CHAPTER 16

Turn Up a Network

This chapter explains how to turn up and test a Cisco ONS 15454 dense wavelength division multiplexing (DWDM) network. For DWDM topology reference information and span loss tables, see Chapter 13, "Network Reference."

There are two main DWDM network types: metro core, where the channel power is equalized and dispersion compensation is applied, and metro access, where the channels are not equalized and dispersion compensation is not applied. The DWDM network topologies supported are hubbed rings, multihubbed rings, meshed rings, linear configurations, and single-span links. The DWDM node types supported are hub, terminal, optical add/drop multiplexing (OADM), reconfigurable optical add/drop multiplexing (ROADM), anti-amplified spontaneous emissions (anti-ASE), and line amplifier. For DWDM and hybrid node turn-up procedures, see Chapter 14, "Turn Up a Node."

Note The procedures and tasks described in this chapter for the Cisco ONS 15454 platform is applicable to the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms, unless noted otherwise.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Note In this chapter, "RAMAN-CTP" refers to the 15454-M-RAMAN-CTP card and "RAMAN-COP" refers to the 15454-M-RAMAN-COP card.

Before You Begin

This section lists the chapter procedures (NTPs). Turn to a procedure for applicable tasks (DLPs).

1. NTP-G51 Verify DWDM Node Turn Up, page 16-2—Complete this procedure before beginning network turn-up.
2. NTP-G52 Verify Node-to-Node Connections, page 16-3—Complete this procedure next.
3. NTP-G201 Configure the Raman Pump on an MSTP Link, page 16-4—Complete this procedure to set the Raman total power and Raman ratio.
4. NTP-G53 Set Up Timing—Complete this procedure next.
5. NTP-G54 Provision and Verify a DWDM Network, page 16-28—Complete this procedure next.
6. NTP-G56 Verify the OSNR, page 16-33—Complete as needed.

7. NTP-G142 Perform a Protection Switch Test, page 16-34—Complete as needed.
8. NTP-G164 Configure Link Management Protocol, page 16-36—Complete as needed.
9. NTP-G233 Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 16-43—Complete as needed.
10. NTP-G303 Configure Virtual links on the Cisco 7600 and Cisco ONS 15454 DWDM Node, page 16-65—Complete as needed.
11. NTP-G57 Create a Logical Network Map, page 16-68—Complete as needed.
12. NTP-G325 View the Power Levels of Cisco ONS 15454 MSTP Nodes, page 16-68—Complete as needed.
13. NTP-G326 Provision SRLG on the Cisco ONS 15454 MSTP Network, page 16-69—Complete as needed.

NTP-G51 Verify DWDM Node Turn Up

Purpose	This procedure verifies that each ONS 15454 is ready for DWDM network turn-up before adding nodes to a network. This procedure applies to all ROADM, OADM, and line-amplifier nodes.
Tools/Equipment	Network plan provided by your network administrator
Prerequisite Procedures	Chapter 14, “Turn Up a Node”
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Log in to an ONS 15454 node on the network that you will test. See the DLP-G46 Log into CTC task for instructions. If you are already logged in, continue with Step 2.

Step 2 Click the **Alarms** tab.

a. Verify that the alarm filter is not turned on. See the DLP-G128 Disable Alarm Filtering task as necessary.

b. Verify that no equipment alarms appear (EQPT in the Cond column) indicating equipment failure or other hardware problems. If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 3 Verify that the software version shown in the node view (single-shelf mode) or multishelf view (multishelf mode) status area matches the version required by your network. (The status area is located to the left of the shelf graphic.) If the software is not the correct version, perform one of the following procedures:

- Perform a software upgrade using a Cisco ONS 15454 software CD or Cisco ONS 15454 SDH software CD. Refer to the release-specific software upgrade document.
- Replace TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards with cards containing the correct release.

Step 4 Click the **Provisioning > General** tabs. Verify that all general node information settings are correct according to documentation provided by the network administrator. If not, see the NTP-G80 Change Node Management Information procedure.

Step 5 Click the **Provisioning > Network** tabs. Ensure that the IP settings and other Cisco Transport Controller (CTC) network access information is correct according to documentation provided by the network administrator. If not, see the NTP-G81 Change CTC Network Access procedure.

Step 6 Click the **Provisioning > Protection** tabs. Verify that all required protection groups have been created according to documentation provided by the network administrator. If not, see the "NTP-G33 Create a Y-Cable Protection Group" procedure on page 11-182 or the NTP-G83 Modify or Delete Card Protection Settings procedure.

Step 7 Click the **Provisioning > Security** tabs. Verify that all users have been created and that their security levels are correct according to documentation provided by the network administrator. If not, see the NTP-G88 Modify Users and Change Security procedure.

Step 8 If Simple Network Management Protocol (SNMP) is provisioned on the node, click the **Provisioning > SNMP** tabs. Verify that all SNMP settings are correct according to documentation provided by the network administrator. If not, see the NTP-G89 Change SNMP Settings procedure.

Step 9 Repeat this procedure at each node in the network.

Stop. You have completed this procedure.

NTP-G52 Verify Node-to-Node Connections

Purpose	This procedure verifies optical service channel (OSC) terminations between nodes and checks span attenuation. This procedure applies to all ROADM, OADM, and line-amplifier locations.
Tools/Equipment	None
Prerequisite Procedures	NTP-G51 Verify DWDM Node Turn Up, page 16-2
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note In this procedure, Side A refers to Slots 1 through 6, and Side B refers to Slots 12 through 17.

Step 1 Check to see if the fibers coming from the adjacent nodes are connected to the OPT-BST, OPT-BST-E, OPT-AMP-17-C (operating in the booster amplifier mode), or OSC-CSM card LINE RX and TX ports. If yes, continue with Step 2. If adjacent node fibers are not connected to the LINE RX and TX ports, do not continue. Install the cabling to the adjacent nodes using the "NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs" procedure on page 14-74.

Step 2 Verify the following network fiber connections:

- The node's Side A ports (LINE TX and RX) are connected to the Side B ports (LINE RX and TX) of the adjacent node.
- The node's Side B ports (LINE RX and TX) are connected to the Side A ports (LINE TX and RX) of the adjacent node.

Step 3 Complete the DLP-G46 Log into CTC task at the network node that you want to verify.

Step 4 Click the **Provisioning > Comm Channels > OSC** tabs. Verify that OSC terminations appear under the OSC Terminations area for the Side B and Side A OSC-CSM or OSCM cards and that the port state is In-Service and Normal (IS-NR [ANSI]/Unlocked-enabled [ETSI]). If so, continue with Step 5. If OSC terminations are not created, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-123.

Step 5 Complete the NTP-G76 Verify Optical Span Loss Using CTC procedure for all OSC-CSM cards. If the measured span loss is within the minimum and maximum expected span loss values, continue with Step 6. If not, clean the fiber connected to the OPT-BST, OPT-BST-E, OPT-AMP-17-C (operating in the booster amplifier mode), or OSC-CSM cards on both ends of the span, then repeat the NTP-G76 Verify Optical Span Loss Using CTC procedure. If the span loss is within the minimum and maximum expected span loss values, continue with Step 6. If not, contact your next level of support.

Step 6 Repeat Steps 2 through 5 at each network node.

Stop. You have completed this procedure.

NTP-G201 Configure the Raman Pump on an MSTP Link

Purpose	This procedure configures the Raman pump on an Multiservice Transport Platform (MSTP) link.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 The Raman pump can be configured in the following ways:

- DLP-G468 Configure the Raman Pump Using the Installation Wizard, page 16-5—This procedure is the preferred and recommended installation process.
- DLP-G690 Configure the Raman Pump Using Manual Day-0 Installation, page 16-19—Use this procedure to configure and tune RAMAN-CTP and RAMAN-COP cards, using manual day-0 installation.
- DLP-G474 Configure the Raman Pump by Importing the CTP XML File, page 16-25—Use this procedure when the span is longer than 42 dB (expand on span). This procedure is not recommended for spans of 42 dB or less.
- DLP-G489 Configure the Raman Pump by Setting the ANS Parameters Manually, page 16-25—Use this procedure if the Raman installation wizard fails and expert intervention is required.

Stop. You have completed this procedure.

DLP-G468 Configure the Raman Pump Using the Installation Wizard

Purpose	This procedure configures the Raman Pump on an MSTP link using the installation wizard.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G46 Log into CTC • NTP-G30 Install the DWDM Cards, page 14-63 • NTP-G51 Verify DWDM Node Turn Up, page 16-2 • NTP-G37 Run Automatic Node Setup, page 14-124. • Create an optical service channel (OSC) termination link by completing the "NTP-G38 Provision OSC Terminations" procedure on page 14-123 or create an optical transport section (OTS) provisionable patchcord terminations on line ports by completing "NTP-G184 Create a Provisionable Patchcord" procedure on page 17-77, as required.
Required/As Needed	Required
Onsite/Remote	Onsite and remote
Security Level	Provisioning or higher

Note The installation wizard performs optical measurements and data exchange between the nodes. Make sure that the data communications network (DCN) is stable.

Note Running the installation wizard without setting the automatic node setup (ANS) parameters causes the wizard to fail. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-124.

Note Running the installation wizard can impact traffic. Make sure that nobody is working on the nodes before continuing with this procedure.

Caution To perform optical measurements, the installation wizard automatically turns on hardware resources installed on the nodes. Alarms can occur during the installation process. Following the recommendations is critical to the success of installation.

Note Make sure that a Muxponder, a WSS, or a tunable transponder is present before you run the Raman installation wizard.

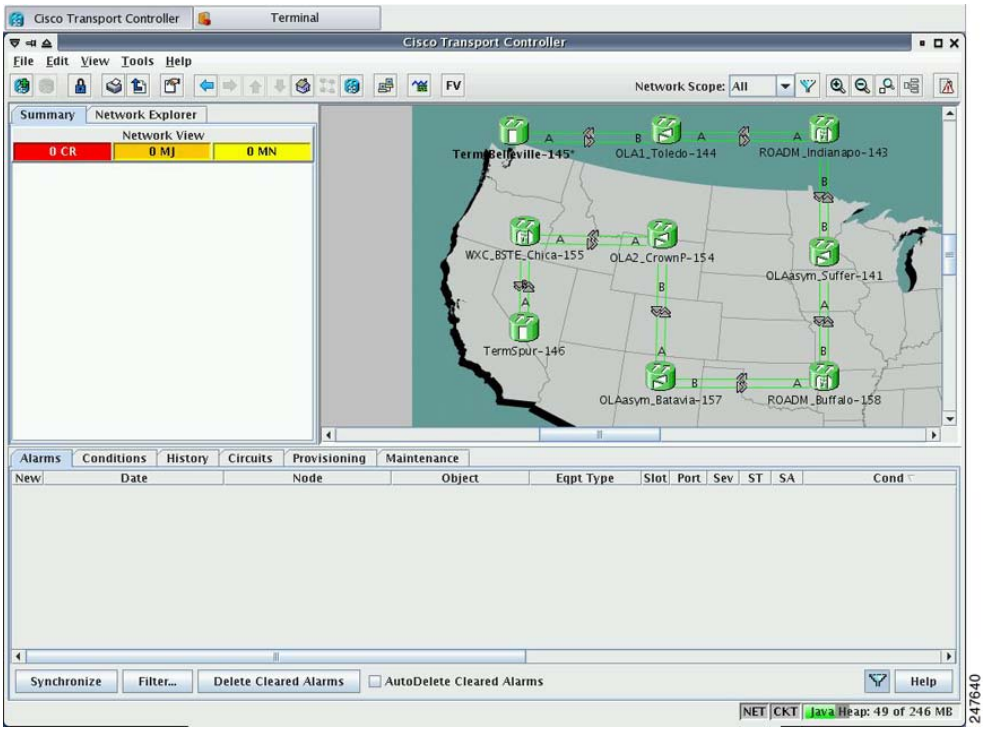
Note When the span is longer than 42 dB, do not use the Raman installation wizard.

Note A bulk attenuator is not required between the transponder and the OPT-RAMP-C or OPT-RAMP-CE card if the Raman installation wizard is started from a Raman only node (line amplifier node equipped with OPT-RAMP-C or OPT-RAMP-CE card without post-amplifier).

Step 1 From the CTC View menu, choose Go to Network View.

Step 2 Figure 16-1 shows a sample network view of nodes (terminal or ROADM) connected in the network.

Figure 16-1 Network View of Nodes (Terminal or ROADM)



The Raman pump on the OPT-RAMP-C or OPT-RAMP-CE card can be configured on a single span or multiple spans.

