunk Mapping</b>	<b>Trunk Rate</b>
30x10G	40x10G-4x100G-MXP	OTU2, OTU2e, or 10 GE	Muxponder-slice 0—10G Client ports 0, 1, 2, 3, 4, 5, 9, and 11 are mapped to the trunk port 12.  The client ports 0, 1, 2, 3, 4, 5, and 9 are configured for all four lanes, 1, 2, 3, and 4.  The client port 11 is configured for lanes 1 and 2.	300G CFP2
20x10G + 2x100G	40x10G-4x100G-MXP	10 GE, 100 GE, OTU2, OTU2e, or OTU4	Muxponder-slice 0—The following 100G and 10G client ports are mapped to trunk port 12. <ul style="list-style-type: none"> <li>• 100G client port—0 and 1</li> <li>• 10G client port—4, 5, 6, and 7 are configured for all four lanes, 1, 2, 3, and 4.</li> <li>• 10G client port—11 and 2 are configured for lanes 3 and 4.</li> </ul>	400G CFP2

<b>Hardware Module Configuration</b>	<b>Line Card Mode</b>	<b>Client Port Rate</b>	<b>Client to Trunk Mapping</b>	<b>Trunk Rate</b>
10x10G + 3 x 100G	40x10G-4x100G-MXP	10GE, 100GE, OTU4, OTU2, or OTU2e	Muxponder-slice 0—The following 100G and 10G client ports are mapped to a trunk port 12. <ul style="list-style-type: none"> <li>• 100G client port—0, 1, and 6</li> <li>• 10G client port—4 and 5 are configured for all four lanes, 1, 2, 3, and 4.</li> <li>• 10G client port—2 are configured for lanes 3 and 4.</li> </ul>	400G CFP2
20x10G + 1 x 100G	40x10G-4x100G-MXP	10 GE, 100 GE, OTU2, OTU2e, or OTU4	Muxponder-slice 0—The following 100G and 10G client ports are mapped to trunk port 12. <ul style="list-style-type: none"> <li>• 100G client port—0</li> <li>• 10G client port—1, 4, 5 and 9 are configured for all four lanes, 1, 2, 3, and 4.</li> <li>• 10G client port—2 is configured for lanes 3 and 4 and 11 is configured for lanes 1 and 2.</li> </ul>	300G CFP2

<b>Hardware Module Configuration</b>	<b>Line Card Mode</b>	<b>Client Port Rate</b>	<b>Client to Trunk Mapping</b>	<b>Trunk Rate</b>
30x10G + 1 x 100G	40x10G-4x100G-MXP	10 GE, 100 GE, OTU2, OTU2e, or OTU4	<p>Mxponder-slice 0—The following 100G and 10G client ports are mapped to trunk port 12.</p> <ul style="list-style-type: none"> <li>• 100G client port—6</li> <li>• 10G client port—0, 1, 2, 3, 4, 5, and 9 are configured for all four lanes, 1, 2, 3, and 4.</li> <li>• 10G client port—11 is configured for lanes 1 and 2.</li> </ul>	400G CFP2
10x10G + 2 x 100G	40x10G-4x100G-MXP	10 GE, 100 GE, OTU2, OTU2e, or OTU4	<p>Mxponder-slice 0—The following 100G and 10G client ports are mapped to trunk port 12.</p> <ul style="list-style-type: none"> <li>• 100G client port—0 and 1</li> <li>• 10G client port—4, and 5 are configured for all four lanes, 1, 2, 3, and 4.</li> <li>• 10G client port—2 is configured for lanes 3 and 4.</li> </ul>	300G CFP2

<b>Hardware Module Configuration</b>	<b>Line Card Mode</b>	<b>Client Port Rate</b>	<b>Client to Trunk Mapping</b>	<b>Trunk Rate</b>
10x10G + 1 x 100G	40x10G-4x100G-MXP	10 GE and 100 GE	<p>Muxponder-slice 0—The following 100G and 10G client ports are mapped to trunk port 12.</p> <ul style="list-style-type: none"> <li>• 100G client port—0</li> <li>• 10G client port—4, and 5 are configured for all four lanes, 1, 2, 3, and 4.</li> <li>• 10G client port—2 is configured for lanes 3 and 4.</li> <li>• Muxponder-slice 1—The following 100G and 10G client ports are mapped to trunk port 13.</li> <li>• 100G client port—1</li> <li>• 10G client port—6, and 7 are configured for all four lanes, 1, 2, 3, and 4.</li> <li>• 10G client port—11 is configured for lanes 3 and 4.</li> </ul>	200G CFP2
200G Muxponder	200G-FOIC2-oFEC-QPSK-1-S 200G-FOIC2-oFEC-8QAM-1-E	OTU4, 100GE	<p>Muxponder-slice 0—Client ports 7 and 10 mapped to the trunk port 12.</p> <p>Muxponder-slice 1—Client ports 5 and 8 mapped to the trunk port 13.</p>	200G CFP2

Hardware Module Configuration	Line Card Mode	Client Port Rate	Client to Trunk Mapping	Trunk Rate
QDD ZRP	4x100GE-MXP-DD	100GE	Mxponder-slice 0—Client ports 1, 6, 7, and 10 are mapped to the trunk port 11. Mxponder-slice 1—Client ports 0, 4, 5, and 8 are mapped to the trunk port 9.	400G
QDD ZRP	400GE-TXP-DD	400GE	Mxponder-slice 0—Client port 10 is mapped to the trunk port 11. Mxponder-slice 1—Client port 8 is mapped to the trunk port 9.	400G
	4x100GE-MXP-DD	100GE	Mxponder-slice 0—Client ports 1, 7, and 10 are mapped to the trunk port 11. Mxponder-slice 1—Client ports 4, 5, and 8 are mapped to the trunk port 9.	300G
	4x100GE-MXP-DD	100GE	Mxponder-slice 0—Client ports 7, and 10 are mapped to the trunk port 11. Mxponder-slice 1—Client ports 4 and 5 are mapped to the trunk port 9.	200G

### QDD ZRP Limitations

- Hold of timer and Idle insertion are not supported on 400GE Client for 400G-TXP mode.
- Local Fault and Remote Fault ethernet alarms are not supported on 400GE Client for 400G-TXP mode.
- Far-end PM counters on Coherent DSP controllers are not supported for 400G-TXP and 4x100G MXP modes.
- QDD ZRP alarms appear with *Flexo* label due to absence of a separate ZRP layer.

## Configuring the Muxponder Mode for 10G Grey Muxponder



**Note** The LC mode must be configured to 10G-GREY-MXP on the OTN-XP card before you perform this configuration.

To configure the OTN-XP card in the muxponder mode, use the following commands:

**configure**

**hw-module location *location* muxponder-slice *muxponder-slice-number***

**trunk-rate 100G**

**client-port-rate *client-port-number* lane *lane-number* client-type { 10GE | OTU2 | OTU2e}**

**commit**

### Example

The following is a sample in which the OTN-XP card is configured with mixed client rates in the muxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#config
Tue Apr 21 09:21:44.460 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 muxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 100G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 4 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

### Verifying the Muxponder Configuration

The following is a sample to verify the muxponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 muxponder
Tue Apr 21 09:26:12.308 UTC

Location:          0/1
Slice ID:         0
Client Bitrate:   MIXED
Trunk Bitrate:    100G
Status:           Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port      Mapper/Trunk Port      Peer/Trunk Port      OTU40/0/0/0
                  Traffic Split Percentage
OTU20/0/0/2/3      NONE                 ODU20/0/0/0/2/3      100
OTU20/0/0/2/4      NONE                 ODU20/0/0/0/2/4      100
TenGigECtrlr0/0/0/4/1 ODU2E0/0/0/0/4/1      NONE                 100
```

## Configuring DAC Rate for 400G Muxponder Modes

Table 6: Feature History

Feature Name	Release	Description
DAC Configuration Support for 400GE, 4x100G, or 400G Regen modes	Cisco IOS XR Release 7.5.2	On the OTN-XP card, you can configure the Digital-to-Analog (DAC) rate for the 400GE, 4x100G, or 400G Regen modes with CFP2 DCO pluggable. Based on the DAC rate configured, pulse shaping and modem setting is set on the CFP2 DCO trunk pluggable.

From Release 7.5.2 onwards, you can configure DAC rate to set the bookended mode for the 400GE, 4x100G, or 400G Regen modes on the OTN-XP card.

### DAC Supported Modes

The following operating modes are supported on the CFP2 coherent pluggable module for the OTN-XP card:

Table 7: DAC Supported Modes

Network Configuration Mode	Trunk Rate	Data Path	Line Framing	FEC Type	Modulation Format	BPS	Baud Rate (GBd)	Pulse Shaping	Mode Type
400G	400G	400G TXP, 4x100G MXP, 400G Regen	FlexO-4	oFEC	16 QAM	4	63.1	1	Enhanced

The following table provides the pulse shaping and modem setting values for the respective DAC rates.



**Note** The default pulse shaping is *1.5* and mode type is *Standard* for the supported modes.

Table 8: DAC Rate

DAC Rate	Pulse Shape	Modem Setting
1	0	Standard
1.25	1	Enhanced
1.5	1	Standard
2	0	Enhanced

To configure the DAC rate for OTN-XP card in the 400G TXP, 4x100G MXP, and 400G Regen modes, use the following commands:

**configure**

**controller optics Rack/Slot/Instance/Port dac-rate 1x1.25**

**commit**

The following is a sample in which DAC rate is configured.

```
RP/0/RP0/CPU0:ios(config)#
RP/0/RP0/CPU0:ios(config)#controller optics 0/0/0/12 dac-Rate 1x1.25
RP/0/RP0/CPU0:ios(config-Optics)#commit
```

### Verifying the DAC Rate Configuration

The following is a sample to verify the DAC rate configuration for the 400G TXP, 4x100G MXP, and 400G Regen modes in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show controllers optics 0/2/0/12
Wed Apr 13 15:00:10.044 UTC

Controller State: Up

Transport Admin State: In Service

Laser State: On

LED State: Red

DAC RATE: 1x1.25

Configured DAC RATE: 1x1.25
```

## Configuring the Muxponder Mode for 4x100G MXP



**Note** The LC mode must be configured to 4x100G-MXP-400G-TXP on the OTN-XP card before you perform this configuration. See [Configuring the LC Mode, on page 18](#).

To configure the OTN-XP card in the 4x100 muxponder mode, use the following commands:

**configure**

**hw-module location *location* muxponder-slice *muxponder-slice-number***

**trunk-rate 400G**

**client-port-rate *client-port-number* client-type {100GE | OTU4}**

**commit**

### Example

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the muxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#config
Tue Apr 21 09:21:44.460 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 muxponder-slice 0
```

## Configuring the Muxponder Mode for 400G TXP

```
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the mxponder-slice 1 mode.

```
RP/0/RP0/CPU0:ios#config
Tue Apr 21 09:21:44.460 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 client-type OTU4
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

### Verifying the Muxponder Configuration

The following is a sample to verify the muxponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 mxponder
Mon Nov 30 01:32:57.338 UTC

Location: 0/1
Slice ID: 0
Client Bitrate: 100GE
Trunk Bitrate: 400G
Status: Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port Mapper/Trunk Port CoherentDSP0/1/0/12
Traffic Split Percentage

HundredGigECtrlr0/1/0/1 ODU40/1/0/12/1 100

Location: 0/1
Slice ID: 1
Client Bitrate: OTU4
Trunk Bitrate: 400G
Status: Provisioned
Client Port Peer/Trunk Port CoherentDSP0/1/0/13
Traffic Split Percentage

OTU40/1/0/8 ODUC40/1/0/13 100
```

## Configuring the Muxponder Mode for 400G TXP




---

**Note** The LC mode must be configured to 4x100G-MXP-400G-TXP on the OTN-XP card before you perform this configuration.

---

To configure the OTN-XP card in the 400G TXP mode, use the following commands:

**configure**

**hw-module location *location* mxponder-slice *mxponder-slice-number***

**trunk-rate 400G**

**client-port-rate *client-port-number* client-type 400GE**

**commit**

### Example

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the muxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#config
Tue Apr 21 09:21:44.460 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 muxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 10 client-type 400GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the muxponder-slice 1 mode.

```
RP/0/RP0/CPU0:ios#config
Tue Apr 21 09:21:44.460 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 muxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 client-type 400GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

### Verifying the Muxponder Configuration

The following is a sample to verify the muxponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 muxponder
Mon Nov 30 01:36:14.514 UTC
```

```
Location: 0/1
Slice ID: 0
Client Bitrate: 400GE
Trunk Bitrate: 400G
Status: Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port Mapper/Trunk Port CoherentDSP0/1/0/12
Traffic Split Percentage
```

```
FourHundredGigECtrlr0/1/0/10 ODU-FLEX0/1/0/12/10 100
```

```
Location: 0/1
Slice ID: 1
Client Bitrate: 400GE
Trunk Bitrate: 400G
Status: Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port Mapper/Trunk Port CoherentDSP0/1/0/13
Traffic Split Percentage
```

```
FourHundredGigECtrlr0/1/0/8 ODU-FLEX0/1/0/13/8 100
```

## Static TPN and TS Allocation for TXP-MXP-Grey Muxponder Modes

The OTN-XP card uses the following mapping of tributary port numbers, tributary slots, and clients for the various TXP and MXP configurations.

