Upgrade C-Band to C+L Band Without Affecting Traffic Flow

This chapter describes how to upgrade a C-band only network to C+L band network for Cisco NCS 1010 without affecting the traffic in the existing network.

Upgrade a C-band network to C+L band without impacting traffic

Use this task to upgrade an existing C-band network to a C+L band network without impacting traffic. This upgrade allows the network to accommodate more bands and boost bandwidth while maintaining uninterrupted service.

Table 1: Feature History

Feature Name	Release Information	Description
Nontraffic Affecting C+L Band Upgrade	Cisco IOS XR Release 7.10.1	Upgrading an existing C-band network to a C+L band network is now possible without impacting the traffic flow. Cisco Optical Network Planner (CONP) computes the values for relevant parameters in C+L network configuration. The upgrade benefits even those networks that were not planned for a future L-band upgrade. C+L band upgrade enables you to accommodate more bands to your network to boost network bandwidth.

Note Use the Cisco Optical Network Planner (CONP) to compute these values for C-band and L-band devices in C+L network configuration:

1. Single band and dual band target PSD values
2. Gain range for amplifiers

Follow these steps to bring up the L-band node while upgrading a C-band only network to a C+L network.

Procedure

Step 1 Configure the required gain and gain-range settings for each L-band node to ensure accurate amplification.

Note
Gain-Estimator (GE) must be in DISABLED state.

Example:

This sample configuration disables gain estimator.

```
RP/0/RP0/CPU0:ios#configure terminal
RP/0/RP0/CPU0:ios(config)#optical-line-control
RP/0/RP0/CPU0:ios(config-olc)#controller ots 0/0/0/0
RP/0/RP0/CPU0:ios(config-olc-ots)#gain-estimator disable
RP/0/RP0/CPU0:ios(config-olc-ots)#commit
```

Step 2 Configure single band PSD on all L-band nodes.

Note
Link Tuner (LT) must be in DISABLED state.

Example:

This sample configuration disables link tuner.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#optical-line-control
RP/0/RP0/CPU0:ios(config-olc)#controller ots 0/0/0/0
RP/0/RP0/CPU0:ios(config-olc-ots)#link-tuner disable
RP/0/RP0/CPU0:ios(config-olc-ots)#commit
RP/0/RP0/CPU0:ios(config-olc-ots)#end
```

Step 3 Configure the dual band PSD set points obtained from CONP and the partner-band configuration on all L-band nodes.

For more information on L-band dual band PSD configuration, see Modify L-Band Amplifier Properties.

Step 4 Manually configure the gain and gain-range values computed by the gain-estimator application on all C-band nodes, and then disable the gain-estimator.

Note
Disabling Gain estimator causes traffic impact if there is a mismatch between the gain-range configured by the user and the gain-range configured by the gain-estimator.

Step 5 Manually configure the single band PSD set points obtained from the link tuner on all C-band nodes, and then disable the link tuner.

Note
Link tuner is in *Enabled* state in the C-band network. Configure the same PSD values that are obtained from the link tuner and then disable the link tuner. Any mismatch between the PSD value configured by the user and and the PSD value configured by the link tuner leads to traffic impact.

Step 6 Configure the dual band PSD set points obtained from CONP and the partner-band configuration on all C-band nodes.

For more information on C-Band dual band PSD configuration, see Modify C-Band Amplifier Properties.

Note

Ensure that dual band configurations are present (dual band PSD and partner-band) on all the C- and L-band nodes during L-band device addition. If either configuration is missing, BFR does not work properly, and the bands start in an uncontrolled manner. This may impact traffic.

Step 7 Bring up the connectivity between C-band and L-band devices.

a) Bring up the interlink connectivity between C-band and L-band devices by enabling the management interfaces for partner-band communication between C-band and L-band nodes.

b) Bring up the fiber connectivity between C-band and L-band devices and enable Gigabit Ethernet interfaces.

Note
Fiber connectivity is the connection between the L-band port on the C-band nodes and the Line port on the L-band nodes.

c) Verify that the connectivity is fine and there are no alarms present on OSC and OTS controller.

d) After completing the connectivity to the last terminal node, verify that the topology is *UP*, and APC has cleared the *PARTIAL TOPOLOGY* alarm on all OLT C-band and L-band nodes.

Example:

This sample is an output of **show olc apc** command.

```
RP/0/RP0/CPU0:OLT1#show olc apc

Controller      : Ots0/0/0/0
APC Status : WORKING
```

Step 8 On the L-band BFR manager, band status remains *NA* until end-to-end connectivity is up. After the end-to-end terminal (OLT-OLT) is discovered, the band status is updated on all the agent nodes. BFR initiates the BRING UP (RECOVERY) procedure and recovers node one at a time.

Example:

This example shows the output of the **show olc band-status** command where the L-Band recovery is not initiated and *BFR status* is *NA*.