Step 3 To start the Raman installation wizard, complete one of the following steps:

- To configure Raman amplification on a single span, go to Network view, right-click on a span and choose **Raman Installation Day0** from the shortcut menu. (Figure 16-2). Go to Step 5.
- To configure Raman amplification on multispans, go to Network view, right-click on a specific node, and choose **Raman Installation Day0 Multi-span** from the shortcut menu (Figure 16-3).

Figure 16-2 Installing the Raman Pump on a Single Span

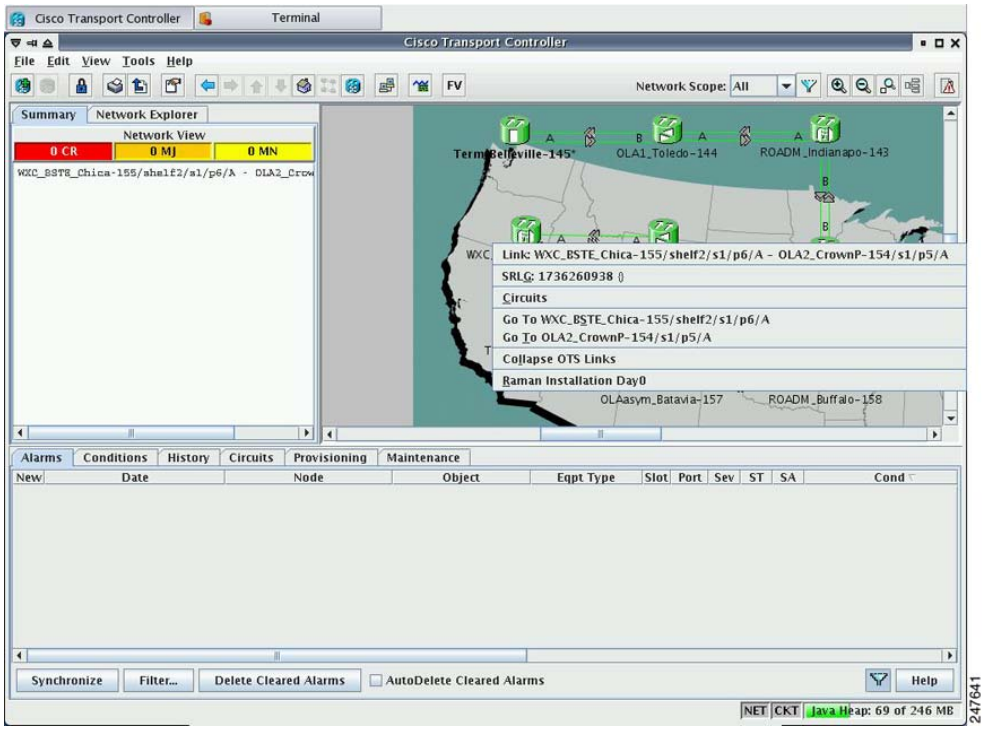
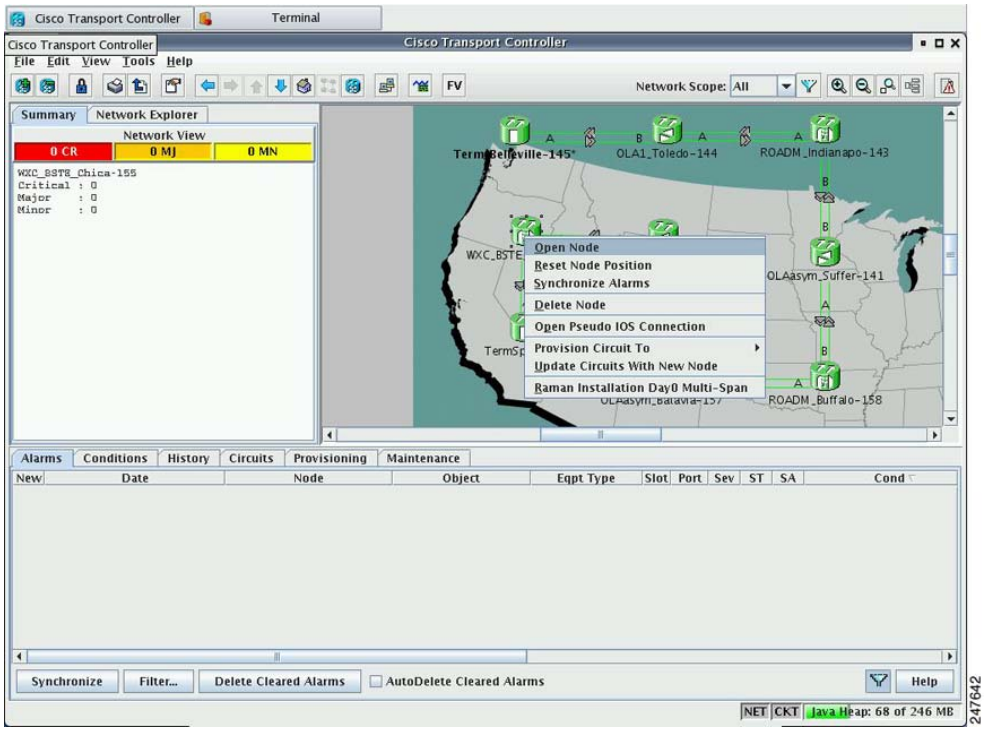
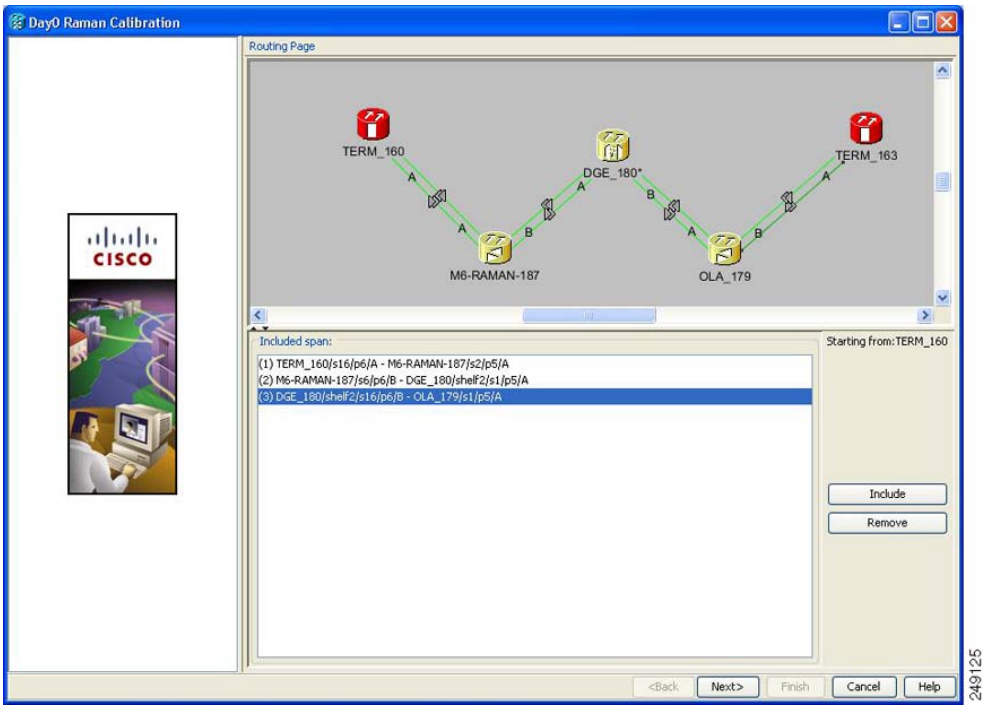


Figure 16-3 Installing the Raman Pump on Multiple Spans



The Routing page is displayed (Figure 16-4).

Figure 16-4 Selecting Spans for Raman Amplification



The Included Span list box lists all spans that are selected in the network.

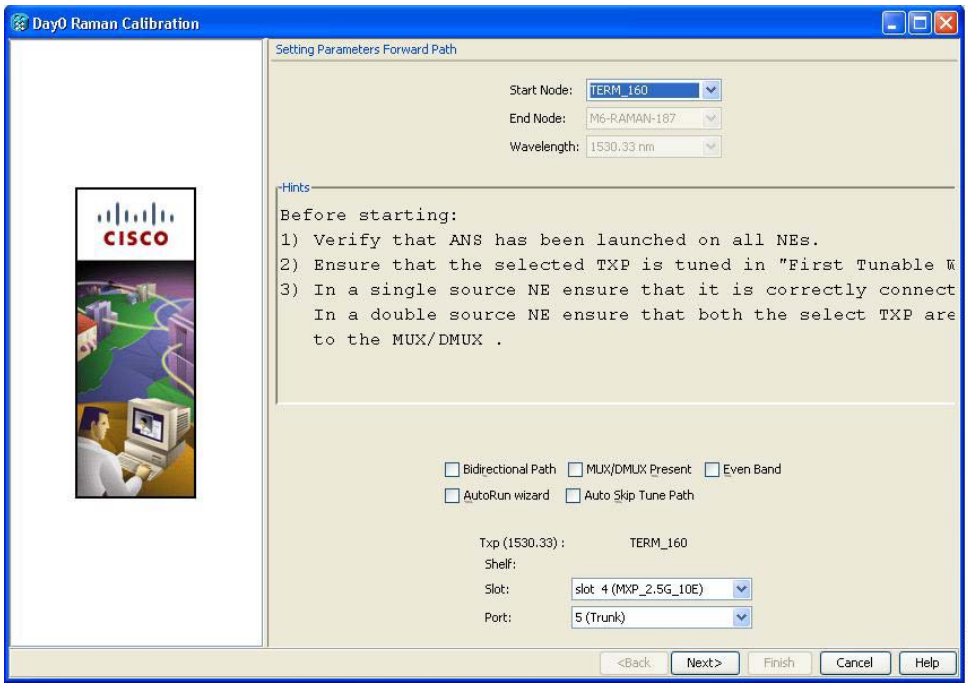
Step 4 Select a span from the network to add a span.

If you are setting up multispans, make sure that the span selection is made in a sequence; otherwise, an error message is displayed.

Step 5 When you have selected the span or spans, click **Next**.

The Setting Parameters page is displayed (see Figure 16-5).

Figure 16-5 Setting Raman Calibration Parameter



Note The Hints area displays the status of internal operations.

Note If multiple spans are selected, the applicable nodes are displayed on the left side of the page.

Step 6 Select one or more check boxes as applicable:

- **Autorun wizard**—The Installation wizard tunes the selected span automatically, requiring no user intervention. However, if the wizard displays errors, the wizard requests for user acknowledgements.
- **Even Band**—This option is used for optical networks that support only even band channels. If the network supports odd and even channels, the Raman Installation wizard tunes the transponder to the first tunable odd band channel.
- **Auto Skip Tune Path**—The Raman Installation wizard skips spans that have been previously tuned by the wizard.
- **Bidirectional Path**—This configures the OPT-RAMP-C or OPT-RAMP-CE cards in both directions (source to destination and destination to source)
- **MUX/DMUX Present**—This option is used if the optical network has transponders connected to the A/D stage (MUX or WSS).

Several scenarios are discussed in the following section. Select as applicable:

- Check box Bidirectional Path is unchecked and check box MUX/DMUX Present is checked. See Figure 16-6 and Step 7a.
- Check box Bidirectional Path is unchecked and check box MUX/DMUX Present is unchecked. See Figure 16-7 and Step 7b.

- Check box Bidirectional Path is checked and check box MUX/DMUX Present is checked. See Figure 16-8 and Step 7c.
- Check box Bidirectional Path is checked and check box MUX/DMUX Present is unchecked. See Figure 16-9 and Step 7d.

Note Before you check the MUX/DMUX Present check box, ensure that the following prerequisites are completed:

- At least one source node is a terminal node or a ROADM node.
- Two transponders/muxponders supporting wavelength of 1530.33 nm and 1560.61 nm, used as probe signals, are available on the source node for odd channels or wavelengths of 1530.72 nm and 1561.01 nm for even channels.
- Trunk ports are connected to the correct ADD ports.

Note The Raman Wizard does not verify if the selected TXP connections are properly connected. The calibration process is terminated if a LOS-P alarm is detected on the MUX input port when the trunk port is turned on.

Note If you do not use the MUX/DMUX Present check box, ensure that the following prerequisites are completed:

- Connect a UT2-based trunk port (from a transponder/muxponder card) to the COM-RX port of the booster amplifier connected to the OPT-RAMP-C or OPT-RAMP-CE card on the source node.