**Table 9: TPN-TS Mapping in 400GE TXP Configuration**

Slice	Client Port	Client Rate	Trunk Port	Trunk Rate	TPN	TS
0	10	400GE	12	400G	1	1.1 to 4.20
1	8	400GE	13	400G	1	1.1 to 4.20

**Table 10: TPN-TS Mapping in 4 X 100G MXP Configuration**

Slice	Client Port	Client Rate	Trunk Port	Trunk Rate	TPN	TS
0	10	100GE/OTU4	12	400G	1	1.1 to 1.20
	7	100GE/OTU4			2	2.1 to 2.20
	6	100GE/OTU4			3	3.1 to 3.20
	1	100GE/OTU4			4	4.1 to 4.20
1	8	100GE/OTU4	13	400G	1	1.1 to 1.20
	5	100GE/OTU4			2	2.1 to 2.20
	4	100GE/OTU4			3	3.1 to 3.20
	0	100GE/OTU4			4	4.1 to 4.20

**Table 11: TPN-TS Mapping in 10 X 10G Grey Muxponder Configuration**

Slice	Client Port	Client Lane	Client Rate	Trunk Port	Trunk Rate	TPN	TS
0	4	1	10GE/OTU2/OTU2e	0	100G	1	1–8
		2	10GE/OTU2/OTU2e			2	9–16
		3	10GE/OTU2/OTU2e			3	17–24
		4	10GE/OTU2/OTU2e			4	25–32
	5	1	10GE/OTU2/OTU2e			5	33–40
		2	10GE/OTU2/OTU2e			6	41–48
		3	10GE/OTU2/OTU2e			7	49–56
		4	10GE/OTU2/OTU2e			8	57–64
	2	3	10GE/OTU2/OTU2e			9	65–72
		4	10GE/OTU2/OTU2e			10	73–80

Slice	Client Port	Client Lane	Client Rate	Trunk Port	Trunk Rate	TPN	TS
1	7	1	10GE/OTU2/OTU2e	1	100G	1	1–8
		2	10GE/OTU2/OTU2e			2	9–16
		3	10GE/OTU2/OTU2e			3	17–24
		4	10GE/OTU2/OTU2e			4	25–32
	6	1	10GE/OTU2/OTU2e			5	33–40
		2	10GE/OTU2/OTU2e			6	41–48
		3	10GE/OTU2/OTU2e			7	49–56
		4	10GE/OTU2/OTU2e			8	57–64
	11	3	10GE/OTU2/OTU2e			9	65–72
		4	10GE/OTU2/OTU2e			10	73–80

## Configuring the Muxponder Mode for 40x10G Muxponder

To configure the OTN-XP card in the 40x10G muxponder mode, use the following commands:

**configure**

**hw-module location *location* muxponder-slice *muxponder-slice-number***

**trunk-rate 400G**

**client-port-rate *client-port-number* lane *lane-number* client-type {10GE | OTU2 | OTU2E}**

**commit**

### Example

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the muxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#config
Tue Apr 21 09:21:44.460 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/3 muxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 1 client-type 10GE
```

## Configuring the Muxponder Mode for 40x10G Muxponder

```

RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit

```

### Verifying the Muxponder Configuration

The following is a sample to verify the 40x10G muxponder configuration in the OTN-XP card.

```

RP/0/RP0/CPU0:ios#show hw-module location 0/3 muxponder
Wed Jun  2 17:57:36.647 UTC

Location:          0/3
Slice ID:         0
Client Bitrate:   10GE
Trunk Bitrate:    400G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port      CoherentDSP0/3/0/12
                    Traffic Split Percentage

TenGigECtrlr0/3/0/0/1  ODU2E0/3/0/12/0/1  100
TenGigECtrlr0/3/0/0/2  ODU2E0/3/0/12/0/2  100
TenGigECtrlr0/3/0/0/3  ODU2E0/3/0/12/0/3  100
TenGigECtrlr0/3/0/0/4  ODU2E0/3/0/12/0/4  100
TenGigECtrlr0/3/0/1/1  ODU2E0/3/0/12/1/1  100
TenGigECtrlr0/3/0/1/2  ODU2E0/3/0/12/1/2  100
TenGigECtrlr0/3/0/1/3  ODU2E0/3/0/12/1/3  100
TenGigECtrlr0/3/0/1/4  ODU2E0/3/0/12/1/4  100
TenGigECtrlr0/3/0/2/1  ODU2E0/3/0/12/2/1  100
TenGigECtrlr0/3/0/2/2  ODU2E0/3/0/12/2/2  100
TenGigECtrlr0/3/0/2/3  ODU2E0/3/0/12/2/3  100
TenGigECtrlr0/3/0/2/4  ODU2E0/3/0/12/2/4  100
TenGigECtrlr0/3/0/3/1  ODU2E0/3/0/12/3/1  100
TenGigECtrlr0/3/0/3/2  ODU2E0/3/0/12/3/2  100
TenGigECtrlr0/3/0/3/3  ODU2E0/3/0/12/3/3  100
TenGigECtrlr0/3/0/3/4  ODU2E0/3/0/12/3/4  100
TenGigECtrlr0/3/0/4/1  ODU2E0/3/0/12/4/1  100

```

TenGigECtrlr0/3/0/4/2	ODU2E0/3/0/12/4/2	100
TenGigECtrlr0/3/0/4/3	ODU2E0/3/0/12/4/3	100
TenGigECtrlr0/3/0/4/4	ODU2E0/3/0/12/4/4	100
TenGigECtrlr0/3/0/5/1	ODU2E0/3/0/12/5/1	100
TenGigECtrlr0/3/0/5/2	ODU2E0/3/0/12/5/2	100
TenGigECtrlr0/3/0/5/3	ODU2E0/3/0/12/5/3	100
TenGigECtrlr0/3/0/5/4	ODU2E0/3/0/12/5/4	100
TenGigECtrlr0/3/0/6/1	ODU2E0/3/0/12/6/1	100
TenGigECtrlr0/3/0/6/2	ODU2E0/3/0/12/6/2	100
TenGigECtrlr0/3/0/6/3	ODU2E0/3/0/12/6/3	100
TenGigECtrlr0/3/0/6/4	ODU2E0/3/0/12/6/4	100
TenGigECtrlr0/3/0/7/1	ODU2E0/3/0/12/7/1	100
TenGigECtrlr0/3/0/7/2	ODU2E0/3/0/12/7/2	100
TenGigECtrlr0/3/0/7/3	ODU2E0/3/0/12/7/3	100
TenGigECtrlr0/3/0/7/4	ODU2E0/3/0/12/7/4	100
TenGigECtrlr0/3/0/9/1	ODU2E0/3/0/12/9/1	100
TenGigECtrlr0/3/0/9/2	ODU2E0/3/0/12/9/2	100
TenGigECtrlr0/3/0/9/3	ODU2E0/3/0/12/9/3	100
TenGigECtrlr0/3/0/9/4	ODU2E0/3/0/12/9/4	100
TenGigECtrlr0/3/0/11/1	ODU2E0/3/0/12/11/1	100
TenGigECtrlr0/3/0/11/2	ODU2E0/3/0/12/11/2	100
TenGigECtrlr0/3/0/11/3	ODU2E0/3/0/12/11/3	100
TenGigECtrlr0/3/0/11/4	ODU2E0/3/0/12/11/4	100

## Configuring the Muxponder Mode for 30x10G

To configure the OTN-XP card in the 30x10G muxponder mode, use the following commands:

**configure**

**hw-module location *location* muxponder-slice *muxponder-slice-number***

**trunk-rate 300G**

**client-port-rate *client-port-number* lane *lane-number* client-type {10GE | OTU2E | OTU2}**

**commit**

### Example

The following is a sample in which the OTN-XP card is configured with 300G trunk rate on the muxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#config
Tue Apr 21 09:21:44.460 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 muxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 300G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 3 client-type OTU2
```

## Configuring the Muxponder Mode for 30x10G

```
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

### Verifying the Muxponder Configuration

The following is a sample to verify the 30x10G muxponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 muxponder
Wed Jun 2 17:56:40.574 UTC

Location:          0/1
Slice ID:          0
Client Bitrate:   MIXED
Trunk Bitrate:    300G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port  Peer/Trunk Port      CoherentDSP0/1/0/12
                                                               Traffic Split Percentage

OTU20/1/0/0/3      NONE             ODU20/1/0/12/0/3
100
OTU20/1/0/1/3      NONE             ODU20/1/0/12/1/3
100
OTU20/1/0/2/3      NONE             ODU20/1/0/12/2/3
100
OTU20/1/0/3/3      NONE             ODU20/1/0/12/3/3
100
OTU20/1/0/4/3      NONE             ODU20/1/0/12/4/3
100
OTU20/1/0/5/3      NONE             ODU20/1/0/12/5/3
100
OTU20/1/0/9/3      NONE             ODU20/1/0/12/9/3
100
OTU2E0/1/0/0/2      NONE             ODU2E0/1/0/12/0/2
100
OTU2E0/1/0/1/2      NONE             ODU2E0/1/0/12/1/2
100
OTU2E0/1/0/2/2      NONE             ODU2E0/1/0/12/2/2
100
OTU2E0/1/0/3/2      NONE             ODU2E0/1/0/12/3/2
100
OTU2E0/1/0/4/2      NONE             ODU2E0/1/0/12/4/2
100
OTU2E0/1/0/5/2      NONE             ODU2E0/1/0/12/5/2
100
OTU2E0/1/0/9/2      NONE             ODU2E0/1/0/12/9/2
100
```

TenGigECtrlr0/1/0/0/1 100	ODU2E0/1/0/12/0/1	NONE
TenGigECtrlr0/1/0/0/4 100	ODU2E0/1/0/12/0/4	NONE
TenGigECtrlr0/1/0/1/1 100	ODU2E0/1/0/12/1/1	NONE
TenGigECtrlr0/1/0/1/4 100	ODU2E0/1/0/12/1/4	NONE
TenGigECtrlr0/1/0/2/1 100	ODU2E0/1/0/12/2/1	NONE
TenGigECtrlr0/1/0/2/4 100	ODU2E0/1/0/12/2/4	NONE
TenGigECtrlr0/1/0/3/1 100	ODU2E0/1/0/12/3/1	NONE
TenGigECtrlr0/1/0/3/4 100	ODU2E0/1/0/12/3/4	NONE
TenGigECtrlr0/1/0/4/1 100	ODU2E0/1/0/12/4/1	NONE
TenGigECtrlr0/1/0/4/4 100	ODU2E0/1/0/12/4/4	NONE
TenGigECtrlr0/1/0/5/1 100	ODU2E0/1/0/12/5/1	NONE
TenGigECtrlr0/1/0/5/4 100	ODU2E0/1/0/12/5/4	NONE
TenGigECtrlr0/1/0/9/1 100	ODU2E0/1/0/12/9/1	NONE
TenGigECtrlr0/1/0/9/4 100	ODU2E0/1/0/12/9/4	NONE