```
RP/0/RP0/CPU0:#show olc band-status

Thu Dec 15 13:54:25.703 UTC

Controller              : Ots0/0/0/0
Self-Band               : None
BFR status      : NA
```

This example shows the output of the **show olc band-status** command where the L-Band recovery is in progress and *BFR status* is *Running*.

```
RP/0/RP0/CPU0:#show olc band-status

Thu Dec 15 13:54:25.703 UTC

Controller              : Ots0/0/0/0
Self-Band               : None
BFR status      : Running
Node RID                : 10.1.1.1
Self IP address         : 10.9.1.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.1.1
Partner Controller      : Ots0/0/0/0
Partner link status     : UP
C-Band status   : ACTIVE
C-Band PSD              : Dual Band
L-Band status           : ACTIVE
```

```
L-Band PSD              : Dual Band
Node RID                : 10.2.1.2
Self IP address         : 10.9.2.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.2.1
Partner Controller      : Ots0/0/0/2
Partner link status     : UP
C-Band status   : RECOVERING
C-Band PSD              : NA
L-Band status           : RECOVERING
L-Band PSD              : NA
Node RID                : 10.2.1.3
Self IP address         : 10.9.3.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.3.1
Partner Controller      : Ots0/0/0/2
Partner link status     : UP
C-Band status   : RECOVERING
C-Band PSD              : NA
L-Band status           : RECOVERING
L-Band PSD              : NA
Node RID                : 10.2.1.4
Self IP address         : 10.9.4.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.4.1
Partner Controller      : Ots0/0/0/0
Partner link status     : UP
C-Band status   : RECOVERING
C-Band PSD              : NA
L-Band status           : RECOVERING
L-Band PSD              : NA

Node RID                : 10.2.1.5
Self IP address         : 10.9.5.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.5.1
Partner Controller      : Ots0/0/0/0
Partner link status     : UP
C-Band status           : RECOVERING
L-Band status           : RECOVERING
```

Step 9 Wait for recovery to complete on all nodes. After recovery, verify the PSD status of the C-band and partner L-band nodes to confirm the PSD profile is *DUAL BAND PSD*.

Step 10 Verify that BFR converged on all nodes and the state on the agent nodes are *ACTIVE* with *DUAL BAND PSD*. Check the traffic status on C-band nodes and verify that traffic was not impacted during the L-band addition.

Example:

This example shows the output of the **show olc band-status** command where the L-Band bring up is complete, PSD profile is *DUAL BAND PSD*, and band status of all the agent nodes is *Active*.

```
RP/0/RP0/CPU0:#show olc band-status

Thu Dec 15 13:54:25.703 UTC

Controller              : Ots0/0/0/0
Self-Band               : None
BFR status      : Running

Node RID                : 10.2.1.1
Self IP address         : 10.9.1.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.1.1
```

```
Partner Controller      : Ots0/0/0/0
Partner link status     : UP

C-Band status           : ACTIVE
C-Band PSD              : Dual Band
L-Band status           : ACTIVE
L-Band PSD              : Dual Band

Node RID                : 10.2.1.2
Self IP address         : 10.9.2.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.2.1
Partner Controller      : Ots0/0/0/2
Partner link status     : UP

C-Band status           : ACTIVE
C-Band PSD              : Dual Band
L-Band status           : ACTIVE
L-Band PSD              : Dual Band

Node RID                : 10.2.1.3
Self IP address         : 10.9.3.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.1.1
Partner Controller      : Ots0/0/0/2
Partner link status     : UP

C-Band status           : ACTIVE
C-Band PSD              : Dual Band
L-Band status           : ACTIVE
L-Band PSD              : Dual Band

Node RID                : 10.2.1.4
Self IP address         : 10.9.4.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.4.1
Partner Controller      : Ots0/0/0/0
Partner link status     : UP

C-Band status           : ACTIVE
C-Band PSD              : Dual Band
L-Band status           : ACTIVE
L-Band PSD              : Dual Band

Node RID                : 10.2.1.5
Self IP address         : 10.9.5.2
Self Controller         : Ots0/0/0/0
Partner IP address      : 10.9.5.1
Partner Controller      : Ots0/0/0/0
Partner link status     : UP

C-Band status   : ACTIVE
L-Band status   : ACTIVE
```

The network now supports simultaneous operation of C-band and L-band wavelengths, resulting in improved bandwidth. This maintains continuous service and ensures that uninterrupted traffic during the upgrade.