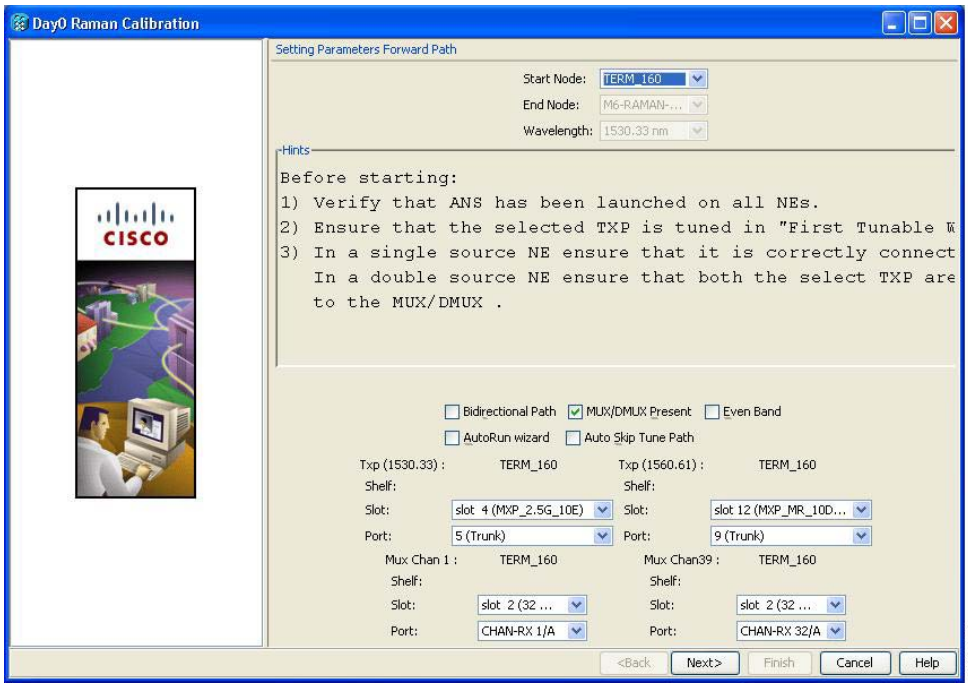
  A full-spectrum, tunable interface allows the system to tune the signal on two required wavelengths without any human intervention.
- A 10-dB bulk attenuator must be connected between the TXP trunk port and the COM-RX port of the booster amplifier.

Caution Make sure that the bulk attenuator is removed as soon as installation finishes and the correct fiber is reconnected to the COM-RX port of the booster amplifier.

Step 7 Perform any one of the following steps, based on your selection in Step 6.

a. Select the two transponders on the source node from the Slot drop-down list. The installation wizard tunes the transponders to the required wavelengths. (Figure 16-6).

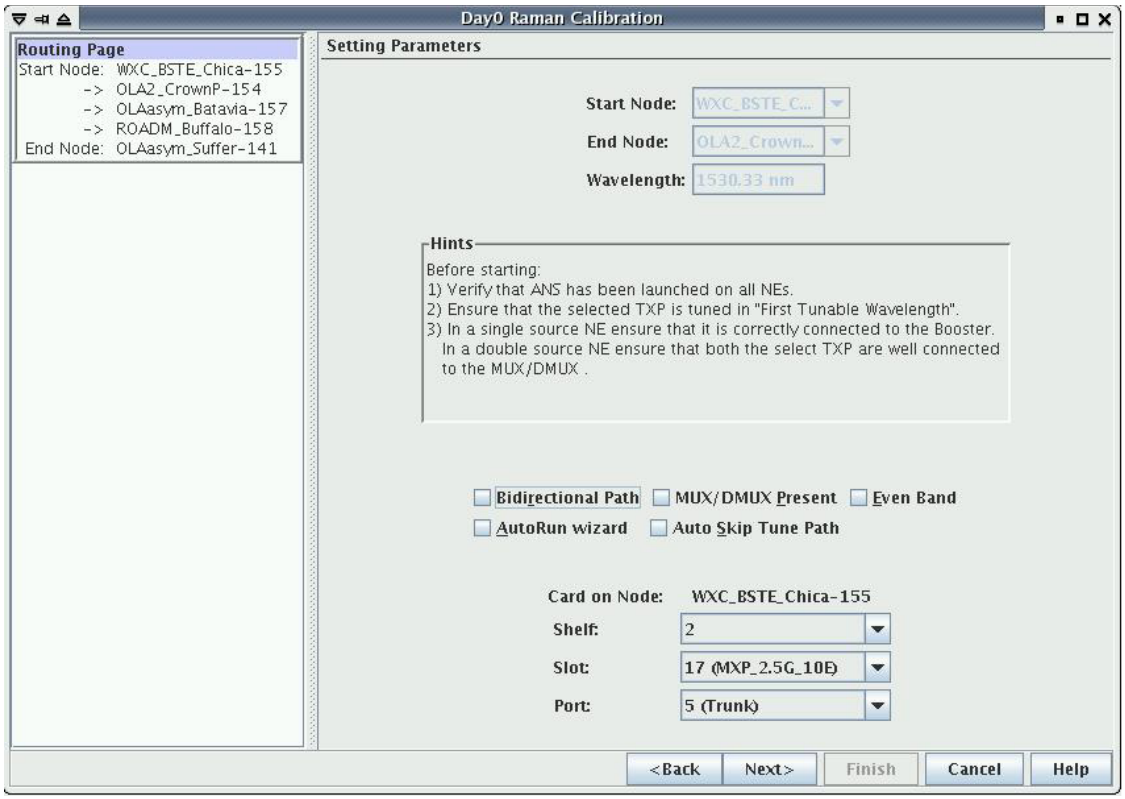
Figure 16-6 Bidirectional Path Is Unchecked and MUX/DMUX Present Is Checked



b. Select one transponder on the source node from the Slot drop-down list. The installation wizard verifies if the transponder can tune on the first tunable wavelength. Make sure that the card used is a tunable C-band transponder and set the transponder to the "first tunable wavelength". Otherwise, the wizard fails and the installation must be repeated using a correctly configured tunable transponder (Figure 16-7).

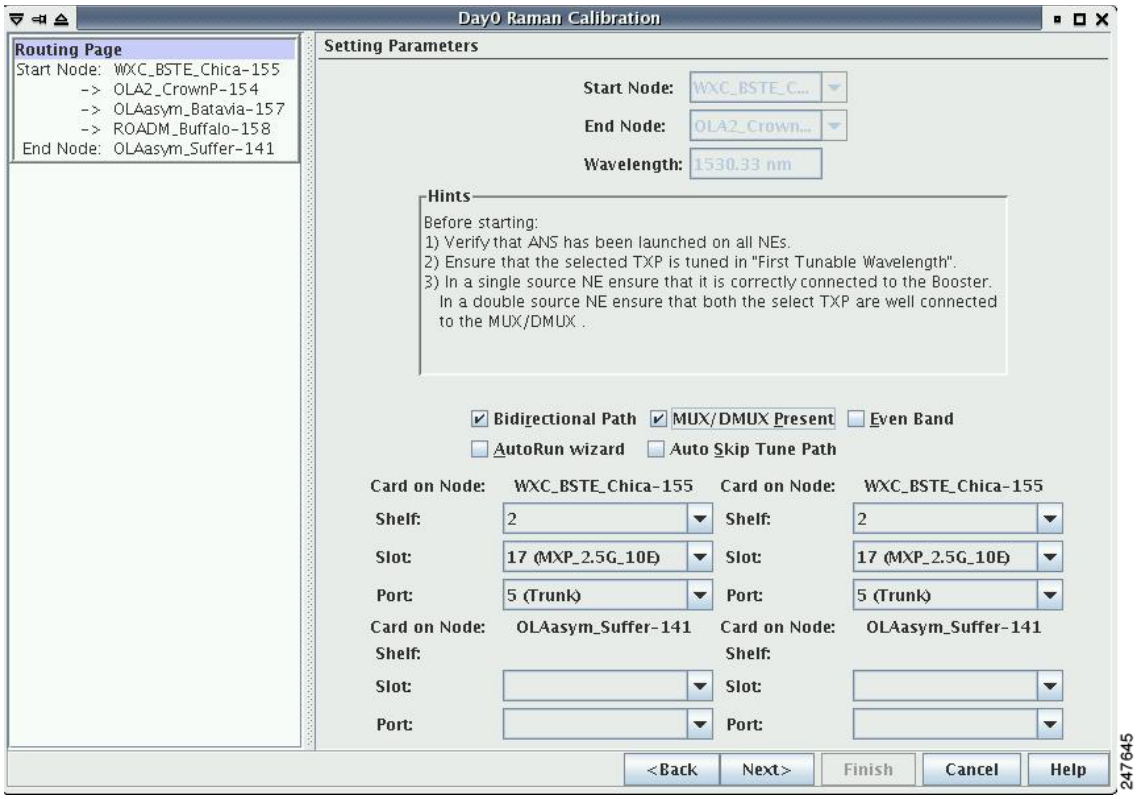
Note The wizard uses a pre-installed UT-2 based transponder.

Figure 16-7 Bidirectional Path Is Unchecked and MUX/DMUX Present Is Unchecked



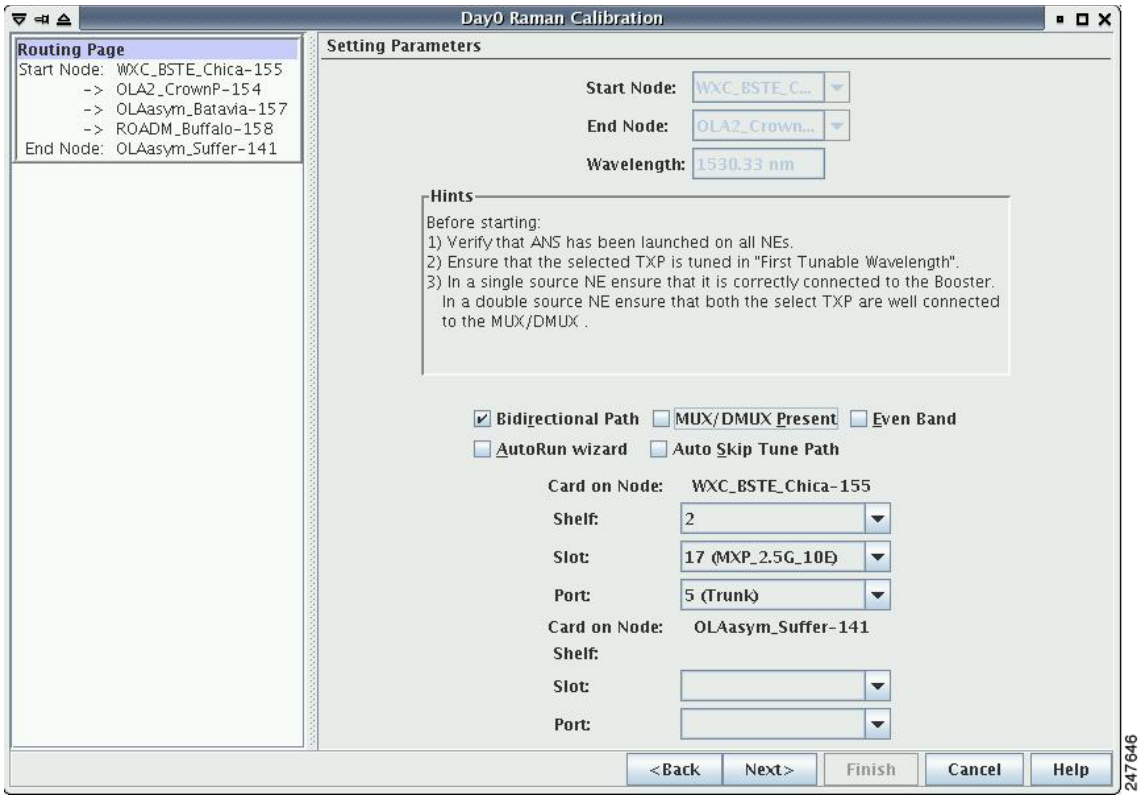
c. Select the two transponders on the source and destination nodes from the Slot drop-down list. The installation wizard verifies if the transponders are tuned to the expected wavelengths or on the first tunable wavelength. Otherwise, the wizard fails and the installation must be repeated (Figure 16-8).