## Configuring Hybrid Modes Using 40x10G-4x100G-MXP

**Table 12: Feature History**

Feature Name	Release Information	Description
Hybrid Modes Using 40x10G-4x100G-MXP	Cisco IOS XR Release 7.3.2	<p>With the 40x10G-4x100G-MXP muxponder mode support, you can configure the following hybrid modes:</p> <ul style="list-style-type: none"> <li>• 20x10G + 2x100G</li> <li>• 10x10G + 3 x 100G</li> </ul> <p>With the 40x10G-4x100G-MXP muxponder mode support, you have flexibility to choose a combination of 10G and 100G client rates across different OTN and Ethernet client rates.</p>

**Table 13: Feature History**

Feature Name	Release Information	Description
Support for 10x10G + 2 x 100G, 20x10G + 1 x 100G, and 30x10G + 1 x 100G Hybrid Modes	Cisco IOS XR Release 7.5.1	You can configure different client rates across the ports depending on the bandwidth requirement, using the following hybrid modes: <ul style="list-style-type: none"> <li>• 30x10G + 1 x 100G</li> <li>• 10x10G + 2 x 100G</li> <li>• 20x10G + 1 x 100G</li> </ul>

With the 40x10G-4x100G-MXP muxponder mode support, you can configure the following hybrid modes:

- 20x10G + 2x100G
- 10x10G + 3 x 100G
- 30x10G + 1 x 100G
- 10x10G + 2 x 100G
- 20x10G + 1 x 100G

For more information on the client to trunk mapping for each of the mode, see [#unique\\_6 unique\\_6\\_Connect\\_42\\_table\\_yft\\_mn1\\_srb](#).

## Configuring the Muxponder Mode for 20x10G-2x100G

To configure the OTN-XP card in the 20x10G-2x100G muxponder mode, use the following commands:

**configure**

**hw-module location *location* muxponder-slice *muxponder-slice-number***

**trunk-rate 400G**

**client-port-rate *client-port-number* client-type {100GE | OTU4}**

**client-port-rate *client-port-number* lane *lane-number* client-type {10GE | OTU2 | OTU2E}**

**commit**

### Example

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the muxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#config
Tue Apr 21 09:21:44.460 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 muxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 client-type OTU4
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 3 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 4 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 1 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 2 client-type OTU2E
```

```

RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 3 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 4 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 1 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 3 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 4 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit

```

### Verifying the Muxponder Configuration

The following is a sample to verify the 20x10G-2x100G muxponder configuration in the OTN-XP card.

```

RP/0/RP0/CPU0:ios#show hw-module location 0/1 muxponder
Wed Jun  2 18:00:58.201 UTC

Location:          0/1
Slice ID:         0
Client Bitrate:   MIXED
Trunk Bitrate:    400G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port    Peer/Trunk Port      CoherentDSP0/1/0/12
                                         Traffic Split Percentage
OTU40/1/0/1           NONE              ODU40/1/0/12/1                100
OTU2E0/1/0/2/3        NONE              ODU2E0/1/0/12/2/3
OTU2E0/1/0/2/4        100               ODU2E0/1/0/12/2/4
OTU2E0/1/0/4/1        100               ODU2E0/1/0/12/4/1
OTU2E0/1/0/4/2        100               ODU2E0/1/0/12/4/2
OTU2E0/1/0/4/3        100               ODU2E0/1/0/12/4/3
OTU2E0/1/0/4/4        100               ODU2E0/1/0/12/4/4
OTU2E0/1/0/5/1        100               ODU2E0/1/0/12/5/1
OTU2E0/1/0/5/2        100               ODU2E0/1/0/12/5/2
OTU2E0/1/0/5/3        100               ODU2E0/1/0/12/5/3
OTU2E0/1/0/5/4        100               ODU2E0/1/0/12/5/4
TenGigECtrlr0/1/0/6/1  ODU2E0/1/0/12/6/1  100
TenGigECtrlr0/1/0/6/2  ODU2E0/1/0/12/6/2  100
TenGigECtrlr0/1/0/6/3  ODU2E0/1/0/12/6/3  100
TenGigECtrlr0/1/0/6/4  ODU2E0/1/0/12/6/4  100
TenGigECtrlr0/1/0/7/1  ODU2E0/1/0/12/7/1  100
TenGigECtrlr0/1/0/7/2  ODU2E0/1/0/12/7/2  100

```

## Configuring the Muxponder Mode for 10 x 10G-3 x 100G

TenGigEController0/1/0/7/3	ODU2E0/1/0/12/7/3	100
TenGigEController0/1/0/7/4	ODU2E0/1/0/12/7/4	100
TenGigEController0/1/0/11/3	ODU2E0/1/0/12/11/3	100
TenGigEController0/1/0/11/4	ODU2E0/1/0/12/11/4	100
HundredGigEController0/1/0/0	ODU40/1/0/12/0	NONE

## Configuring the Muxponder Mode for 10 x 10G-3 x 100G

To configure the OTN-XP card in the 10 x 10G and 3 x 100G muxponder mode, use the following commands:

### configure

**hw-module location *location* muxponder-slice *muxponder-slice-number***

**trunk-rate 400G**

**client-port-rate *client-port-number* client-type {100GE | OTU4}**

**client-port-rate *client-port-number* lane *lane-number* client-type {10GE | OTU2 | OTU2E}**

**commit**

### Example

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the muxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#config
Tue Apr 21 09:21:44.460 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 muxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 client-type OTU4
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 3 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 4 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 1 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 3 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 4 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 1 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 2 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 3 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 4 client-type OTU2E
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

### Verifying the Muxponder Configuration

The following is a sample to verify the 10 x 10G and 3 x 100G muxponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 muxponder
Wed Jun 2 18:00:58.201 UTC

Location:          0/1
Slice ID:          0
Client Bitrate:    MIXED
Trunk Bitrate:     400G
Status:            Provisioned
LLDP Drop Enabled: FALSE
```

ARP Snoop Enabled:	FALSE	Mapper/Trunk Port	Peer/Trunk Port	CoherentDSP0/1/0/12
Client Port				
OTU40/1/0/1		NONE	ODU40/1/0/12/1	100
OTU2E0/1/0/2/3 100		NONE	ODU2E0/1/0/12/2/3	
OTU2E0/1/0/2/4 100		NONE	ODU2E0/1/0/12/2/4	
OTU2E0/1/0/4/1 100		NONE	ODU2E0/1/0/12/4/1	
OTU2E0/1/0/4/2 100		NONE	ODU2E0/1/0/12/4/2	
OTU2E0/1/0/4/3 100		NONE	ODU2E0/1/0/12/4/3	
OTU2E0/1/0/4/4 100		NONE	ODU2E0/1/0/12/4/4	
OTU2E0/1/0/5/1 100		NONE	ODU2E0/1/0/12/5/1	
OTU2E0/1/0/5/2 100		NONE	ODU2E0/1/0/12/5/2	
OTU2E0/1/0/5/3 100		NONE	ODU2E0/1/0/12/5/3	
OTU2E0/1/0/5/4 100		NONE	ODU2E0/1/0/12/5/4	
HundredGigECtrlr0/1/0/0	ODU40/1/0/12/0	NONE		100
HundredGigECtrlr0/1/0/6	ODU40/1/0/12/6	NONE		100

## Configuring Hybrid Modes for 20x10G + 1 x 100G Over 300G

To configure the OTN-XP card in the 20x10G + 1x100G muxponder mode, use the following commands:

**configure**

**hw-module location *location* mxponder-slice *mxponder-slice-number***

**trunk-rate 300G**

**client-port-rate *client-port-number* client-type {100GE | OTU4}**

**client-port-rate *client-port-number* lane *lane-number* client-type {10GE | OTU2 | OTU2E}**

**commit**

The following is a sample in which the OTN-XP card is configured with the 20x10G + 1x100G mode on the mxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#configure
Sun Jul 25 12:43:00.399 UTC
RP/0/RP0/CPU0:ios(config)#
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 300G
RP/0/RP0/CPU0:ios#configure
Sun Jul 25 12:43:00.399 UTC
RP/0/RP0/CPU0:ios(config)#
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 300G
/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 3 client-type otu2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 4 client-type otu2e
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 3 client-type otu2
```

## Configuring Hybrid Modes for 20x10G + 1 x 100G Over 300G

```

RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 4 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit

```

The following is a sample to verify the 20x10G + 1x100G muxponder configuration in the OTN-XP card:

```

RP/0/RP0/CPU0:ios#sh hw-module location 0/2 mxponder-slice 0
Sun Jul 25 13:11:01.829 UTC

```

Location:	0/2			
Client Bitrate:	MIXED			
Trunk Bitrate:	300G			
Status:	Provisioned			
LLDP Drop Enabled:	FALSE			
ARP Snoop Enabled:	FALSE			
Client Port		Mapper/Trunk Port	Peer/Trunk Port	CoherentDSP0/2/0/12
		Traffic Split Percentage		
OTU20/2/0/1/3 100		NONE	ODU20/2/0/12/1/3	
OTU20/2/0/2/3 100		NONE	ODU20/2/0/12/2/3	
OTU20/2/0/4/3 100		NONE	ODU20/2/0/12/4/3	
OTU20/2/0/4/4 100		NONE	ODU20/2/0/12/4/4	
OTU2E0/2/0/1/4 100		NONE	ODU2E0/2/0/12/1/4	
OTU2E0/2/0/2/1 100		NONE	ODU2E0/2/0/12/2/1	
OTU2E0/2/0/2/2 100		NONE	ODU2E0/2/0/12/2/2	
TenGigECtrlr0/2/0/1/1 100		ODU2E0/2/0/12/1/1		NONE
TenGigECtrlr0/2/0/1/2 100		ODU2E0/2/0/12/1/2		NONE
TenGigECtrlr0/2/0/2/4 100		ODU2E0/2/0/12/2/4		NONE
TenGigECtrlr0/2/0/4/1 100		ODU2E0/2/0/12/4/1		NONE
TenGigECtrlr0/2/0/4/2 100		ODU2E0/2/0/12/4/2		NONE
TenGigECtrlr0/2/0/5/1 100		ODU2E0/2/0/12/5/1		NONE
TenGigECtrlr0/2/0/5/2 100		ODU2E0/2/0/12/5/2		NONE
TenGigECtrlr0/2/0/5/3 100		ODU2E0/2/0/12/5/3		NONE
TenGigECtrlr0/2/0/5/4 100		ODU2E0/2/0/12/5/4		NONE

```

TenGigECtrlr0/2/0/9/1      ODU2E0/2/0/12/9/1      NONE
    100
TenGigECtrlr0/2/0/9/2      ODU2E0/2/0/12/9/2      NONE
    100
TenGigECtrlr0/2/0/9/3      ODU2E0/2/0/12/9/3      NONE
    100
TenGigECtrlr0/2/0/9/4      ODU2E0/2/0/12/9/4      NONE
    100
TenGigECtrlr0/2/0/11/1     ODU2E0/2/0/12/11/1    NONE
    100
TenGigECtrlr0/2/0/11/2     ODU2E0/2/0/12/11/2    NONE
    100
HundredGigECtrlr0/2/0/0    ODU40/2/0/12/0        NONE
    100

```

```
RP/0/RP0/CPU0:ios#show lc-module location 0/2 lcmode
Sun Jul 25 15:28:16.324 UTC
```

Node	Lcmode_Supported	Owner	Running	Configured
0/2	Yes	CLI	40x10G-4x100G-MXP	40x10G-4x100G-MXP

## Configuring Hybrid Modes for 30x10G + 1 x 100G Over 400G

To configure the OTN-XP card in the 30x10G + 1x100G muxponder mode, use the following commands:

**configure**

**hw-module location *location* mxponder-slice *mxponder-slice-number***

**trunk-rate 400G**

**client-port-rate *client-port-number* client-type {100GE | OTU4}**

**client-port-rate *client-port-number* lane *lane-number* client-type {10GE | OTU2 | OTU2E}**

**commit**

The following is a sample in which the OTN-XP card is configured with 300G trunk rate on the mxponder-slice 0 mode.