Figure 16-8 Bidirectional Path Is Checked and MUX/DMUX Present Is Checked



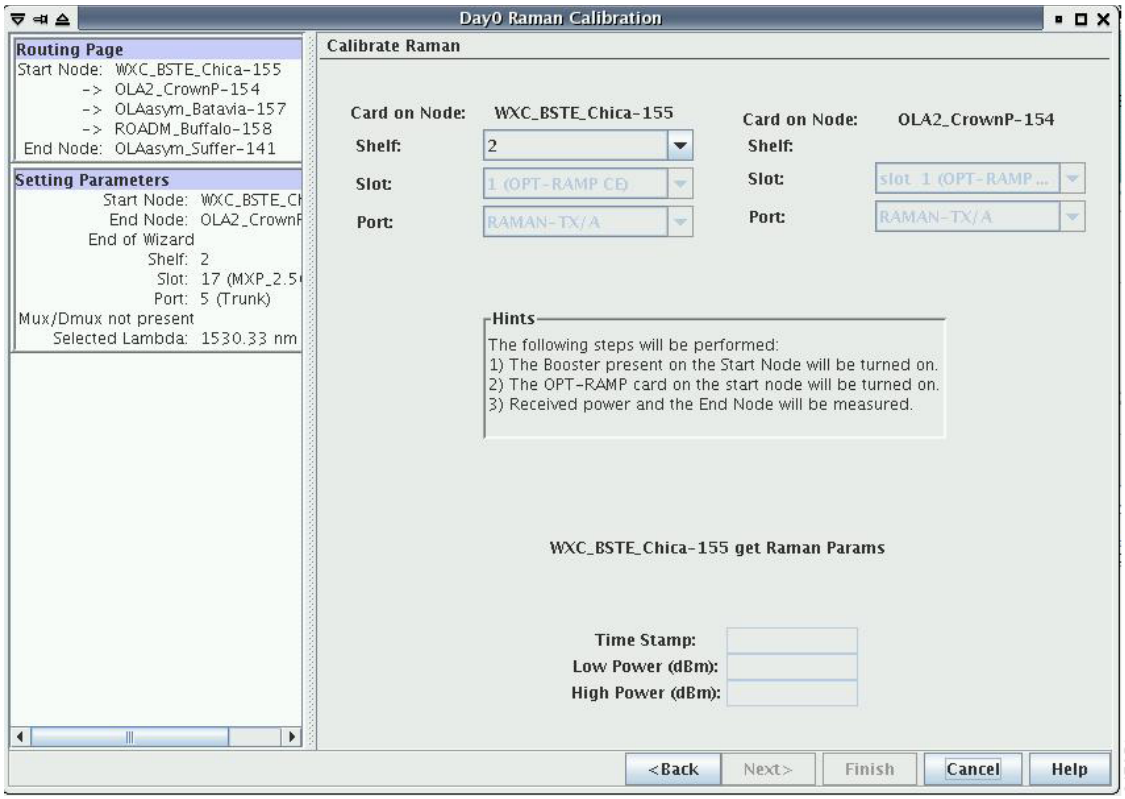
d. Select a transponder on the source and destination nodes from the Slot drop-down list. The installation wizard verifies if the transponder can be tuned on the first tunable wavelength. Make sure that the transponder is a tunable C-band transponder. Otherwise, the wizard fails and the installation must be repeated (Figure 16-9).

Figure 16-9 Bidirectional Path Is Checked and MUX/DMUX Present Is Unchecked



Step 8 Click **Next**. The Calibrate Raman Page is displayed (Figure 16-10).

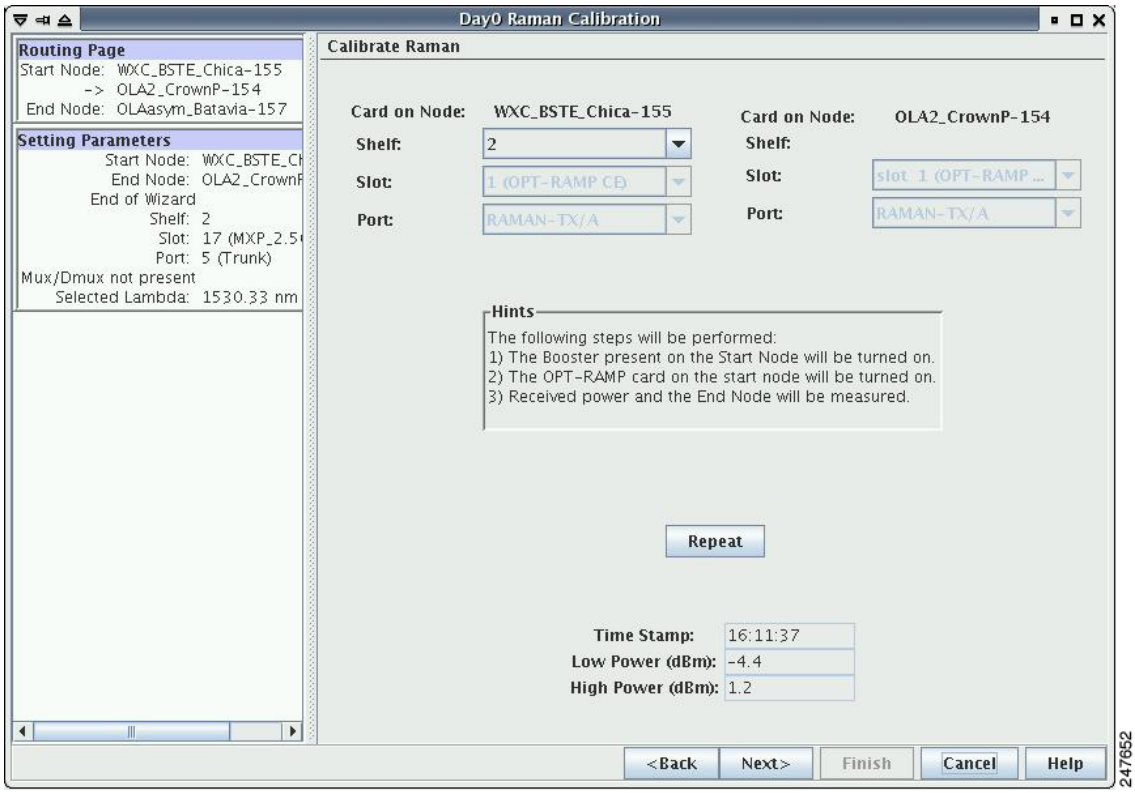
Figure 16-10 Calibrating Raman Amplification



The installation wizard changes the trunk port to the In-Service (IS) state and turns on all the amplifiers. All the OTS and optical channel (OCH) ports in the span are changed to IS state.

Step 9 As soon as the Raman calibrations are complete, the Next button is enabled. Click **Next**.

Figure 16-11 Calibrating Raman Amplification



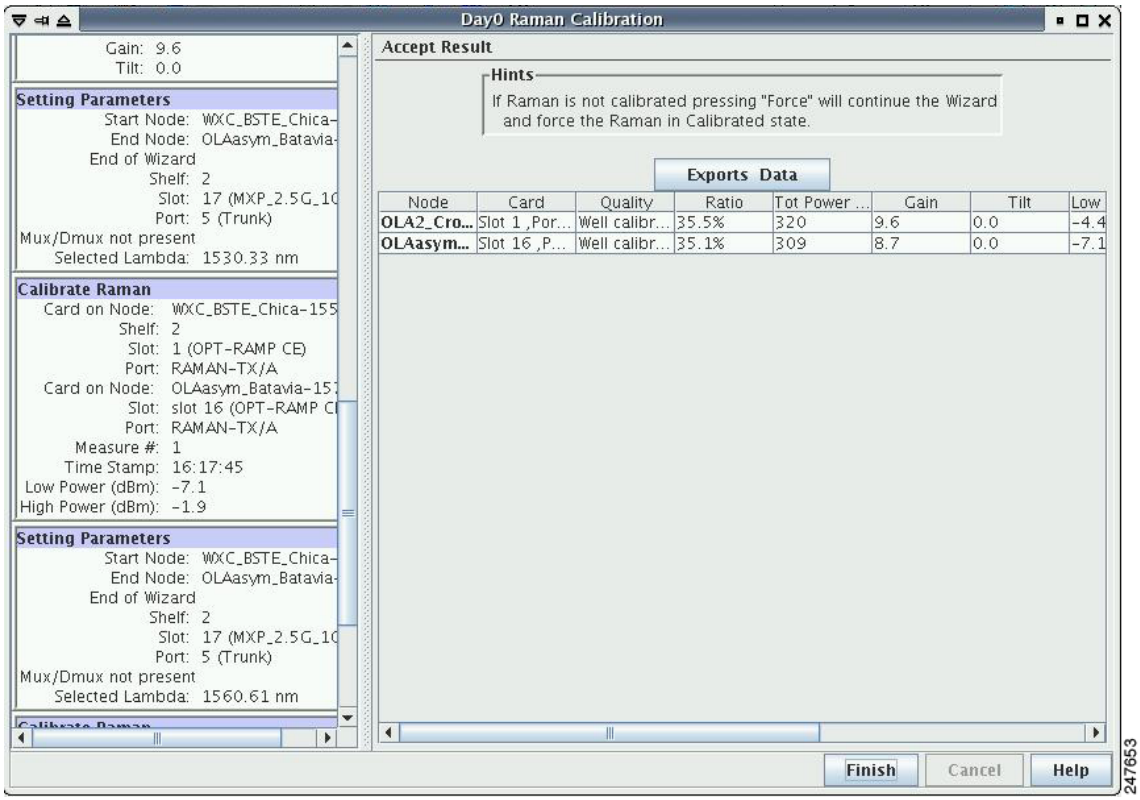
Step 10 The power received on the destination node when wavelength on the source is turned on is shown. If you installed Raman amplification on multiple spans, click **Next** to view results of other spans.

Step 11 If the installation wizard fails, click the **Repeat** button. The Raman installation wizard recalibrates the values on the destination node.

Note If you have repeated the calibration several times and the wizard fails, press **Cancel** to abort the installation process. Log in to the Cisco Technical Support Website at http://www.cisco.com/cisco/web/support/index.html for more information or call Cisco Technical Support at (800) 553-2447.

Step 12 Click **Next**. The Accept Results page is displayed (Figure 16-12).

Figure 16-12 Raman Amplification Results



The calculated Raman power and Raman gain are displayed. (Figure 16-12.)

Step 13 The wizard compares the calculated Raman gain value with the expected results. Your action depends on the Raman gain values:

- Expected gain (Gt) – 0.5 dB <= (gain) <= (expected gain) + 0.5 dB—If the Raman gain is within this range, it means that the setup procedure was successful. Go to Step 14.
- (Expected gain) - 3.0 dB <= (gain) <= (expected gain) – 0.5 dB—If the Raman gain is within this range, it means that the values are slightly outside the range. The wizard recommends that you verify the span length and cabling, and repeat the installation wizard procedure. If the Raman gain values are still not within the expected value range even after repeating the installation process, you can choose to forcibly apply these values by clicking **Force Calibration.**

Note After you have forced the new calibration, the new value of the Raman gain is applied to the OPT-RAMP-C or OPT-RAMP-CE card as the set point; However, the new value does not update the value of the ANS set point for Raman gain. After the installation is complete, reanalyze the network in Cisco Transport Planner using this new value for the Raman gain set point and verify that it results in a good network design. After the CTP analysis is successful, import the updated CTP XML file again into CTC by completing the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47. Launch, run, and apply the ANS parameters by completing "NTP-G37 Run Automatic Node Setup" procedure on page 14-124. This resolves the discrepancy between the values of the ANS parameters and the card parameters.

However, we recommend that you log in to the Cisco Technical Support Website at http://www.cisco.com/cisco/web/support/index.html for more information if the Raman gain values are still not within the expected value range or call Cisco Technical Support at (800) 553-2447.

- (gain) < (expected gain) – 3.0 dB or if (gain) < (expected gain) + 0.5 dB—If the Raman gain is within this range and the values calculated are far from the targeted results, the installation fails and the wizard recommends repeating the installation. If the results do not improve, it means that the installation process has failed. The Force Calibration option is not available. Click **Cancel** to abort the installation and log in to the Cisco Technical Support Website at http://www.cisco.com/cisco/web/support/index.html for more information or call Cisco Technical Support at (800) 553-2447.

Note The reason that the calculated values are not within the range may be due to installation issues (for example, the actual fiber type is different than the one used by Cisco Transport Planner to design the link) or procedural issues.

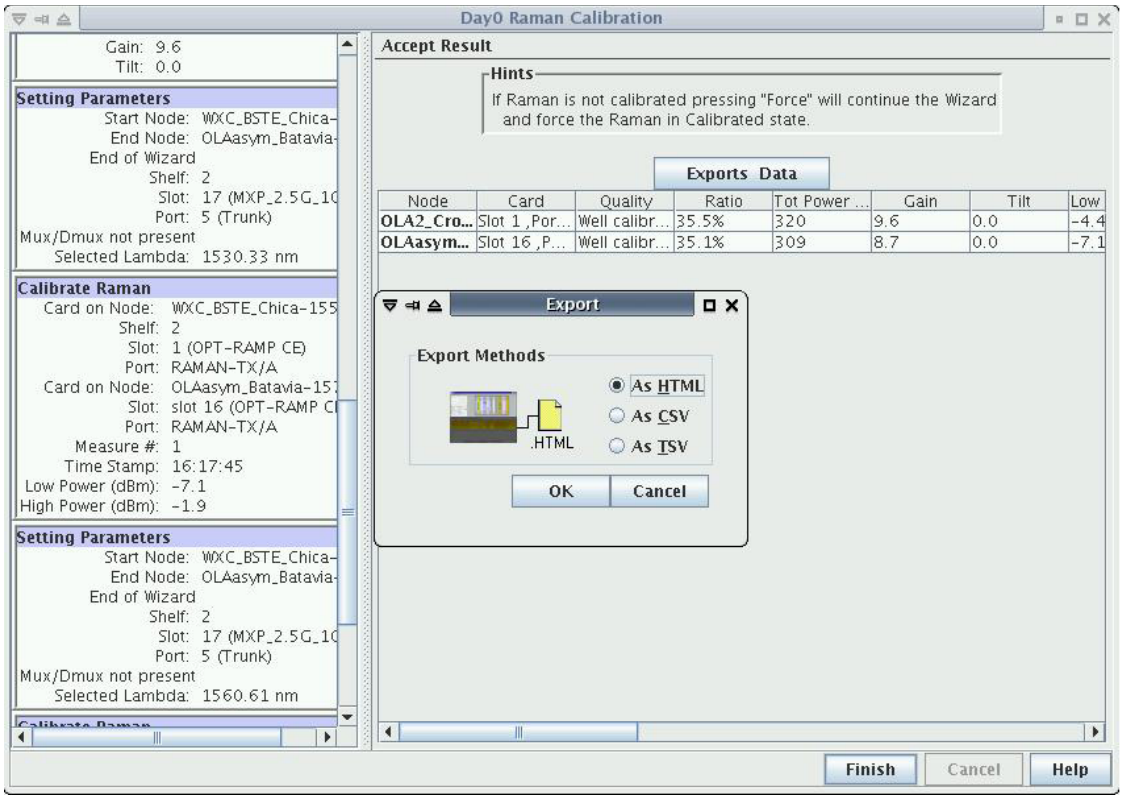
Step 14 Click **Exports Data** to export the Raman setup tuning data in text format (Figure 16-13).

Step 15 Click **Finish**.

Note When an error occurs during calibration of multiple spans, the calibration process stops and the Force Calibration button becomes visible.

Note If an error occurs during calibration of multiple spans when using the AutoRun wizard, the calibration stops and the Force Calibration button becomes visible. Click **Force Calibration** to force the results.

Figure 16-13 Exporting Raman Tuning Data



Step 16 Return to your originating procedure (NTP).

DLP-G690 Configure the Raman Pump Using Manual Day-0 Installation

Purpose	This task tunes the RAMAN-CTP and RAMAN-COP cards manually during day-0 installation.
Tools/Equipment	• An optical spectrum analyzer (OSA) must be available at both the local and remote nodes. • A 15 dB bulk attenuator
Prerequisite Procedures	• DLP-G46 Log into CTC • Create an optical service channel (OSC) termination link by completing the "NTP-G38 Provision OSC Terminations" procedure on page 14-123 or create optical transport section (OTS) provisionable patchcord terminations on line ports by completing "NTP-G184 Create a Provisionable Patchcord" procedure on page 17-77, as required. The ONS-SC-OSC-18.0= SFP is supported.
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Note Perform the tuning procedure on one fiber at a time. Tune the RAMAN-COP module on the remote node followed by RAMAN-CTP of the local node.

Note The RAMAN-COP card needs RAMAN-CTP card to operate.

Note If a 40-SMR1-C or 40-SMR2-C card is connected to the COM port of the RAMAN-CTP card, the ADD-RX port of the 40-SMR1-C or 40-SMR2-C card must be set to the OOS,MT (ANSI) or locked, maintenance (ETSI) state to enable the probe signals. Change the administrative state of the ADD-RX port to IS,AINS (ANSI) or unlocked,automaticInService (ETSI) after the tuning procedure is complete. See the "DLP-G532 Change Optical Line Settings for 40-SMR1-C and 40-SMR2-C Cards" task on page 21-95.

Note If an OPT-EDFA-17, OPT-EDFA-24, OPT-AMP-C, or OPT-BST-E amplifier is used as a line amplifier during the tuning procedure, the COM-RX port of the amplifier must be set to the OOS,MT (ANSI) or locked, maintenance (ETSI) state. Change the administrative state of the COM-RX port to IS,AINS (ANSI) or unlocked,automaticInService (ETSI) after the tuning procedure is complete.

Step 1 To tune the RAMAN-COP card on the remote node, complete Steps 3 through 14.

Step 2 To tune the RAMAN-CTP card on the local node, complete Steps 14 through 22.

Step 3 On the local node, perform the following steps:

a. In the node view (single-shelf mode) or shelf view (multishelf mode), double-click the RAMAN-CTP card.

b. Click the **Maintenance** > **ALS** tabs.

c. Choose **On** from the OSRI drop-down list for the RAMAN-TX port.

d. Click **Apply** and then click **Yes**. This forces both the Raman pumps of the RAMAN-CTP card to shut down.

Note The DFB signal is not affected by the Raman noise because the Raman pumps of the RAMAN-CTP card are shut down. The Optical Signal to Noise Ratio (OSNR) value remains above the failure threshold during the RAMAN-COP card tuning procedure, when the Raman ratio is forced to 100%.

e. Connect the OSA to the COM-TX port of the RAMAN-CTP card using physical patch cords.

f. Set the OSA Resolution Bandwidth (RBW) to 0.2 nm and the OSA Video Bandwidth (RBV) to 100 Hz.

Step 4 On the remote node, perform the following steps:

a. Connect a tunable C-band transponder or muxponder to the COM-RX port of the line amplifier that is connected to the COM-RX port of the RAMAN-CTP card.

b. Connect a 15 dB bulk attenuator between the TXP trunk port and the COM-RX port of the line amplifier so that the input power of the line amplifier does not exceed -7 dBm.

c. In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP or MXP card.

d. Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

e. Select the wavelength as 1530.33 nm for odd band or 1530.73 nm for even band from the wavelength field.

f. Click **Apply** to save the changes.

g. Click the **Provisioning > Line > SONET** tabs.

h. Choose the **IS** option from the Admin State drop-down field and click **Apply**.

i. Click the **Maintenance > ALS** tabs, and set the ALS mode to **Disable**. This enables the line amplifier or the 40-SMR1-C or 40-SMR2-C card to detect a valid input power on the COM-RX or ADD-RX port respectively. The line amplifier starts up in control power mode and reaches the per channel power set point. A valid signal flows from the node into the fiber.

Step 5 On the remote node, perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf view), double-click the RAMAN-COP card.

b. Click **Maintenance > Manual Setup** tabs.

c. Select the **High Power First Lambda** option.

d. Click the **Pump On** button. The High Power First Lambda field becomes editable.

Note The Raman pumps at 1428 nm on the RAMAN-COP card are automatically set to a high power level of 450 mW.

Step 6 On the local node, record the peak optical power level at 1530.33 nm manually. The OSA detects a single channel at 1530.33 nm.

Step 7 On the remote node, perform the following

a. Enter the peak optical power value recorded in Step 6 in the High Power First Lambda field.

b. Select the **Low Power First Lambda** option.

c. Click the **Pump On** button. The Low Power First Lambda field becomes editable.

Note The Raman pumps at 1428 nm on the RAMAN-COP card are automatically set to a low power level of 200 mW.

Step 8 On the local node, record the peak optical power level at 1530.33 nm manually. The OSA detects a single channel at 1530.33 nm. The peak optical power level has reduced significantly.

Step 9 On the remote node, enter the peak optical power value recorded in Step 8 in the Low Power First Lambda field.

Step 10 Switch off the transponder or muxponder card on the remote node and select the last lambda values using the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP or MXP card.

b. Click the **Provisioning > Line > SONET** tabs.

c. Choose the **OOS,DSBLD** option from the Admin State drop-down field and click **Apply**.

d. Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

e. Select 1560.61 nm for odd band or 1561.1 nm for even band wavelength from the wavelength field and then click **Apply**.

f. Click **Provisioning > Line > SONET** tabs.

g. Choose the **IS** option from the Admin State drop-down field and click **Apply**.

Step 11 Repeat Steps 5 through 10 to edit the High Power Last Lambda and Low Power Last Lambda settings.

Step 12 On the remote node, click **Tune** to calculate the power, ratio, and actual gain on the RAMAN-COP card. The results are displayed in the result panel in the Manual Setup > Maintenance tab.

- Power—Displays the optimum total pump power value provisioned on the RAMAN-COP card to reach the target Raman installation gain.
- Ratio—Displays the optimum pumps ratio value provisioned on the card to reach the target Raman gain.

Note The newly calculated set points for the power and ratio can be viewed in the Maintenance > Installation Report tab in the RAMAN-COP card view after the successful execution of Raman tuning procedure. The newly provisioned values overwrite the values for the power and ratio ANS parameters and the Origin field displays the value, “AUTOMATIC” in the Provisioning > WDM-ANS > Provisioning tab.

- Actual Gain—Displays the current Raman gain calculated using the power and ratio values. If the calculated gain is less than the Raman installation gain setpoint, a warning message is displayed, prompting the user to accept the reduced calculated gain.

Step 13 Click the **Force** button to force the new gain setpoint.

Step 14 On the local node, perform the following:

a. In the node view (single-shelf mode) or shelf view (multishelf mode), double-click the RAMAN-CTP card.

b. Click the **Maintenance** > **ALS** tabs.

c. Choose **Off** from the OSRI drop-down list for the RAMAN-TX port.

d. Click **Apply** and then click **Yes**.

Step 15 On the local node, perform the following steps:

a. Connect the OSA to the COM-TX port of the RAMAN-CTP card using physical patchcords.

b. Set the OSA Resolution Bandwidth (RBW) to 0.2 nm and the OSA Video Bandwidth (RBV) to 100 Hz.

Step 16 On the remote node, perform the following steps:

a. Connect a tunable C-band transponder or muxponder to the COM-RX port of the line amplifier that is connected to the COM-RX port of the RAMAN-CTP card.

b. Connect a 15 dB bulk attenuator between the TXP trunk port and the COM-RX port of the line amplifier so that the input power of the line amplifier does not exceed -7 dBm.

c. In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP or MXP card.

d. Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

e. Select the wavelength as 1530.33 nm for odd bands or 1530.73 nm for even bands from the wavelength field.

f. Click **Apply** to save the changes.

g. Click the **Provisioning > Line > SONET** tabs.

h. Choose the **IS** option from the Admin State drop-down field and click **Apply**.

i. Click the **Maintenance > ALS** tabs and set the ALS mode to **Disable**. This enables the line amplifier to detect a valid input power on the COM-RX port. The line amplifier starts up in control power mode and reaches the per channel power setpoint. A valid signal flows from the node into the fiber.

Step 17 On the local node, perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf view), double-click the RAMAN-CTP card.

b. Click the **Maintenance > Manual Start** tabs.

c. Select the **High Power First Lambda** option. Raman pump P1 is activated.

d. Click the **Pump On** button. The High Power First Lambda field becomes editable.

Note The Raman pumps at 1428 nm on the RAMAN-CTP card are automatically set to a high power level of 450 mW.

e. Record the peak optical power level at 1530.33 nm manually. The OSA detects a single channel at 1530.33 nm.

f. Enter the peak optical power value recorded in Step 17e in the High Power First Lambda field.

g. Select the **Low Power First Lambda** option.

h. Click the **Pump On** button. The Low Power First Lambda field becomes editable.

Note The Raman pumps at 1428 nm on the RAMAN-CTP card are automatically set to a high power level of 200 mW.

i. Record the peak optical power level at 1530.33 nm manually. The OSA detects a single channel at 1530.33 nm. The peak optical power level has reduced significantly.

j. Enter the peak optical power value recorded in Step 17i in the Low Power First Lambda field.