```

RP/0/RP0/CPU0:ios#configure
Sun Jul 25 12:43:00.399 UTC
RP/0/RP0/CPU0:ios(config)#
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios#configure
Sun Jul 25 12:43:00.399 UTC
RP/0/RP0/CPU0:ios(config)#
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 2 client-type otu2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 3 client-type otu2e
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 3 client-type otu2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 lane 4 client-type otu2e
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 1 client-type otu2e
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 2 client-type otu2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 3 client-type otu2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 4 client-type 10GE

```

## Configuring Hybrid Modes for 30x10G + 1 x 100G Over 400G

```

RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 3 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 4 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 9 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 11 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#

```

The following is a sample to verify the 30x10G + 1x100G muxponder configuration in the OTN-XP card.

```

RP/0/RP0/CPU0:ios#sh hw-module location 0/2 mxponder-slice 0
Sun Jul 25 13:11:01.829 UTC

```

Location:	0/2			
Mapper/Trunk Port	Peer/Trunk Port	CoherentDSP	0/2/0/12	
Traffic Split Percentage				
OTU20/2/0/0/2	NONE	ODU20/2/0/12/0/2		
100				
OTU20/2/0/1/3	NONE	ODU20/2/0/12/1/3		
100				
OTU20/2/0/2/3	NONE	ODU20/2/0/12/2/3		
100				
OTU20/2/0/4/3	NONE	ODU20/2/0/12/4/3		
100				
OTU20/2/0/4/4	NONE	ODU20/2/0/12/4/4		
100				
OTU2E0/2/0/0/3	NONE	ODU2E0/2/0/12/0/3		
100				
OTU2E0/2/0/1/4	NONE	ODU2E0/2/0/12/1/4		
100				
OTU2E0/2/0/2/1	NONE	ODU2E0/2/0/12/2/1		
100				
OTU2E0/2/0/2/2	NONE	ODU2E0/2/0/12/2/2		
100				
TenGigECtrlr0/2/0/0/1	ODU2E0/2/0/12/0/1	NONE		
100				
TenGigECtrlr0/2/0/0/4	ODU2E0/2/0/12/0/4	NONE		
100				
TenGigECtrlr0/2/0/1/1	ODU2E0/2/0/12/1/1	NONE		
100				
TenGigECtrlr0/2/0/1/2	ODU2E0/2/0/12/1/2	NONE		
100				
TenGigECtrlr0/2/0/2/4	ODU2E0/2/0/12/2/4	NONE		
100				
TenGigECtrlr0/2/0/3/1	ODU2E0/2/0/12/3/1	NONE		

100			
TenGigECtrlr0/2/0/3/2	ODU2E0/2/0/12/3/2	NONE	
100			
TenGigECtrlr0/2/0/3/3	ODU2E0/2/0/12/3/3	NONE	
100			
TenGigECtrlr0/2/0/3/4	ODU2E0/2/0/12/3/4	NONE	
100			
TenGigECtrlr0/2/0/4/1	ODU2E0/2/0/12/4/1	NONE	
100			
TenGigECtrlr0/2/0/4/2	ODU2E0/2/0/12/4/2	NONE	
100			
TenGigECtrlr0/2/0/5/1	ODU2E0/2/0/12/5/1	NONE	
100			
TenGigECtrlr0/2/0/5/2	ODU2E0/2/0/12/5/2	NONE	
100			
TenGigECtrlr0/2/0/5/3	ODU2E0/2/0/12/5/3	NONE	
100			
TenGigECtrlr0/2/0/5/4	ODU2E0/2/0/12/5/4	NONE	
100			
TenGigECtrlr0/2/0/9/1	ODU2E0/2/0/12/9/1	NONE	
100			
TenGigECtrlr0/2/0/9/2	ODU2E0/2/0/12/9/2	NONE	
100			
TenGigECtrlr0/2/0/9/3	ODU2E0/2/0/12/9/3	NONE	
100			
TenGigECtrlr0/2/0/9/4	ODU2E0/2/0/12/9/4	NONE	
100			
TenGigECtrlr0/2/0/11/1	ODU2E0/2/0/12/11/1	NONE	
100			
TenGigECtrlr0/2/0/11/2	ODU2E0/2/0/12/11/2	NONE	
100			
HundredGigECtrlr0/2/0/6	ODU40/2/0/12/0	NONE	100
100			

```
RP/0/RP0/CPU0:ios#show lc-module location 0/2 lcmode
Sun Jul 25 15:28:16.324 UTC
```

Node	Lcmode_Supported	Owner	Running	Configured
0/2	Yes	CLI	40x10G-4x100G-MXP	40x10G-4x100G-MXP

## Configuring Hybrid Modes for 10x10G + 2 x 100G Over 300G

To configure the OTN-XP card in the 10x10G + 2x100G muxponder mode, use the following commands:

**configure**

**hw-module location *location* muxponder-slice *mxponder-slice-number***

**trunk-rate 300G**

**client-port-rate *client-port-number* client-type {100GE | OTU4}**

**client-port-rate *client-port-number* lane *lane-number* client-type {10GE | OTU2 | OTU2E}**

**commit**

The following is a sample in which the OTN-XP card is configured with 300G trunk rate on the mxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#configure
Sun Jul 25 12:43:00.399 UTC
RP/0/RP0/CPU0:ios(config)#
RP/0/RP0/CPU0:ios(config)#hw-module location 0/2 mxponder-slice 0
```

## Configuring Hybrid Modes for 10x10G + 2 x 100G Over 300G

```
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 300G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 client-type otu4
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 2 lane 4 client-type OTU2e
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 3 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 lane 4 client-type OTU2
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 1 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 2 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 3 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 lane 4 client-type 10GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

The following is a sample to verify the 10x10G + 2x100G muxponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/2 mxponder-slice 0
Sun Jul 25 14:57:40.806 UTC

Location:          0/2
Slice ID:          0
Client Bitrate:   MIXED
Trunk Bitrate:    300G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port  Peer/Trunk Port      CoherentDSP0/2/0/12
                                                               Traffic Split Percentage

OTU40/2/0/1           NONE      ODU40/2/0/12/1          100
OTU2e0/2/0/2/4
    100               NONE      ODU2e0/2/0/12/2/4
OTU20/2/0/4/3
    100               NONE      ODU20/2/0/12/4/3
OTU20/2/0/4/4
    100               NONE      ODU20/2/0/12/4/4
TenGigECtrlr0/2/0/2/3      ODU2E0/2/0/12/2/3      NONE
    100
TenGigECtrlr0/2/0/4/1      ODU2E0/2/0/12/4/1      NONE
    100
TenGigECtrlr0/2/0/4/2      ODU2E0/2/0/12/4/2      NONE
    100
TenGigECtrlr0/2/0/5/1      ODU2E0/2/0/12/5/1      NONE
    100
TenGigECtrlr0/2/0/5/2      ODU2E0/2/0/12/5/2      NONE
    100
TenGigECtrlr0/2/0/5/3      ODU2E0/2/0/12/5/3      NONE
    100
TenGigECtrlr0/2/0/5/4      ODU2E0/2/0/12/5/4      NONE
    100
HundredGigECtrlr0/2/0/0      ODU40/2/0/12/0      NONE          100
RP/0/RP0/CPU0:ios#show lc-module location 0/2 lcmode
Sun Jul 25 15:28:16.324 UTC

Node     Lcmode_Supported     Owner     Running             Configured
-----  -----
0/2       Yes                  CLI      40x10G-4x100G-MXP  40x10G-4x100G-MXP
```

## Configuring the Muxponder Mode for 200G on OTN-XP Card

**Table 14: Feature History**

Feature Name	Release Information	Description
Muxponder Configuration for 200G Trunk with QPSK and 8QAM Modulation	Cisco IOS XR Release 7.3.2	<p>The OTN-XP card supports up to 200G trunk rate with QPSK and 8QAM modulation using CFP2. This feature enhances the signal reachability with reduced noise and can support the 50GHz network.</p> <p>Commands modified:</p> <ul style="list-style-type: none"> <li>• hw-module (OTN-XP Card)</li> </ul>

To configure the OTN-XP card in the 200G muxponder mode, use the following commands:

**configure**

**hw-module location *location* muxponder-slice *muxponder-slice-number***

**trunk-rate 200G**

**commit**

The following is a sample configuration of 200G trunk rate on the muxponder-slice 0 mode for OTN-XP card:

```
RP/0/RP0/CPU0:ios#config
Wed Jun  2 17:17:59.409 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 muxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 200G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 10 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

The following is a sample configuration of 200G trunk rate on the muxponder-slice 1 mode for OTN-XP card:

```
RP/0/RP0/CPU0:ios#config
Wed Jun  2 17:17:59.409 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 muxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 200G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 0:

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 xponder-capabilities muxponder-slice 0
Wed Jun  2 17:02:33.088 UTC

Location: 0/1

Trunk-Port(s): 12

Port Group Restrictions:
Shared-Client-Group-Bandwidth      Shared-Group-Client-Ports
        400G                         1, 6, 7, 10
```

**Configuring 8QAM Modulation for 200G Muxponder Mode**

```

Trunk-bandwidth: 400G
Client-port          Supported client rates
  1                  OTU4, 100GE
  6                  OTU4, 100GE
  7                  OTU4, 100GE
  10                 OTU4, 100GE, 400GE

Trunk-bandwidth: 300G
Client-port          Supported client rates
  6                  OTU4, 100GE
  7                  OTU4, 100GE
  10                 OTU4, 100GE

Trunk-bandwidth: 200G
Client-port          Supported client rates
  7                  OTU4, 100GE
  10                 OTU4, 100GE

```

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 1:

```

RP/0/RP0/CPU0:ios#show hw-module location 0/1 xponder-capabilities mxponder-slice 1
Wed Jun  2 17:02:50.133 UTC

Location: 0/1

Trunk-Port(s): 13

Port Group Restrictions:
Shared-Client-Group-Bandwidth      Shared-Group-Client-Ports
  400G                           0, 4, 5, 8

Trunk-bandwidth: 400G
Client-port          Supported client rates
  0                  OTU4, 100GE
  4                  OTU4, 100GE
  5                  OTU4, 100GE
  8                  OTU4, 100GE, 400GE

Trunk-bandwidth: 300G
Client-port          Supported client rates
  4                  OTU4, 100GE
  5                  OTU4, 100GE
  8                  OTU4, 100GE

Trunk-bandwidth: 200G
Client-port          Supported client rates
  5                  OTU4, 100GE
  8                  OTU4, 100GE

```

**Configuring 8QAM Modulation for 200G Muxponder Mode**

By default, QPSK is the modulation format, when you configure 200G trunk rate.

The following operating modes are supported on the DP04CFP2 coherent pluggable module:

**Table 15: DP04CFP2 Supported Modes**

<b>Network Configuration Mode</b>	<b>Client Type</b>	<b>Trunk Rate</b>	<b>Data Path</b>	<b>Line Framing</b>	<b>FEC Type</b>	<b>Modulation Format</b>	<b>BPS</b>	<b>Baud Rate (GBd)</b>	<b>Pulse Shaping</b>	<b>Mode Type</b>
200G-FOIC2-oFEC-QPSK-1-S (Default mode)	2xFOIC1.2	200G	FlexO Str	FlexO-2	oFEC	QPSK	2	63.1	1	Standard
200G-FOIC2-oFEC-8QAM-1-E	2xFOIC1.2	200G	FlexO Str	FlexO-2	oFEC	8QAM	3	42.1	1	Enhanced

Use the following commands to change the modulation format to 8QAM:

**configure**

**controller optics Rack/Slot/Instance/Port bits-per-symbol 3**

**commit**

The following is a sample in which 8QAM modulation is configured.

```
RP/0/RP0/CPU0:ios#config
Wed Jun  2 17:21:59.409 UTC
RP/0/RP0/CPU0:ios(config)#controller optics0/1/0/12 bits-per-symbol 3
RP/0/RP0/CPU0:ios(config-optics)#commit
```

### Verifying the 8QAM Modulation Configuration

```
RP/0/RP0/CPU0:ios#show controllers optics 0/1/0/12
Wed Jun  2 17:17:29.652 UTC

Controller State: Up

Transport Admin State: In Service

Laser State: On

LED State: Green

Optics Status

    Optics Type: <Unknown> 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 = 1
    HIGH-TX-PWR = 0          LOW-TX-PWR = 1
    HIGH-LBC = 0             HIGH-DGD = 0
    OOR-CD = 0               OSNR = 1
```

## Configuring 8QAM Modulation for 200G Muxponder Mode

```

WVL-OOL = 0               MEA    = 0
IMPROPER-REM = 0
TX-POWER-PROV-MISMATCH = 0
Laser Bias Current = 0.0 %
Actual TX Power = 0.97 dBm
RX Power = 1.47 dBm
RX Signal Power = 17.67 dBm
Frequency Offset = 82 MHz

```

Performance Monitoring: Enable

## THRESHOLD VALUES

-----

Parameter	High Alarm	Low Alarm	High Warning	Low Warning
Rx Power Threshold(dBm)	3.0	-31.5	0.0	0.0
Tx Power Threshold(dBm)	3.0	-12.0	0.0	0.0
LBC Threshold(mA)	N/A	N/A	0.00	0.00

```

LBC High Threshold = 90 %
Configured Tx Power = 1.00 dBm
Configured CD High Threshold = 96000 ps/nm
Configured CD lower Threshold = -96000 ps/nm
Configured OSNR lower Threshold = 13.70 dB
Configured DGD Higher Threshold = 67.00 ps
Baud Rate = 42.2082633972 GBd

```

**Bits per Symbol = 3.0000000000 bits/symbol**

**Modulation Type: 8QAM**

Chromatic Dispersion 2 ps/nm

Configured CD-MIN -48000 ps/nm CD-MAX 48000 ps/nm

Polarization Mode Dispersion = 0.0 ps

Second Order Polarization Mode Dispersion = 72.00 ps^2

Optical Signal to Noise Ratio = 34.10 dB

SNR = 18.40 dB

Polarization Dependent Loss = 1.20 dB

Polarization Change Rate = 0.00 rad/s

Differential Group Delay = 2.00 ps

## Transceiver Vendor Details

```

Form Factor          : Not set
Fiber Connector Type: Not Set
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

```

## Configuring the Muxponder Mode for 300G on OTN-XP Card

**Table 16: Feature History**

Feature Name	Release Information	Description
Muxponder Configuration for 300G Trunk with 8QAM Modulation	Cisco IOS XR Release 7.3.2	<p>The OTN-XP card supports up to 300G trunk rate with 8QAM modulation using CFP2. This feature improves the signal reachability with decreased noise.</p> <p>Commands modified:</p> <ul style="list-style-type: none"> <li>• hw-module (OTN-XP Card)</li> </ul>

To configure the OTN-XP card in the 300G muxponder mode, use the following commands:

**configure**

**hw-module location *location* muxponder-slice *muxponder-slice-number***

**trunk-rate 300G**

**commit**

The following is a sample configuration of 300G trunk rate on the muxponder-slice 0 mode for OTN-XP card:

```
RP/0/RP0/CPU0:ios#config
Wed Jun  2 17:17:59.409 UTC
RP/0/RP0/CPU0:ios(config) #hw-module location 0/1 muxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #trunk-rate 300G
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #client-port-rate 6 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #client-port-rate 7 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #client-port-rate 10 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #commit
```

The following is a sample configuration of 300G trunk rate on the muxponder-slice 1 mode for OTN-XP card:

```
RP/0/RP0/CPU0:ios#config
Wed Jun  2 17:17:59.409 UTC
RP/0/RP0/CPU0:ios(config) #hw-module location 0/1 muxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #trunk-rate 300G
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #client-port-rate 4 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #client-port-rate 5 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #client-port-rate 8 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #commit
```

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 0:

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 xponder-capabilities muxponder-slice 0
Wed Jun  2 17:02:33.088 UTC

Location: 0/1

Trunk-Port(s): 12

Port Group Restrictions:
Shared-Client-Group-Bandwidth      Shared-Group-Client-Ports
        400G                         1, 6, 7, 10
```

## Configuring the Muxponder Mode for 300G on OTN-XP Card

```

Trunk-bandwidth: 400G
Client-port          Supported client rates
  1                  OTU4, 100GE
  6                  OTU4, 100GE
  7                  OTU4, 100GE
  10                 OTU4, 100GE, 400GE

Trunk-bandwidth: 300G
Client-port          Supported client rates
  6                  OTU4, 100GE
  7                  OTU4, 100GE
  10                 OTU4, 100GE

Trunk-bandwidth: 200G
Client-port          Supported client rates
  7                  OTU4, 100GE
  10                 OTU4, 100GE

```

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 1:

```

RP/0/RP0/CPU0:ios#show hw-module location 0/1 xponder-capabilities mxponder-slice 1
Wed Jun  2 17:02:50.133 UTC

Location: 0/1

Trunk-Port(s): 13

Port Group Restrictions:
Shared-Client-Group-Bandwidth      Shared-Group-Client-Ports
  400G                           0, 4, 5, 8

Trunk-bandwidth: 400G
Client-port          Supported client rates
  0                  OTU4, 100GE
  4                  OTU4, 100GE
  5                  OTU4, 100GE
  8                  OTU4, 100GE, 400GE

Trunk-bandwidth: 300G
Client-port          Supported client rates
  4                  OTU4, 100GE
  5                  OTU4, 100GE
  8                  OTU4, 100GE

Trunk-bandwidth: 200G
Client-port          Supported client rates
  5                  OTU4, 100GE
  8                  OTU4, 100GE

```

By default, 8QAM is the modulation format, when you configure 300G trunk rate.

The following operating mode is supported on the DP04CFP2 coherent pluggable module:

**Table 17: DP04CFP2 Supported Modes**

<b>Network Configuration Mode</b>	<b>Client Type</b>	<b>Trunk Rate</b>	<b>Data Path</b>	<b>Line Framing</b>	<b>FEC Type</b>	<b>Modulation Format</b>	<b>BPS</b>	<b>Baud Rate (GBd)</b>	<b>Pulse Shaping</b>	<b>Mode Type</b>
300G-FOIC3-oFEC-8QAM-1-S (Default mode)	3xFOIC1.2	300G	FlexO Str	FlexO-3	oFEC	8QAM	3	63.1	1	Standard

The following sample shows the supported client rates for 300G trunk rate and the provisioning status of slice 1:

```
RP/0/RP0/CPU0:ios#show hw-module location 0/1 muxponder-slice 1
Fri Jul 23 16:04:42.279 UTC
```

Location:	0/1	
Slice ID:	1	
Client Bitrate:	100GE	
Trunk Bitrate:	300G	
Status:	Provisioned	
LLDP Drop Enabled:	FALSE	
ARP Snoop Enabled:	FALSE	
Client Port	Mapper/Trunk Port	CoherentDSP0/1/0/13
	Traffic Split Percentage	
HundredGigEController0/1/0/4	ODU40/1/0/13/8	100
HundredGigEController0/1/0/5	ODU40/1/0/13/5	100
HundredGigEController0/1/0/8	ODU40/1/0/13/8	100

The following sample shows the default 8QAM modulation format for the 300G trunk rate:

```
RP/0/RP0/CPU0:ios#show controllers optics 0/1/0/12
Wed Jun 2 17:17:29.652 UTC

Controller State: Up

Transport Admin State: In Service

Laser State: On

LED State: Green

Optics Status

Optics Type: <Unknown> 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 = 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
```

**Configuring the Muxponder Mode for 300G on OTN-XP Card**

```

IMPROPER-REM = 0
TX-POWER-PROV-MISMATCH = 0
Laser Bias Current = 0.0 %
Actual TX Power = 0.97 dBm
RX Power = 1.47 dBm
RX Signal Power = 17.67 dBm
Frequency Offset = 82 MHz

```

Performance Monitoring: Enable

**THRESHOLD VALUES**

Parameter	High Alarm	Low Alarm	High Warning	Low Warning
Rx Power Threshold(dBm)	3.0	-31.5	0.0	0.0
Tx Power Threshold(dBm)	3.0	-12.0	0.0	0.0
LBC Threshold(mA)	N/A	N/A	0.00	0.00

```

LBC High Threshold = 90 %
Configured Tx Power = 1.00 dBm
Configured CD High Threshold = 96000 ps/nm
Configured CD lower Threshold = -96000 ps/nm
Configured OSNR lower Threshold = 13.70 dB
Configured DGD Higher Threshold = 67.00 ps
Baud Rate = 42.2082633972 GBd
Bits per Symbol = 3.0000000000 bits/symbol
Modulation Type: 8QAM
Chromatic Dispersion 2 ps/nm
Configured CD-MIN -48000 ps/nm CD-MAX 48000 ps/nm
Polarization Mode Dispersion = 0.0 ps
Second Order Polarization Mode Dispersion = 72.00 ps^2
Optical Signal to Noise Ratio = 34.10 dB
SNR = 18.40 dB
Polarization Dependent Loss = 1.20 dB
Polarization Change Rate = 0.00 rad/s
Differential Group Delay = 2.00 ps

```

**Transceiver Vendor Details**

```

Form Factor : Not set
Fiber Connector Type: Not Set
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

```

## Configuring the Muxponder Mode for 4x100GE-MXP-DD

*Table 18: Feature History*

Feature Name	Release Information	Description
4X100GE MXP modes with QDD ZRP for OTN-XP Card	Cisco IOS XR Release 7.3.2	<p>On the OTN-XP card, you can configure a single 4x100GE payload that is received over the client port as a 400GE signal over DWDM on the line side.</p> <p>The card improves efficiency, performance, and flexibility for customer networks allowing 4x100GE client transport over 400GE WDM wavelength.</p>

From Release 7.3.2 onwards, you can configure the 4x100GE-MXP-DD muxponder mode on the OTN-XP card.