Step 18 Switch off the transponder or muxponder card on the remote node and select the last lambda values using the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP or MXP card.

b. Click the **Provisioning > Line > SONET** tabs.

c. Choose the **OOS,DSBLD** option from the Admin State drop-down field and click **Apply**.

d. Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

e. Select the wavelength as 1560.61 nm for odd bands and 1561.1 nm for even bands from the wavelength field and click **Apply**.

f. Click the **Provisioning > Line > SONET** tabs.

g. Choose the **IS** option from the Admin State drop-down field and click **Apply**.

Step 19 Repeat Steps 17 and 18 to edit the High Power Last Lambda and Low Power Last Lambda settings. The Raman pump P2 is activated and the Raman ratio is 0%.

Step 20 On the local node, click the **Tune** button to calculate the power, ratio, and actual gain on the RAMAN-CTP card. The results are displayed in the result panel in the Manual Setup > Maintenance tab.

- Power—Displays the calculated optimum total pump power value provisioned on the RAMAN-CTP card to reach the target Raman installation gain.
- Ratio—Displays the optimum pumps ratio value provisioned on the RAMAN-CTP card to reach the target Raman gain.

Note The newly calculated setpoints for the power and ratio can be viewed in the Maintenance > Installation Report tab in the RAMAN-CTP card view after the successful execution of Raman tuning procedure. The newly provisioned values overwrite the values for the power and ratio ANS parameters and the Origin field displays the value, "AUTOMATIC" in the Provisioning > WDM-ANS > Provisioning tab.

- Actual Gain—Displays the current Raman gain calculated using the power and ratio values. The calculated gain (G) is compared with the expected Raman gain setpoint (G^{STP}). Your actions depends on the value of the calculated gain:
  - G^{STP} – 0.5 dB <= G <= G^{STP} + 0.5 dB—If the calculated gain is within this range, it means that the tuning procedure was successful.
  - G^{STP} – 2 dB < G < G^{STP}—A warning message is displayed, prompting you to accept the reduced calculated gain. Go to Step 21.
  - G < G^{STP} – 2 dB—A failure message is displayed. Go to Step 22.

Step 21 Click the **Force** button to force the new gain setpoint.

Note After you have forced the new calibration, the new value of the Raman gain is applied to the RAMAN-CTP card as the set point. The newly provisioned gain setpoint can be viewed in the Maintenance > Installation Report tab in the RAMAN-CTP card view. However, the newly provisioned gain setpoint does not automatically change the values of the Value and Origin fields of the ANS gain setpoint in the Provisioning > WDM-ANS > Provisioning tab. After the installation is complete, reanalyze the network in Cisco Transport Planner using the new value for the Raman gain set point and verify that it results in a good network design. After the CTP analysis is successful, import the updated CTP XML file again into CTC by completing the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47. Launch, run, and apply the ANS parameters by completing "NTP-G37 Run Automatic Node Setup" procedure on page 14-124. This resolves the discrepancy between the values of the ANS parameters and the card parameters.

Step 22 Repeat the Steps 14 through 21 again after cleaning the fibers and checking the node connections.

Note The status field in the Maintenance > Installation Report tab displays the value, "Raman tuned by WIZARD" after the tuning procedure is complete.

Step 23 Repeat Steps 1 and 2 to complete the tuning procedure in the opposite fiber.

Step 24 Return to your originating procedure (NTP).

DLP-G474 Configure the Raman Pump by Importing the CTP XML File

Purpose	This procedure configures the Raman pump by importing the Cisco Transport Planner XML file.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Install the ANS parameters calculated using Cisco Transport Planner, by completing the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47.

Step 2 Launch, run, and apply ANS parameters by completing "NTP-G37 Run Automatic Node Setup" procedure on page 14-124.

Step 3 Verify if the Raman pump was configured successfully. Perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-RAMP-C or OPT-RAMP-CE amplifier to display the card view.

b. Click the **Maintenance > Installation** tabs.

c. Verify the value of the Raman Ratio and Raman Total Power parameters are consistent with the ANS set points.

d. Verify if the status of the Raman configuration displays the value as "Tuned by ANS". If not, go to Step 1 to repeat the procedure again.

Step 4 Return to your originating procedure (NTP).

DLP-G489 Configure the Raman Pump by Setting the ANS Parameters Manually

Purpose	This procedure configures the Raman pump by setting the ANS parameters manually.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed, when the wizard fails and expert intervention is required.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure can be performed only on a per span basis and not on multiple spans. To configure multiple spans, repeat this procedure on each span that you want to configure.

Step 1 Provision the ANS parameters manually, by completing the "DLP-G541 Add an ANS Parameter" task on page 14-60. The ANS parameters are:

- (Slot *i*.OPT-RAMP-CE).Port RAMAN-TX.Amplifier Gain

- (Slot *i*.OPT-RAMP-CE).Port RAMAN-TX.Raman Ratio
- (Slot *i*.OPT-RAMP-CE).Port RAMAN-TX.Raman Total Power

ANS parameters are displayed in the Provisioning > WDM-ANS > Provisioning tab. For more information, see Chapter 12, "Node Reference."

Step 2 Launch, run, and apply ANS parameters by completing "NTP-G37 Run Automatic Node Setup" procedure on page 14-124.

Step 3 Verify if the Raman pump was configured successfully. Perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-RAMP-C or OPT-RAMP-CE amplifier to display the card view.

b. Click the **Maintenance** > **Installation** tabs.

c. Verify the values of the Raman Ratio and Total Pump Power parameters are consistent with the ANS set points.

d. Verify the status of the Raman configuration displays the value, "Tuned by ANS". If not, go to Step 1 to repeat the procedure again.

Step 4 Return to your originating procedure (NTP).

DLP-490 Restore Raman Link After a Fiber Cut Occurs

Purpose	This procedure tunes Raman set points after a fiber cut has been repaired. The Raman total power value is calculated again, and the original Raman gain is restored.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure does not calculate the Raman pump ratio. The Raman pump ratio is not expected to change after the fiber cut is repaired.

Caution This procedure affects traffic. Ensure that nobody is working on the nodes before you begin.

Step 1 Complete the "NTP-G54 Provision and Verify a DWDM Network" procedure on page 16-28.

Ensure that the network traffic is restored.

Step 2 Verify if the restore procedure was successful. Perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-RAMP-C or OPT-RAMP-CE amplifier to display the card view.

b. Click the **Maintenance** > **Installation** tabs.

c. Verify the value of the Fiber Cut Recovery column. The possible values are:

- Executed— The restore procedure was completed successfully.

- Pending—The restore procedure is incomplete.
- Failed —The system failed to execute the procedure.

d. If the status is Pending or Failed in Step 2c., perform the following steps:

- Click the **Maintenance > APC & Restore** tabs.
- Click **Restore from Fiber Cut**. This recalculates the Raman gain on the span and verifies if this value is consistent with the ANS set point for Raman gain.

Step 3 Return to your originating procedure (NTP).

DLP-G350 Use the Cisco Transport Planner Traffic Matrix Report

Purpose	This task describes how to use the Cisco Transport Planner traffic matrix report to provision and verify a DWDM network.
Tools/Equipment	None
Prerequisite Procedures	NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-4
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 Display a printed copy of the Cisco Transport Planner Traffic Matrix report for your network. The report can be exported in Microsoft Excel (.xls) or HTML format.

Step 2 View the following information:

- Service Demand—Lists the general service demand from site to site.
- Service Circuit—Lists the service circuit.
- OCH-CC Src—Lists the optical channel client connection (OCHCC) source site and the shelf direction, either Side B or Side A.
- OCH-CC Src Position—Lists the OCHCC source rack, shelf, and slot.
- OCH-CC Src Unit—Lists the OCHCC source TXP, MXP, or ITU-T line card.
- OCH-CC Src Port—Lists the OCHCC source port.
- A/D Src Position—Lists the optical channel add/drop card source rack, shelf, and slot.
- A/D Src Unit—Lists the optical channel add/drop card source TXP, MXP, or ITU-T line card.
- A/D Src Port—Lists the optical channel add/drop card source port.
- OCH-CC Dst—Lists the OCHCC destination site and shelf direction, either Side B or Side A.
- OCH-CC Dst Position—Lists the OCHCC destination rack, shelf, and slot.
- OCH-CC Dst Unit—Lists the OCHCC destination TXP, MXP, or ITU-T line card.
- OCH-CC Dst Port—Lists the OCHCC destination port.
- A/D Dst Position—Lists the optical channel add/drop card destination rack, shelf, and slot
- A/D Dst Unit—Lists the optical channel add/drop card destination TXP, MXP, or ITU-T line card.
- A/D Dst Port—Lists the optical channel add/drop card destination port.

  - Dest Unit is the product ID of the optical path source card.
  - Dest Port is the port label reported on the front panel of the optical path destination card.
- Cl Service Type—Identifies the service type of the optical channel.
- Protection—Identifies the type of protection used for the optical channel:
  - Optical paths for unprotected-Side B and unprotected-Side A optical channels are routed along one direction only in the network.
  - Optical paths for Y-cable, fiber-switched, and client 1+1 optical channels are routed along two independent directions in the network.
- Op Bypass Site Name—Identifies where the optical channel is dropped and reinserted when it is not terminated on a TXP or MXP card (optical bypass).

Note If the word *None* appears in the Op Bypass Site Name column, no optical bypass is defined for the optical channel.

- Wavelength—Identifies the wavelength used for the optical channel. Table 17-6 on page 17-20 lists the thirty-two available wavelengths.
- DWDM Interface Type—Identifies the DWDM interface type that is used for the optical channel:
  - *Transponder* indicates that a transponder (TXP), muxponder (MXP), or DWDM pluggable port module is used for the optical channel.
  - *Line Card* indicates that an ITU line card is used for the optical channel.
- DWDM Card Type—Identifies the type of TXP or line card that is used for the optical channel. For information about card types supported by Cisco Transport Planner, see *Cisco Transport Planner DWDM Operations Guide*.

Step 3 Return to your originating procedure (NTP).

NTP-G54 Provision and Verify a DWDM Network

Purpose	This procedure describes how to turn-up an optical service in MSTP networks. It also provides a guidance to perform an entry-level optical performances verification of an optical circuit (OCH-NC/OCH-CC/OCHTrail) created on the MSTP networks.
Tools/Equipment	Test set or protocol analyzer Cisco Transport Planner Traffic Matrix
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, AR_XPE, 100G-LC-C, 10x10G-LC, CFP-LC, ADM-10G, and OTU2_XP Cards. Provisioning procedures of these cards are provided in Chapter 11, "Provision Transponder and Muxponder Cards"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note In this procedure, Side A refers to Slots 1 through 6, and Side B refers to Slots 12 through 17.

Step 1 Complete the DLP-G46 Log into CTC task to log in to an ONS 15454 node on the network.

Step 2 Click the **Alarms** tab:

a. Verify that the alarm filter is not turned on. See the DLP-G128 Disable Alarm Filtering task, as necessary.

b. Verify that no equipment (EQPT) alarms appear. If equipment failure alarms appear, investigate and resolve them before continuing. Refer to *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 3 Using the Cisco Transport Planner Traffic Matrix (see Table 14-1 on page 14-4) for your site, identify the first channel (ITU wavelength) to be provisioned. Use the TXP, MXP, or line card that corresponds to the selected wavelength.

Step 4 For the ITU wavelength identified in Step 3, create an optical channel client connection (OCHCC) circuit or optical channel network connection (OCHNC) circuit, or optical channel trail circuit using one of the following tasks:

- DLP-G346 Provision Optical Channel Client Connections, page 17-18.
- DLP-G105 Provision Optical Channel Network Connections, page 17-44.
- DLP-G395 Create an Optical Channel Trail, page 17-34.

.After creating the OCHCC or OCHNC circuit, return to this procedure and continue with Step 5.

Note Every time a channel is created in the DWDM network, the amplifiers automatically calculate the optical output power needed to maintain a constant power level on each channel when working in Gain Control. If the amplifier is working in power control, APC tool is used for amplifiers power level calculation and setting. Automatic power control (APC) runs when you create new circuits. APC also runs periodically (every 60 minutes) to check and monitor power levels in all the significant sections of the network. If the span length changes, APC modifies amplifier gains and modifies express variable optical attenuation (VOA). For more information about APC, see the Chapter 13, "Network Reference."

Step 5 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Circuits** tab. Verify that the OCHCC or OCHNC created in Step 4 has a DISCOVERED status and an IS state. If so, continue with Step 6. If not, complete "NTP-G183 Diagnose and Fix OCHNC and OCH Trail Circuits" task on page 17-68.