### Restrictions for Port Group Mapping

The following table explains about the port mapping when the muxponder-slice 0 is at the near end and is connected to the muxponder-slice 1 at the far end:

*Table 19: Port Group Mapping for Shared-Client-Group-Bandwidth*

Slice Configuration - Client Port	Shared-Client-Group-Bandwidth	Shared-Group-Client-Ports
Slice 0	400G	1, 6, 7, 10
Slice 1	400G	8, 0, 4, 5

*Table 20: Port Group Mapping for Trunk-Bandwidth*

Trunk-Bandwidth	Slice Configuration - Client Port	Supported Client Rates	Client-Ports
400G	Slice 0	100G	1, 6, 7, 10
	Slice 1	100G	8, 0, 4, 5
300G	Slice 0	100G	6, 7, 10
	Slice 1	100G	8, 4, 5
200G	Slice 0	100G	7, 10
	Slice 1	100G	4, 5

The traffic flows from the near-end slice-0 to the far-end slice-1 client ports:

- The port 1 traffic reaches port 8

- The port 6 traffic reaches port 0
- The port 7 traffic reaches port 4
- The port 10 traffic reaches port 5

The following table describes the QSFP DD trunk port to the slice-0 client port and slice-1 client port mapping:

**Table 21: QSFP DD Trunk Port to the Slice-0 and Slice-1 Client Port Mapping**

QSFP-DD Trunk Port	Slice 0 - Client Port	Slice 1 - Client Port
0	Port 10	Port 5
1	Port 7	Port 4
2	Port 6	Port 0
3	Port 1	Port 8

## Configuring the Muxponder Mode for 4x100GE-MXP-DD

To configure the OTN-XP card in the 4x100GE-MXP-DD muxponder mode, use the following commands:

**configure**

**hw-module location *location* mxponder-slice *mxponder-slice-number***

**trunk-rate 400G**

**client-port-rate *client-port-number* client-type 100GE**

**commit**

### Example

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the mxponder-slice 0 mode.

```
RP/0/RP0/CPU0:ios#configure
Tue Jun 15 20:20:17.227 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0 mxponder-slice 0
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 1 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 6 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 7 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 10 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
Tue Jun 15 20:20:57.532 UTC
```

### Verifying the Muxponder Configuration

The following is a sample to verify the 4x100GE-MXP-DD muxponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 mxponder
Tue Jun 15 20:21:46.587 UTC
Location: 0/0
```

Slice ID:	0	
Client Bitrate:	100GE	
Trunk Bitrate:	400G	
Status:	Provisioned	
LLDP Drop Enabled:	FALSE	
ARP Snoop Enabled:	FALSE	
Client Port	Mapper/Trunk Port	CoherentDSP0/0/0/11
	Traffic Split Percentage	
HundredGigECtrlr0/0/0/1	-	100
HundredGigECtrlr0/0/0/6	-	100
HundredGigECtrlr0/0/0/7	-	100
HundredGigECtrlr0/0/0/10	-	100

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the mxponder-slice 1 mode.

```
RP/0/RP0/CPU0:ios#configure
Tue Jun 15 20:22:13.981 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0 mxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 0 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

### Verifying the Muxponder Configuration

The following is a sample to verify the 4x100GE-MXP-DD muxponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 mxponder-slice 1
Tue Jun 15 20:23:06.217 UTC

Location:          0/0
Slice ID:          1
Client Bitrate:    100GE
Trunk Bitrate:     400G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port      CoherentDSP0/0/0/9
                  Traffic Split Percentage

HundredGigECtrlr0/0/0/0      -          100
HundredGigECtrlr0/0/0/4      -          100
HundredGigECtrlr0/0/0/5      -          100
HundredGigECtrlr0/0/0/8      -          100
```

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 mxponder
Tue Jun 15 20:23:46.650 UTC

Location:          0/0
Slice ID:          0
Client Bitrate:    100GE
Trunk Bitrate:     400G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port      CoherentDSP0/0/0/11
```

## Configuring the Muxponder Mode for 2x100GE-MXP-DD

Traffic Split Percentage			
HundredGigECtrlr0/0/0/1	-		100
HundredGigECtrlr0/0/0/6	-		100
HundredGigECtrlr0/0/0/7	-		100
HundredGigECtrlr0/0/0/10	-		100
Client Port	Mapper/Trunk Port	CoherentDSP0/0/0/9	
Traffic Split Percentage			
HundredGigECtrlr0/0/0/0	-		100
HundredGigECtrlr0/0/0/4	-		100
HundredGigECtrlr0/0/0/5	-		100
HundredGigECtrlr0/0/0/8	-		100

## Configuring the Muxponder Mode for 2x100GE-MXP-DD

Table 22: Feature History

Feature Name	Release Information	Description
2X100GE MXP modes with QDD ZRP for OTN-XP Card	Cisco IOS XR Release 7.5.1	<p>On the OTN-XP card, you can configure two 2x100GE payloads that are received over the client port as a 200GE signal over DWDM on the line side.</p> <p>The 2x100GE-MXP-DD muxponder mode improves efficiency, performance, and flexibility for customer networks allowing 2x100GE client transport over 200GE WDM wavelength.</p>

From Release 7.5.1 onwards, you can configure the 2x100GE-MXP-DD muxponder mode on the OTN-XP card.



**Note** The LC mode must be configured to 4x100GE-MXP-DD on the OTN-XP card before you perform this configuration.

Two slices of 2x100GE-MXP-DD can be configured with the same LC mode on the OTN-XP card.

Restrictions on the port group mapping exist when the muxponder-slice 0 is at the near end and is connected to the muxponder-slice 1 at the far end. For more details, see [Restrictions for Port Group Mapping](#), on page 65.

To configure the OTN-XP card in the 2x100GE-MXP-DD muxponder mode, use the following commands:

**configure**

**hw-module location *location* muxponder-slice *muxponder-slice-number***

**trunk-rate 200G**

```
client-port-rate client-port-number client-type 100GE
commit
```

### Example

The following is a sample in which the OTN-XP card is configured with 200G trunk rate on the mxponder-slice 1 mode.

```
RP/0/RP0/CPU0:ios#configure
Tue Jun 15 20:20:17.227 UTC
RP/0/RP0/CPU0:ios(config) #hw-module location 0/1 mxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #trunk-rate 200G
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #client-port-rate 4 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #client-port-rate 5 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp) #commit
Tue Jun 15 20:20:57.532 UTC
```

### Verifying the Supported Client Rates for each Trunk Rate

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 0.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 xponder-capabilities mxponder-slice 0
Fri Jul 23 15:35:43.059 UTC

Location: 0/0

Trunk-Port(s): 11

Port Group Restrictions:
Shared-Client-Group-Bandwidth      Shared-Group-Client-Ports
        400G                      1, 6, 7, 10

Trunk-bandwidth: 400G
Client-port          Supported client rates
        1                         100GE
        6                         100GE
        7                         100GE
        10                        100GE

Trunk-bandwidth: 300G
Client-port          Supported client rates
        6                         100GE
        7                         100GE
        10                        100GE

Trunk-bandwidth: 200G
Client-port          Supported client rates
        7                         100GE
        10                        100GE
```

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 1.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 xponder-capabilities mxponder-slice 1
Wed Sep 15 00:30:47.433 UTC

Location: 0/0

Trunk-Port(s): 9
```

## Configuring the Muxponder Mode for 2x100GE-MXP-DD

```

Port Group Restrictions:
Shared-Client-Group-Bandwidth      Shared-Group-Client-Ports
        400G                      8, 0, 4, 5

Trunk-bandwidth: 400G
Client-port          Supported client rates
        8                         100GE
        0                         100GE
        4                         100GE
        5                         100GE

Trunk-bandwidth: 300G
Client-port          Supported client rates
        8                         100GE
        4                         100GE
        5                         100GE

Trunk-bandwidth: 200G
Client-port          Supported client rates
        4                         100GE
        5                         100GE

```

### Verifying the Running Configuration

The following is a sample to verify the provisioned slice and client port information for 2x100GE-MXP-DD muxponder configuration in the OTN-XP card.

```

RP/0/RP0/CPU0:ios#show running config
hw-module location 0/2
  mxponder-slice 0
    trunk-rate 200G
    client-port-rate 1 client-type 100GE
    client-port-rate 7 client-type 100GE
  !
hw-module location 0/1
  mxponder-slice 1
    trunk-rate 200G
    client-port-rate 4 client-type 100GE
    client-port-rate 5 client-type 100GE
  !
!
```

### Verifying the Muxponder Configuration

The following is a sample to verify the 2x100GE-MXP-DD muxponder configuration in the OTN-XP card for mxponder-slice 0.

```

RP/0/RP0/CPU0:ios#show hw-module location 0/0 mxponder-slice 0
Fri Jul 23 16:04:42.279 UTC

Location:          0/0
Slice ID:          0
Client Bitrate:   100GE
Trunk Bitrate:    200G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port      CoherentDSP0/0/0/11
                    Traffic Split Percentage

HundredGigECtrlr0/0/0/7           -                   100
HundredGigECtrlr0/0/0/10          -                   100

```

The following is a sample to verify the 2x100GE-MXP-DD muxponder configuration in the OTN-XP card for mxponder-slice 1.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 mxponder-slice 1
Tue Jun 15 20:21:46.587 UTC

Location:          0/0
Slice ID:          1
Client Bitrate:    100GE
Trunk Bitrate:     200G
Status:             Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port          Mapper/Trunk Port      CoherentDSP0/0/0/11
                      Traffic Split Percentage

HundredGigEctr1r0/0/0/4      -                100
HundredGigEctr1r0/0/0/5      -                100
```

## Configuring the Muxponder Mode for 3x100GE-MXP-DD

**Table 23: Feature History**

Feature Name	Release Information	Description
3x100GE MXP modes with QDD ZRP for OTN-XP Card	Cisco IOS XR Release 7.5.1	<p>On the OTN-XP card, you can configure two 3x100GE payloads that are received over the client port as a 300GE signal over DWDM on the line side.</p> <p>The 3x100GE-MXP-DD muxponder mode improves efficiency, performance, and flexibility for customer networks allowing 3x100GE client transport over 300GE WDM wavelength.</p>

From Release 7.5.1 onwards, you can configure the 3x100GE-MXP-DD muxponder mode on the OTN-XP card.



**Note** The LC mode must be configured to 4x100GE-MXP-DD on the OTN-XP card before you perform this configuration.

Two slices of 3x100GE-MXP-DD can be configured with the same LC mode on the OTN-XP card.

Restrictions on the port group mapping exist when the mxponder-slice 0 is at the near end and is connected to the mxponder-slice 1 at the far end. For more details, see [Restrictions for Port Group Mapping , on page 65](#).

To configure the OTN-XP card in the 3x100GE-MXP-DD muxponder mode, use the following commands:

**configure**

**hw-module location *location* mxponder-slice *mxponder-slice-number***

**trunk-rate 300G**

**client-port-rate *client-port-number* client-type 100GE**

**commit**

### Example

The following is a sample in which the OTN-XP card is configured with 300G trunk rate on the muxponder-slice 1 mode.

```
RP/0/RP0/CPU0:ios#configure
Tue Jun 15 20:20:17.227 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 muxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 300G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 4 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 5 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 client-type 100GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
Tue Jun 15 20:20:57.532 UTC
```

### Verifying the Supported Client Rates for each Trunk Rate

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 0.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 xponder-capabilities muxponder-slice 0
Fri Jul 23 15:35:43.059 UTC

Location: 0/0

Trunk-Port(s): 11

Port Group Restrictions:
Shared-Client-Group-Bandwidth      Shared-Group-Client-Ports
        400G                         1, 6, 7, 10

Trunk-bandwidth: 400G
Client-port          Supported client rates
        1                           100GE
        6                           100GE
        7                           100GE
        10                          100GE

Trunk-bandwidth: 300G
Client-port          Supported client rates
        6                           100GE
        7                           100GE
        10                          100GE

Trunk-bandwidth: 200G
Client-port          Supported client rates
        7                           100GE
        10                          100GE
```

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 1.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 xponder-capabilities muxponder-slice 1
Wed Sep 15 00:30:47.433 UTC

Location: 0/0

Trunk-Port(s): 9

Port Group Restrictions:
```

Shared-Client-Group-Bandwidth	400G	Shared-Group-Client-Ports	8, 0, 4, 5
Trunk-bandwidth: 400G		Supported client rates	
Client-port		8	100GE
		0	100GE
		4	100GE
		5	100GE
<b>Trunk-bandwidth: 300G</b>		<b>Supported client rates</b>	
Client-port		8	100GE
		4	100GE
		5	100GE
Trunk-bandwidth: 200G		Supported client rates	
Client-port		4	100GE
		5	100GE

### Verifying the Running Configuration

The following is a sample to verify the provisioned slice and client port information for 3x100GE-MXP-DD muxponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show running config
hw-module location 0/2
  mxponder-slice 0
    trunk-rate 300G
    client-port-rate 1 client-type 100GE
    client-port-rate 7 client-type 100GE
    client-port-rate 10 client-type 100GE
  !
hw-module location 0/1
  mxponder-slice 1
    trunk-rate 300G
    client-port-rate 4 client-type 100GE
    client-port-rate 5 client-type 100GE
    client-port-rate 8 client-type 100GE
  !
!
```