Step 6 Click the circuit and click **Edit**.

Step 7 In the Edit Circuit dialog box, click the **State** tab.

Step 8 In the Cross-Connections table, verify that the circuit path is correct and record all the nodes that appear in the Node column. The first node is the circuit source, and the last node is the circuit destination. If the circuit path is incorrect, delete the circuit and go back to Step 4 to create a new circuit.

Step 9 Perform the entry-level performance verification of the optical power levels matching with expected setpoints for the OCH-circuit identified in Step 8.

Optical verification is done for cards in the OCH-circuit. The verification must be done node by node, following the logical signal flow from source to destination node.

Verify the power levels on the following:

a. Fixed or reconfigurable add/drop cards.

b. Amplifiers, including the raman cards.

Note You need to verify the power setpoint for OPT-PSM cards in the path protection configuration.

Step 10 Display the circuit source node in node view (single-shelf mode), or shelf view (multishelf mode). Following the signal flow from the TXP, MXP, or line card Trunk ports, if an fixed or reconfigurable add/drop card is installed, complete the following steps. If not, continue with Step 11.

Note Use of Node Functional View to identify at a glance, the logical signal flow in complex nodes.

a. In node view (single-node mode) or multishelf view (multishelf mode) click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector area, select the first fixed or reconfigurable add/drop card to be checked. Identify the power parameter and record the corresponding port and active value from the parameter list.

c. Check the power setpoint on the ports displayed in the Port field in CTC. The add/drop cards must meet this output power setpoint per channel.

d. Display the selected fixed or reconfigurable add/drop module in card view:

e. Click the **Provisioning** tabs.

f. Locate the port selected in step b in the CTC menu.

Note The CTC displays the name according to the card installed.

g. Identify the row associated to the Port. Check the value reported in Power or Power To column in CTC.

– If the card value matches the VOA Power Ref. cell or the recorded Power value, with +/- 1 dB of tolerance, continue with Step 11.

Note VOA Power Ref at card level must be equal to the Power Active Value recorded in step b. If not, go back to Node view and click the ANS button. Then repeat this procedure.

– If the value is out of tolerance range from the VOA Power Ref, contact your next level of support.

Step 11 Display the circuit source node in node view (single-shelf mode), or shelf view (multishelf mode). Following the signal flow, if an amplifier card is installed, complete the following steps.

Note Use of Node Functional View to identify the logical signal flow in complex nodes at a glance.

If not, continue with Step 12.

a. In node view (single-node mode) or multishelf view (multishelf mode) click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector area, click the amplifier card to be checked. Identify the power parameter and record the corresponding port and active value from the parameter list.

c. Check the power setpoint on the ports displayed in the Port field in CTC. The add/drop cards must meet this output power setpoint per channel.

d. Display the selected amplifier in card view.

e. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs. Identify the row associated to the Port selected in step b. Check the signal output power value.

- If the value is equal to or greater (due to ASE accumulation) than the value shown in the Channel Power Ref cell, continue with Step 12.

Note Channel Power Reference at card level must be equal to the Power Active Value noted in step b. If not, go back to Node view and click the ANS button. Then repeat this procedure.

- If the value is lower than the value shown in the Channel Power Reference cell, contact your next level of support.

Step 12 Go to the Edit Circuit dialog box and move to the next intermediate node in node view (single-shelf mode), or shelf view (multishelf mode). Following the signal flow, repeat Step 10 and Step 11 in order to check fixed or reconfigurable add/drop cards and amplifiers cards.
When all the intermediate nodes have been checked, move to Step 13 to verify the destination node.

Step 13 Display the Destination node in node view (single-shelf mode), or shelf view (multishelf mode). Following the signal flow, if an amplifier card is installed, complete the power levels check according with Step 11.

Complete the power level verification on the fixed or reconfigurable add/drop card that is dropping the signal using the following steps:

a. In node view (single-node mode) or multishelf view (multishelf mode) click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector area, click the last fixed or reconfigurable drop card to be checked. Identify the drop power parameter among the optical parameters and record the correspondent Port and Active Value.

c. Check the power setpoint on the ports displayed in the Port field in CTC. The cards must meet this Drop Power setpoint per channel.

d. Display the selected fixed or reconfigurable add/drop module in card view.

e. Click the **Provisioning** tabs.

f. Locate the port selected in step b in the CTC menu.

Note The CTC displays the name according to the card installed.

g. Identify the row associated to the Port. Check the value reported in Power or Power To column in CTC.

- If the card value matches the VOA Power Ref. cell (when present) or the recorded Power Drop value, with +/- 2 dB of tolerance, continue with Step 14.

Note VOA Power Ref at card level must be equal to the Power Drop Active Value recorded in step b. If not, go back to Node view and click the ANS button. Then repeat this procedure.

- If the value is out of tolerance range from the VOA Power Ref, contact your next level of support.

Step 14 Check the received power range on TXP, MXP, or line cards:

a. Navigate to the node where the first TXP, MXP, or line card is installed.

b. Display the TXP, MXP, or line card in card view.

c. Complete the DLP-G136 Clear Selected PM Counts.

d. Click the **Performance > Optics PM** tabs.

e. Record the values shown in the RX Optical Pwr field.

f. Click the **Provisioning > Optics Thresholds** tabs.

g. Verify that the value in Step e falls between the values shown for the RX Power High and RX Power Low. If so, continue with Step 15. If not, complete one of the following.

- Power lower than range—Clean the trunk fiber at the patch panel and on the TXP or MXP card. Repeat Steps e through g. If the power is still too low, contact your next level of support.
- Power higher than range—Add attenuation to the fiber and repeat Steps e through g. If the power still does not fall within the range, contact your next level of support.

Step 15 Perform a short-term bit error rate (BER) test:

a. Complete the DLP-G136 Clear Selected PM Counts for the TXP, MXP, or line card.

b. Display the TXP, MXP, or line card in card view.

c. Click the **Performance > Payload PM** tabs, or, if OTN is provisioned, the **Performance > OTN PM** tabs.

d. Perform a short-term BER test using a test signal from a test set or protocol analyzer.

e. Monitor the payload performance monitoring (PM) for at least 10 minutes for errors.

Note To see an accurate PM count, the BER test results must be consistent with the transmitted bit rate for at least 10 minutes.

Note For information about using a test set or protocol analyzer, see the test set or protocol analyzer user guide.

Step 16 Create a new OCHNC or OCHCC circuit for the next ITU wavelength listed in the Cisco Transport Planner Traffic Matrix and perform one of the following tasks:

- If the new circuit optical path is not including nodes different from those the first circuits belongs to, perform only steps from Step 13 to Step 15.
- If the new circuit optical path includes new nodes, do the proper optical checks:
  - Step 10 and Step 11 if the new node is the Source node
  - Step 12 if the new nodes are intermediate nodes
  - Step 13 if the new node is the destination node

Stop. You have completed this procedure.

NTP-G56 Verify the OSNR

Purpose	This procedure verifies the optical signal-to-noise ratio (OSNR). The OSNR is the ratio between the signal power level and the noise power level.
Tools/Equipment	Optical spectrum analyzer
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at an ONS 15454 on the network.

Step 2 Using an optical spectrum analyzer, check the received OSNR for each transmitted channel on both ends of the span. Identify the last OSC-CSM, OPT-PRE, or OPT-BST MON port that the channel passes through before it is dropped.

Note The OPT-PRE reference also applies to the OPT-AMP-17-C card operating in OPT-PRE mode and the OPT-BST reference also applies to the OPT-AMP-17-C card operating in OPT-LINE mode.

Step 3 If OPT-PRE cards are installed with an OPT-BST, OPT-BST-E, or OSC-CSM card, use the OPT-PRE MON port.

Note For OSNR values for each card class, see Chapter 4, “Optical Amplifier Cards.”

Step 4 If the OSNR is too low, check the following, depending on your node configuration:

Note The purpose of this step is not to improve the signal-to-noise ratio (SNR), but to match the per-channel power level within the RX port power range.

- Check the fiber connections between the OPT-BST, OPT-BST-E, or OSC-CSM card and the OPT-PRE amplifier. If needed, clean the connectors. See the NTP-G115 Clean Fiber Connectors procedure.
- On the near-end OPT-BST amplifier, check the equalization of the added channels at the monitor output.
- On the OPT-PRE amplifier, check the output power on both COM TX and DC TX ports.
- On the far-end OPT-PRE amplifier, check the amplifier gain tilt at the monitor output.

If the OSNR is still too low, contact your next level of support.

Step 5 Repeat Steps 2 and 4 for all traffic in the network.

Stop. You have completed this procedure.

NTP-G142 Perform a Protection Switch Test

Purpose	This procedure tests the optical path, client TXP, MXP, GE_XP and GE_XPE (when provisioned in 10GE or 20GE MXP mode), 10GE_XP and 10GE_XPE (when provisioned in 10GE TXP mode), and OTU2_XP (when provisioned in TXP mode) cards and the Y-cable protection groups in your network for proper operation. The test signals can be generated by either the actual client device or a test set (whichever is available). We recommend that you repeat this test at each node in the network where protection group traffic is dropped.
Tools/Equipment	A list of protection groups. This information is provided in the Cisco Transport Planner Traffic Matrix. A test set or actual client device that provides the required payload for the circuits that are provisioned.
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite; personnel are required to be on site at each end of the circuit under test.
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at an ONS 15454 on the network.

Step 2 Identify the Y-cable circuit to be tested by viewing the Traffic Matrix for your site. Locate the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards in the ONS 15454 node that will be used for the protection group.

Step 3 Verify that the Y-cable protection group is provisioned:

- **a.** In node view (single-node mode) or multishelf view (multishelf mode), click the **Provisioning > Protection** tabs.
- **b.** In the Protect and Working areas, confirm that the correct TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards are in the Y-cable protection group by viewing the slot number and card type.
- **c.** If the required protection group is not provisioned, stop and perform the "NTP-G33 Create a Y-Cable Protection Group" procedure on page 11-182. Otherwise, continue with Step 4.

Step 4 Repeat Step 3 for each Y-cable protection group at the node. When all protection groups are verified, continue with the next step.

Step 5 Physically connect the transmitter of the client or test set to either Port 10 or Port 12 of the Y-cable module protecting the test circuit. (See Table 14-7 on page 14-106 and Table 14-8 on page 14-106.)

Step 6 If you connected the transmitter to Port 10, connect the client or test set receiver to Port 5 on the Y-cable module. If not, connect the client or test set receiver to Port 11 on the Y-cable module.

Step 7 At the far-end site for the test circuit, physically loop the Y-cable module as follows:

- **a.** If this is the first client on the Y-cable module, loop Port 10 to Port 5 on the far-end Y-cable module.
- **b.** If this is the second client on the Y-cable module, loop Ports 11 and 12 on the far-end Y-cable module.

Step 8 At the near-end site for the test circuit, place the client device or test set into service and begin transmitting the required payload.

Step 9 In CTC, display the near-end site in node view (single-node mode) or multishelf view (multishelf mode).

Step 10 Click the **Maintenance > Protection** tabs.

Step 11 In the Protection Groups area, highlight the protection group to be tested.

Step 12 In the Selected Group area, identify the active slot and the standby slot.

Step 13 Verify that the LED s on the physical cards in the shelf match the following:

a. For the active TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card, record the slot number: _____. Verify that the port LEDs appear as follows:

- DWDM port is green.
- Client port is green.

b. For the standby TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card, record the slot number: _____. Verify that the port LEDs appear as follows:

- DWDM port is green.
- Client port is not illuminated or amber, depending on the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card.

Step 14 In the Selected Group area, highlight the active TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP slot.

Step 15 From the Switch Commands area below the Selected Group area, click **Manual**, then click **YES**.

Step 16 From the Selected Group area, record the following information and verify that the active and standby TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP slot numbers are the opposite of Step 13.

a. For the active TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card, record the slot number: _____. Verify that the port LEDs appear as follows:

- DWDM port is green.
- Client port is green.

b. For the standby TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card, record the slot number: _____. Verify that the port LEDs appear as follows:

- DWDM port is green.
- Client port is not illuminated or amber, depending on the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card.

Step 17 Verify that the LEDs on the physical cards in the shelf match the following:

a. For the active TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP slot LEDs:

- DWDM port is green.
- Client port is green.

b. For the standby TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP slot LEDs:

- DWDM port is green.
- Client port is not illuminated.

Step 18 Confirm that the client or test set at the local site is operating normally without alarms. If the test set is reporting active alarms, contact your next level of support.

Note It is normal to see a traffic hit on the test set during a protection switch.