### Verifying the Muxponder Configuration

The following is a sample to verify the 3x100GE-MXP-DD muxponder configuration in the OTN-XP card for mxponder-slice 0.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 mxponder-slice 0
Tue Jun 15 20:21:46.587 UTC

Location:          0/0
Slice ID:          0
Client Bitrate:    100GE
Trunk Bitrate:     300G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port      CoherentDSP0/0/0/11
                    Traffic Split Percentage
HundredGigECtrlr0/0/0/1                  -                      100
HundredGigECtrlr0/0/0/7                  -                      100
```

## Configuring the Transponder Mode for 400GE-TXP-DD

```
HundredGigECtrlr0/0/0/10 - 100
```

The following is a sample to verify the 3x100GE-MXP-DD muxponder configuration in the OTN-XP card for mxponder-slice 1.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 mxponder-slice 1
Tue Jun 15 20:21:46.587 UTC

Location: 0/0
Slice ID: 1
Client Bitrate: 100GE
Trunk Bitrate: 300G
Status: Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port Mapper/Trunk Port CoherentDSP0/0/0/11
Traffic Split Percentage

HundredGigECtrlr0/0/0/8 - 100
HundredGigECtrlr0/0/0/4 - 100
HundredGigECtrlr0/0/0/5 - 100
```

## Configuring the Transponder Mode for 400GE-TXP-DD

**Table 24: Feature History**

Feature Name	Release Information	Description
400GE TXP mode with QDD ZRP for OTN-XP Card	Cisco IOS XR Release 7.5.1	<p>On the OTN-XP card, you can configure two 400GE payloads that are received over the client port as a 400GE signal over DWDM on the line side.</p> <p>The 400GE-TXP-DD muxponder mode improves efficiency, performance, and flexibility for customer networks allowing 400GE client transport over 400GE WDM wavelength.</p>

From Release 7.5.1 onwards, you can configure the 400GE-TXP-DD transponder mode on the OTN-XP card.



**Note**

The LC mode must be configured to 400GE-TXP-DD on the OTN-XP card before you perform this configuration.

Two slices of 400GE-TXP-DD can be configured with the same LC mode on the OTN-XP card.

Restrictions on the port group mapping exist when the mxponder-slice 0 is at the near end and is connected to the mxponder-slice 1 at the far end. For more details, see [Restrictions for Port Group Mapping](#), on page 65.

---

To configure the OTN-XP card in the 400GE-TXP-DD transponder mode, use the following commands:

**configure**

**hw-module location *location* mxponder-slice *mxponder-slice-number***

**trunk-rate 400G**

```
client-port-rate client-port-number client-type 100GE
commit
```

### Example

The following is a sample in which the OTN-XP card is configured with 400G trunk rate on the muxponder-slice 1 mode.

```
RP/0/RP0/CPU0:ios#configure
Tue Jun 15 20:20:17.227 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 muxponder-slice 1
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 400G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 8 client-type 400GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
Tue Jun 15 20:20:57.532 UTC
```

### Verifying the Supported Client Rates for each Trunk Rate

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 0.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 xponder-capabilities muxponder-slice 0
Wed Oct 27 16:14:35.693 UTC

Location: 0/0

Trunk-Port(s): 11

Port Group Restrictions:
Shared-Client-Group-Bandwidth      Shared-Group-Client-Ports
        400G                      10

Trunk-bandwidth: 400G
Client-port          Supported client rates
        10                      100GE
```

The following is the sample output for verifying the supported client rates for each trunk rate configured in muxponder slice 1.

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 xponder-capabilities muxponder-slice 1
Wed Oct 27 16:16:37.524 UTC

Location: 0/0

Trunk-Port(s): 9

Port Group Restrictions:
Shared-Client-Group-Bandwidth      Shared-Group-Client-Ports
        400G                      8

Trunk-bandwidth: 400G
Client-port          Supported client rates
        8                       400GE
```

### Verifying the Running Configuration

The following is a sample to verify the provisioned slice and client port information for 400GE-TXP-DD transponder configuration in the OTN-XP card.

```
RP/0/RP0/CPU0:ios#show running config
hw-module location 0/0
```

## Configuring the Transponder Mode for 400GE-TXP-DD

```

mplexponder-slice 0
  trunk-rate 400G
  client-port-rate 10 client-type 100GE
!
hw-module location 0/0
mplexponder-slice 1
  trunk-rate 400G
  client-port-rate 8 client-type 100GE
!
!
```

### Verifying the Muxponder Configuration

The following is a sample to verify the 400GE-TXP-DD transponder configuration in the OTN-XP card for mplexponder-slice 0.

```

RP/0/RP0/CPU0:ios#show hw-module location 0/0 mplexponder-slice 0
Fri Jul 23 16:04:42.279 UTC

Location:          0/0
Slice ID:          0
Client Bitrate:    400GE
Trunk Bitrate:     400G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port      CoherentDSP0/0/0/11
                   Traffic Split Percentage

HundredGigEController0/0/0/1      -                100
HundredGigEController0/0/0/6      -                100
HundredGigEController0/0/0/7      -                100
HundredGigEController0/0/0/10     -                100

```

The following is a sample to verify the 400GE-TXP-DD transponder configuration in the OTN-XP card for mplexponder-slice 1.

```

RP/0/RP0/CPU0:ios#show hw-module location 0/0 mplexponder-slice 1
Tue Jun 15 20:21:46.587 UTC

Location:          0/0
Slice ID:          1
Client Bitrate:    400GE
Trunk Bitrate:     400G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port        Mapper/Trunk Port      CoherentDSP0/0/0/9
                   Traffic Split Percentage

HundredGigEController0/0/0/8      -                100
HundredGigEController0/0/0/0      -                100
HundredGigEController0/0/0/4      -                100
HundredGigEController0/0/0/5      -                100

```

### Verifying the Client Ethernet Controller Status

The following is a sample to verify the Client Ethernet Controller Status of the 400GE-TXP-DD transponder configuration in the OTN-XP card.

```
P/O/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: 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: 0ms
```

## Configuring Inverse Muxponder on OTN-XP Card for 400GE Client

**Table 25: Feature History**

Feature Name	Release Information	Feature Description
Inverse Muxponder Configuration on OTN-XP Card	Cisco IOS XR Release 7.3.2	<p>The OTN-XP card supports inverse multiplexing for 400GE client over 2x200G CFP2 trunk ports. This feature allows you to split the 400GE client signal and carry it over 2x200G trunks thereby increasing the ease of signal reachability.</p> <p>Commands modified:</p> <ul style="list-style-type: none"> <li>• hw-module (OTN-XP Card)</li> <li>• controller coherentDSP</li> </ul>

You can configure the OTN-XP card to support inverse multiplexing for 400GE client over 2x200G CFP2 trunk ports. To configure the inverse muxponder datapath, use the following commands:

**configure**

**hw-module location *location***

```
mxponder
trunk-rate 200G
client-port-rate client-port-number client-type 400GE
commit
end
```

The following sample configures inverse muxponder for 400G:

```
RP/0/RP0/CPU0:ios #Configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0 mxponder
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#trunk-rate 200G
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#client-port-rate 10 client-type 400GE
RP/0/RP0/CPU0:ios(config-hwmod-mxp)#commit
```

The following sample verifies the inverse muxponder configuration:

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 mxponder
Wed Jun  9 23:16:59.478 UTC

Location:          0/0
Client Bitrate:   400GE
Trunk Bitrate:    200G
Status:            Provisioned
LLDP Drop Enabled: FALSE
ARP Snoop Enabled: FALSE
Client Port           Mapper/Trunk Port      CoherentDSP0/0/0/12
CoherentDSP0/0/0/13          Traffic Split Percentage
FourHundredGigECtrlr0/0/0/10  ODU-FLEXO/0/0/12/10      50
                                         50
```

### Alarm Correlation in Inverse Muxponder

When any service-affecting alarm is raised on the trunk port 12 or 13, the alarms are reported on the ports as follows:

- Port 12—Flexo alarms (FLEXO\_LOS, FLEXO\_LOL, FLEXO\_GIDM, FLEXO\_FMM, FLEXO\_LOF, and FLEXO\_LOM) and OTU alarms (LOD, AIS, LOS, LOM, LOD, and TIM)
- Port 13—Flexo alarms except Flexo MM and GIDM.

Both ports 12 and 13 go down when any service-affecting alarm is raised.

#### Example:

Shut down the trunk port 12:

```
RP/0/RP0/CPU0:ios(config)#controller coherentDSP 0/3/0/12
RP/0/RP0/CPU0:ios(config-CoDSP)#shutdown
RP/0/RP0/CPU0:ios(config-CoDSP)#commit
Thu Sep 30 14:12:48.416 UTC
```

The following sample verifies that when trunk port 12 is shut down, LOS alarm is raised and the trunk port 13 also goes down.

```
RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/12
Thu Sep 30 14:12:54.604 UTC
```

Port	: CoherentDSP 0/2/0/12
------	------------------------

```

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
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 : LOS

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 : 1, 2,
      Rx GID : 0
      RX IID : 0, 0,

Flexo Peers Information:
      Controller : CoherentDSP0_2_0_13
      OTUCn rate : OTUC2

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

RP/0/RP0/CPU0:ios#show controllers coherentDSP 0/2/0/13
Thu Sep 30 14:12:59.330 UTC

Port : CoherentDSP 0/2/0/13
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
Bandwidth : 200.0Gb/s

Alarm Information:
LOS = 1 LOF = 0 LOM = 0
OOF = 0 OOM = 0 AIS = 0

```

**Configuring Inverse Muxponder on OTN-XP Card for 400GE Client**

```

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 : 0.00E+00
POSTFEC BER : 0.00E+00
Q-Factor : 15.80 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 : 0h, 0m
AINS remaining time : 0 seconds

```

You can perform the following configurations on the DSPcontroller ports:

- [Flexo Parameter Update on Inverse Muxponder Configuration on the OTN-XP Card](#)
- [Configure TTI on Inverse Muxponder Configuration on the OTN-XP Card](#)
- [Configure Loopback on Inverse Muxponder Configured on the OTN-XP Card](#)

# 2-QDD-C Line Card

*Table 26: Feature History*

Feature Name	Release Information	Description
NCS1K4-2-QDD-C-K9 C-Band Line Card	Cisco IOS XR Release 7.3.1	<p>NCS 1004 supports the NCS1K4-2-QDD-C-K9 C-Band line card. The card has eight client ports (QSFP28 and QSFP-DD) and two DWDM dual sub-channel module trunk ports. Each trunk port is capable of 200, 300, and 400 Gbps line rate with fine control of modulation format, baud-rate, and forward error correction. The trunk ports are software configurable. The line card supports module and slice configurations.</p> <p>Command added:</p> <ul style="list-style-type: none"> <li>• <b>controller fourHundredGigECtrlr</b></li> </ul>

The following section describes the supported configurations and procedures to configure the card modes on the 2-QDD-C line card.

## Limitations for 2-QDD-C

- Flex Ethernet is not supported.
- A single 400GE cannot be split and use as 4x 100GE due to hardware limitations.

## Unsupported Features for 2-QDD-C in R731

The following features are not supported in R7.3.1 for 2-QDD-C card:

- OTU4 client
- Layer 1 encryption
- GCC remote node management
- Line rates of 50G, 100G, 150G, 250G, and 350G

## 2-QDD-C Card Modes

The 2-QDD-C line cards support module and slice configurations.

The line cards have two trunk ports (0 and 1) and 8 client ports (2 through 9) each. You can configure the line card in two modes:

- Muxponder—In this mode, both trunk ports are configured with the same trunk rate. The client-to-trunk mapping is in a sequence in vertical order.
- Muxponder slice—In this mode, each trunk port is configured independent of the other with different trunk rates. The client-to-trunk mapping is fixed in vertical order. For Trunk 0, the client ports are 2 through 5. For Trunk 1, the client ports are 6 through 9.

## Sub 50G Configuration

**Table 27: Feature History**

Feature Name	Release Information	Description
Support for n x 50G Rate	Cisco IOS XR Release 7.5.1	You can now configure sub 50G muxponder mode in a combination of trunk and client rates for 2-QDD-C cards.

You can configure sub 50G muxponder mode in the following combination of trunk and client rates:

- 100GE Muxponder mode:
  - 1x100GE and 2x50G
  - 3x100GE and 2x150G
  - 5x100GE and 2x250G
  - 7x100GE and 2x350G
- OTU4 Muxponder mode:
  - 1xOTU4 and 2x50G
  - 3xOTU4 and 2x150G
  - 5xOTU4 and 2x250G
  - 7xOTU4 and 2x350G

The following table displays the port configuration for the supported data rates.

Trunk Data Rate (per trunk)	Total Configured Data rate	Trunk Ports	Client Ports for Trunk 0 (100G)	Shared Client Port (50G per trunk)	Client Ports for Trunk 1 (100G)
50G	100G	0, 1	-	2	-
150G	300G	0, 1	2	3	4
250G	500G	0, 1	2, 3	4	5, 6

Trunk Data Rate (per trunk)	Total Configured Data rate	Trunk Ports	Client Ports for Trunk 0 (100G)	Shared Client Port (50G per trunk)	Client Ports for Trunk 1 (100G)
350G	700G	0, 1	2, 3, 4	5	6, 7, 8

From Release 7.5.2, 2-QDD-C cards support an alternate port configuration for Sub 50G (split client port mapping) that you configure using CLI. The following table displays the port configuration for the supported data rates.

Trunk Data Rate (per trunk)	Total Configured Data rate	Trunk Ports	Client Ports for Trunk 0 (100G)	Shared Client Port (50G per trunk)	Client Ports for Trunk 1 (100G)
50G	100G	0, 1	-	5	-
150G	300G	0, 1	2	5	6
250G	500G	0, 1	2, 3	5	6, 7
350G	700G	0, 1	2, 3, 4	5	6, 7, 8

For information on how to configure split client port mapping, see [Configure Split Client Port Mapping](#), on page 3

### Coupled Mode Restrictions

The following restrictions apply to the coupled mode configuration:

- Both trunk ports must be configured with the same bits-per-symbol or baud rate and must be sent over same fiber and direction.
- The chromatic dispersion must be configured to the same value for both trunk ports.
- When trunk internal loopback is configured, it must be done for both trunk ports. Configuring internal loopback on only one trunk results in traffic loss.
- Fault on a trunk port of a coupled pair may cause errors on all clients including those running only on the unaffected trunk port.

## Supported Data Rates for 2-QDD-C Card

The following table displays the client and trunk ports that are enabled for the muxponder configuration.

Trunk Data Rate	Card Support	Client Data Rate	Client Optics	Trunk Ports	Client Ports
200	2-QDD-C	100GE, OTU4	QSFP-28	0, 1	2, 3, 4, 5
300	2-QDD-C	100GE, OTU4	QSFP-28	0, 1	2, 3, 4, 5, 6, 7
400	2-QDD-C	100GE, OTU4	QSFP-28	0, 1	2, 3, 4, 5, 6, 7, 8, 9
400	2-QDD-C	400GE	QSFP-DD	0, 1	4, 8

## Supported Data Rates for 2-QDD-C Card

The following table displays the client and trunk ports that are enabled for the muxponder slice 0 configuration.

Trunk Data Rate	Card Support	Client Data Rate	Trunk Ports	Client Ports
100	2-QDD-C	100GE, OTU4	0	2
200	2-QDD-C	100GE, OTU4	0	2, 3
300	2-QDD-C	100GE, OTU4	0	2, 3, 4
400	2-QDD-C	100GE, OTU4	0	2, 3, 4, 5
400	2-QDD-C	400GE	0	4

The following table displays the client and trunk ports that are enabled for the muxponder slice 1 configuration.

Trunk Data Rate	Card Support	Client Data Rate	Trunk Ports	Client Ports
100	2-QDD-C	100GE, OTU4	1	6
200	2-QDD-C	100GE, OTU4	1	6, 7
300	2-QDD-C	100GE, OTU4	1	6, 7, 8
400	2-QDD-C	100GE, OTU4	1	6, 7, 8, 9
400	2-QDD-C	400GE	1	8

The following table displays the trunk parameter ranges for the 2-QDD-C card.

Trunk Payload	FEC	Min BPS	Max BPS	Min GBd	Max GBd
150G	27%	1.453125	4.335938	24.02079	71.67494
200G	27%	2	4.40625	31.51	69.43
250G	27%	2.414063	6	28.93129	71.9069
300G	27%	2.8984375	6	34.7175497	71.8681352
350G	27%	3.382813	6	40.5038	71.84047
400G	27%	3.8671875	6	46.2900663	71.8197392
150G	15%	1.320313	3.9375	24.02079	71.67494
200G	15%	1.7578125	5.25	24.02079115	71.74209625
250G	15%	2.195313	6	26.27274	71.80592
300G	15%	3.8203125	6	31.52728839	49.51525048
350G	15%	3.070313	6	36.78184	71.87901
400G	15%	3.8671875	6	42.03638452	71.9018782

**Note**

The recommended value for 6 BPS for corresponding line rates are listed below:

Trunk Payload	FEC	BPS	GBd
300G	27%	6	34.7175
350G	27%	6	40.5038
400G	15%	6	42.0364

For more information on the QDD-C card, see the [data sheet](#).

## Configuring the Card Mode for 2-QDD-C Card

From R7.3.1, you can configure the 2-QDD-C line card in the module (muxponder) or slice configuration (muxponder slice).

To configure the card in the muxponder mode, use the following commands:

- **configure**

```
hw-module location location mxponder client-rate {100GE | OTU4 }
```

```
hw-module location location mxponder trunk-rate {100G | 150G | 200G | 250G | 300G | 350G | 400G }
```

```
commit
```

- **configure**

```
hw-module location location mxponder client-rate { 400GE}
```

```
hw-module location location mxponder trunk-rate { 200G | 400G }
```

```
commit
```

To configure the card in the muxponder slice mode, use the following commands.

**configure**

```
hw-module location location mxponder-slice mxponder-slice-number client-rate { 100GE | 400GE}
```

```
hw-module location location mxponder-slice mxponder-slice-number trunk-rate { 100G | 200G | 300G | 400G }
```

```
commit
```

### Examples

The following is a sample in which the card is configured in the muxponder mode with a 400G trunk rate.

```
RP/0/RP0/CPU0:ios#config
Tue Oct 15 01:24:56.355 UTC
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder client-rate 100GE
RP/0/RP0/CPU0:ios(config)#hw-module location 0/1 mxponder trunk-rate 400G
RP/0/RP0/CPU0:ios(config)#commit
```

The following is a sample in which the card is configured in the muxponder slice 0 mode with a 400G trunk rate.

```
RP/0/RP0/CPU0:ios#config
RP/0/RP0/CPU0:ios(config) #hw-module location 0/1 mxponder-slice 0 client-rate 100GE
RP/0/RP0/CPU0:ios(config) #hw-module location 0/1 mxponder-slice 0 trunk-rate 400G
RP/0/RP0/CPU0:ios(config) #commit
```

The following is a sample in which the card is configured in the muxponder slice 1 mode with a 400G trunk rate.

```
RP/0/RP0/CPU0:ios#config
RP/0/RP0/CPU0:ios(config) #hw-module location 0/1 mxponder-slice 1 client-rate 100GE
RP/0/RP0/CPU0:ios(config) #hw-module location 0/1 mxponder-slice 1 trunk-rate 400G
RP/0/RP0/CPU0:ios(config) #commit
```

The following is a sample in which the card is configured in the muxponder mode with a 400GE trunk rate.

```
RP/0/RP0/CPU0:west#configure
Thu Oct 7 11:43:01.914 IST
RP/0/RP0/CPU0:west(config) #hw-module location 0/2 mxponder trunk-rate 4
400G 450G
RP/0/RP0/CPU0:west(config) #hw-module location 0/2 mxponder trunk-rate 400G
RP/0/RP0/CPU0:west(config) #hw-module location 0/2 mxponder client-rate 400GE
RP/0/RP0/CPU0:west(config) #commit
```

## Configuring Mixed Client Traffic Mode

**Table 28: Feature History**

Feature Name	Release Information	Description
Mixed Client Traffic Mode Configuration	Cisco IOS XR Release 7.5.1	You can now configure the client traffic mode on each trunk port of the 2-QDD-C card independently. This feature provides flexibility to carry both OTN and Ethernet client traffic on the 2-QDD-C card at the same time across two slices.

You can configure the client traffic mode on each trunk in a line card independently. This provides flexibility for the same card to carry both OTN and ethernet client traffic at the same time across 2 slices.

100G, 200G, and 300G trunk rates are supported on both the slices (slice 0 and slice 1) with different client modes (100GE/OTU4).

### Configuration

To configure the card in mixed client traffic mode, use the following commands:

```
hw-module location R/S
mxponder-slice 0
  trunk-rate [100G|200G|300G|400G]
  client-rate [100GE|OTU4]
!
mxponder-slice 1
  trunk-rate [100G|200G|300G|400G]
  client-rate [OTU4|100GE]
```

```
!
!
```

The following configuration is a sample of the mixed client traffic mode.

#### **Example 1:**

```
hw-module location 0/0
  mxponder-slice 0
    trunk-rate 400G
    client-rate OTU4
  !
  mxponder-slice 1
    trunk-rate 400G
    client-rate 100GE
  !
!
```

#### **Verifying Card Configuration**

```
RP/0/RP0/CPU0:ios#show hw-module location 0/0 mxponder

Location:          0/0
Slice ID:          0
Client Bitrate:    OTU4
Trunk Bitrate:     400G
Status:            Provisioned
Client Port        Peer/Trunk Port      CoherentDSP0/0/0/0
                  Traffic Split Percentage

OTU40/0/0/2         ODU40/0/0/0/1       100
OTU40/0/0/3         ODU40/0/0/0/2       100
OTU40/0/0/4         ODU40/0/0/0/3       100
OTU40/0/0/5         ODU40/0/0/0/4       100

Location:          0/0
Slice ID:          1
Client Bitrate:    100GE
Trunk Bitrate:     400G
Status:            Provisioned
Client Port        Peer/Trunk Port      CoherentDSP0/0/0/1
                  Traffic Split Percentage

HundredGigECtrlr0/0/0/6   ODU40/0/0/1/1     100
HundredGigECtrlr0/0/0/7   ODU40/0/0/1/2     100
HundredGigECtrlr0/0/0/8   ODU40/0/0/1/3     100
HundredGigECtrlr0/0/0/9   ODU40/0/0/1/4     100
```

The following configuration is a sample in which both the slices use the same client mode.

#### **Example 2:**

```
hw-module location 0/3
  mxponder
    trunk-rate 350G
    client-rate 100GE
  !
!
```

#### **Verifying Card Configuration**

```
RP/0/RP0/CPU0:ios#show hw-module location 0/3 mxponder
Fri Nov 26 12:21:16.174 UTC

Location:          0/3
Client Bitrate:    100GE
Trunk Bitrate:     350G
```

## Configuring Mixed Client Traffic Mode

Status:	Provisioned	
LLDP Drop Enabled:	FALSE	
ARP Snoop Enabled:	FALSE	
Client Port CoherentDSP0/3/0/1	Mapper/Trunk Port	CoherentDSP0/3/0/0
	Traffic Split Percentage	
HundredGigECtrlr0/3/0/2 0	ODU40/3/0/0/1	100
HundredGigECtrlr0/3/0/3 0	ODU40/3/0/0/2	100
HundredGigECtrlr0/3/0/4 0	ODU40/3/0/0/3	100
HundredGigECtrlr0/3/0/5 50	ODU40/3/0/0/4	50
HundredGigECtrlr0/3/0/6 100	ODU40/3/0/1/1	0
HundredGigECtrlr0/3/0/7 100	ODU40/3/0/1/2	0
HundredGigECtrlr0/3/0/8 100	ODU40/3/0/1/3	0