Step 19 From the Switch Commands area below the Selected Group area, click **Clear**, then click **YES** to return the protection group to the original state.

Step 20 Repeat Steps 5 through 19 for each protection group at your site.

Stop. **You have completed this procedure**.

NTP-G164 Configure Link Management Protocol

Purpose	This procedure configures Link Management Protocol (LMP). LMP manages the channels and links that are required between nodes for routing, signaling, and link management.
Tools/Equipment	None
Prerequisite Procedures	NTP-G51 Verify DWDM Node Turn Up, page 16-2
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure is normally required only when the Cisco ONS 15454 must run traffic to and from a Calient PXC, a Cisco CRS-1 router, or a Cisco ASR 9000 router.

Note Cisco ONS Software Release 9.4 supports Cisco CRS-1 routers using Cisco IOS XR Software Release 3.9.0 and Cisco ASR 9000 routers using Cisco IOS XR Software Release 4.1.0. If you have an earlier version of the Cisco IOS XR software, you cannot configure LMP on the Cisco CRS-1 or Cisco ASR 9000 router, and the router will be visible as an unknown node in the CTC network view.

Step 1 Complete the DLP-G46 Log into CTC task to log in to the ONS 15454 on the network.

Step 2 To enable LMP, complete the "DLP-G372 Enable LMP" task on page 16-37.

Step 3 To set up one or more control channels, complete the "DLP-G373 Create, Edit, and Delete LMP Control Channels" task on page 16-37.

Step 4 To set up one or more traffic engineering (TE) links, complete the "DLP-G374 Create, Edit, and Delete LMP TE Links" task on page 16-40.

Step 5 To set up one or more data links, complete the "DLP-G378 Create, Edit, and Delete LMP Data Links" task on page 16-41.

Stop. You have completed this procedure.

DLP-G372 Enable LMP

Purpose	This task enables the LMP function on the ONS 15454 node.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning > Comm Channels > LMP > General** tabs.

Step 2 In the Configuration area, click the **Enable LMP** check box to enable the LMP function.

Step 3 In the Local Node Id text entry box, enter the local node ID in the form of an IP address.

Note Do not set the LMP Local Node ID to another IP address in use on the network. This introduces a duplicate IP address in the network for traffic going to the IP address that is used as the LMP Local Node ID. We recommended to you set the LMP Local Node ID to the node's IP address, because this does not introduce a duplicate IP address in the network.

Step 4 If you are going to use LMP to manage a control channel between a Calient PXC node and a Cisco ONS 15454 DWDM node or between a Cisco CRS-1 or Cisco ASR 9000 router and Cisco ONS 15454 DWDM node, ensure that the LMP-WDM check box is unchecked.

Step 5 If you are going to use LMP to manage a control channel between the ONS 15454 nodes, check the LMP-WDM check box and use the Role field to choose one of the following roles:

- PEER, to use LMP to manage links between two nodes where the other node is configured as OLS.
- OLS, to use LMP to manage links between two nodes where the other node is configured as PEER.

The role selection is available only when LMP-WDM is enabled on the local node. Both the local and remote nodes must be configured with LMP-WDM enabled.

Step 6 Click **Apply**.

Step 7 In the Status area, verify that the Operational State is Up. This indicates that LMP is enabled and the link is active.

Step 8 Return to your originating procedure (NTP).

DLP-G373 Create, Edit, and Delete LMP Control Channels

Purpose	This task creates, edits, or deletes one or more LMP control channels between pairs of Cisco ONS 15454 nodes, between a Calient PXC and a Cisco ONS 15454, or between a Cisco CRS-1 or Cisco ASR 9000 router and a Cisco ONS 15454 node.
Tools/Equipment	None
Prerequisite Procedures	DLP-G372 Enable LMP, page 16-37

Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning > Comm Channels > LMP > Control Channels** tabs.

Step 2 To create a control channel, click **Create**. The Create LMP Control Channel dialog box appears.

Note The values of the Admin State, Requested Hello Interval, Min Hello Interval, Max Hello Interval, Requested Hello Dead Interval, Min Hello Dead Interval, and Max Hello Dead Interval fields correspond to the values specified for these fields in the NODE > lmp section of the node view Provisioning > Defaults tabs. If you change the NODE > lmp values, those values are reflected as defaults in the Create LMP Control Channel dialog box. You can change the default values using the dialog box. However, the NODE > lmp values are always used as the initial defaults.

Step 3 In the Create LMP Control Channel dialog box, complete the following:

- Admin State—Select **unlocked** (if you are using an ETSI shelf) or **IS** (if you are using an ANSI shelf) to establish the control channel; otherwise, select **locked, disabled** (ETSI) or **OOS-DSBLD** (ANSI) to set the control channel to out of service.
- Local Port—Select **Routed** if the control channel is to be sent over the control plane or management network; otherwise, if the control channel is to be sent over the same fiber as the traffic (either in the payload or in the overhead), select one of the available traffic ports.
- Local Port Id—(Display only) Displays the local port identifier assigned by the node.
- Remote Node Type—Select **15454 or non-CRS1** if you are creating a control channel between two Cisco ONS 15454 nodes or between a Calient PXC and a Cisco ONS 15454 node; select **CRS-1** if you are creating a control channel between a Cisco CRS-1 router and a Cisco ONS 15454 node; otherwise, select **ASR9K** if you are creating a control channel between a Cisco ASR 9000 router and a Cisco ONS 15454 node.
- Remote Node Address—In dotted-decimal format, enter the number that identifies the IP address of the remote node (either a Calient PXC peer node, a Cisco CRS-1 router, Cisco ASR 9000 router, or a Cisco ONS 15454 node) where the control channel will be established.
- Remote Node ID—Initially, CTC autopopulates this value to the remote node IP address that you just assigned. However, you can change the identifier to any nonzero 32-bit integer in dotted decimal format (for example, 10.92.29.10).
- Requested Hello Interval—Enter the Requested Hello Interval in milliseconds (ms). Before sending Hello messages, the Hello Interval and Hello Dead Interval parameters must be established by the local and remote nodes. These parameters are exchanged in the Config message. The Hello Interval indicates how frequently LMP Hello messages will be sent; the interval must be in the 300 ms to 5000 ms range. The Min Hello Interval must be less than or equal to the Requested Hello Interval, and the Requested Hello Interval must be less than or equal to the Max Hello Interval.
- Min Hello Interval—Enter the minimum Hello Interval in milliseconds. When the two nodes negotiate for the Hello Interval, the value that you enter here will be the minimum Hello Interval acceptable for the local node. The Min Hello Interval must be in the 300 ms to 5000 ms range. The Min Hello Interval must be less than or equal to the Requested Hello Interval and the Requested Hello Interval must be less than or equal to the Max Hello Interval.

- Max Hello Interval—Enter the maximum Hello Interval in milliseconds. When the two nodes negotiate for the Hello Interval, the value that you enter here will be the maximum Hello Interval acceptable for the local node. The Max Hello Interval must be in the 300 ms to 5000 ms range. The Min Hello Interval must be less than or equal to the Requested Hello Interval and the Requested Hello Interval must be less than or equal to the Max Hello Interval.
- Requested Hello Dead Interval—Enter the Requested Hello Dead Interval in milliseconds. The Requested Hello Dead Interval indicates how long a device should wait to receive a Hello message before declaring a control channel dead. The Requested Hello Dead interval must be in the 2000 ms to 20000 ms range. The Min Hello Dead Interval must be less than or equal to the Requested Hello Dead Interval and the Requested Hello Dead Interval must be less than or equal to the Max Hello Dead Interval.

Note The Requested Hello Dead Interval must be at least three times greater than the Requested Hello Interval.

- Min Hello Dead Interval—Enter the minimum Hello Dead Interval in milliseconds. The minimum Hello Dead Interval must be in the 2000 ms to 20000 ms range. The minimum Hello Dead Interval must be less than or equal to the Requested Hello Dead Interval and the Requested Hello Dead Interval must be less than or equal to the Max Hello Dead Interval. When the two nodes negotiate for the Hello Dead Interval, the value that you enter here will be the minimum Hello Dead Interval acceptable for the local node.

Note The value of the Min Hello Dead Interval must be greater than the Min Hello Interval.

- Max Hello Dead Interval—Enter the maximum Hello Dead Interval in milliseconds. This interval must be in the 2000 ms to 20000 ms range. The Min Hello Dead Interval must be less than or equal to the Requested Hello Dead Interval and the Requested Hello Dead Interval must be less than or equal to the Max Hello Dead Interval. When the two nodes negotiate for the Hello Dead Interval, the value that you enter here will be the maximum Hello Dead Interval acceptable for the local node.

Note The Max Hello Dead Interval must be greater than the Max Hello Interval.

Step 4 Click **OK** to accept the parameters that you have entered, or click **Cancel** to return to the Control Channels tab without creating a control channel.

Step 5 If you have chosen the Remote Node Type as CRS-1 or ASR9K in Step 3 and if you have chosen that automatic LMP configuration in the "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 16-46, a confirmation dialog box is displayed to indicate that this operation will also change the configuration of the Cisco CRS-1 or Cisco ASR 9000 router. Click **Yes**.

Step 6 If you created a control channel, verify that the parameters for the new Control Channel appear properly in the Control Channels tab.

Note The Actual Hello Interval and Actual Hello Dead Interval parameters reflect the values of these parameters as a result of the negotiated agreement of the local and remote nodes. They may be different than the requested values.

Step 7 After the LMP control channel has been created, observe the status of the channel in the Operational State column of the Control Channels tab, and take the appropriate action as shown in the following list:

- Up—The control channel contacted the far-end node and successfully negotiated a control channel.
- Down—LMP is enabled and the link is inactive. Ensure that the Admin State of the control channel is unlocked (ETSI) or IS (ANSI) and not disabled (ETSI) or OOS-DSBLD (ANSI). If the state still does not transition to Up, the far-end control channel might have disjointed Hello negotiation times that prevent a control channel from transitioning to the Up state. For example, the local ONS 15454 Min Hello Interval and Max Hello Interval might be 900 to 1000, while the remote Min Hello Interval and Max Hello Interval is 1100 to 1200.
- Config Send—The connection could not be made to the remote node. Check to make sure that the remote node address and remote node ID addresses are correct.
- Config Received—The local node sent a configuration request to the remote node and received a response of either ConfigNack or ConfigAck.
- Unknown

Step 8 To delete a control channel, click the channel row to highlight it and click **Delete**. A confirmation dialog box appears that allows you to click **OK** or **Cancel**.

Step 9 To edit a control channel, click the channel row to highlight it and click **Edit**. A dialog box appears that allows you to change the control channel parameters. You can then click **OK** or **Cancel**. If you are editing a control channel that involves a Cisco CRS-1 or Cisco ASR 9000 router, a confirmation dialog box is displayed. Click **Yes**.

Step 10 Return to your originating procedure (NTP).

DLP-G374 Create, Edit, and Delete LMP TE Links

Purpose	This task creates, edits, or deletes TE links and their association to neighboring LMP nodes.
Tools/Equipment	None
Prerequisite Procedures	DLP-G372 Enable LMP, page 16-37
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning > Comm Channels > LMP > TE Links** tabs.

Step 2 To create a TE link, click **Create**. The Create LMP TE Link dialog box appears.

Step 3 In the Create LMP TE Link dialog box, complete the following:

- Admin State—Select **unlocked** (for ETSI shelves) or **IS** (for ANSI shelves) to put the TE link in service; otherwise, select **locked, disabled** (ETSI) or **OOS-DSBLD** (ANSI) to set the TE link to out of service.
- Remote Node Id—Select a remote node (either a Calient PXC peer node, a Cisco CRS-1 router, a Cisco ASR 9000 router, or a Cisco ONS 15454 node) for the other end of the TE link.

- Remote TE Link Id—Enter an unsigned 32-bit value (such as 0x00000001) to identify the remote node identifier for the other end of the TE link. This option is not available if you have chosen the automatic LMP configuration in "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 16-46.
- MUX Capability—Select the MUX capability. This option is not available if you are creating a TE link that involves a Cisco CRS-1 or Cisco ASR 9000 router.

Step 4 Click **OK** to accept the parameters that you have entered and create the TE link, or click **Cancel** to return to the Control Channels tab without creating a TE link.

Step 5 If you created a TE link, verify that the parameters for the new TE link now appear properly in the TE Links tab.

Step 6 After the TE link has been created, observe the status of the TE link in the Operational State column of the TE Links pane, and take the appropriate action as shown in the following list:

- Up—The TE link is active.
- Down—Ensure that the Admin State of the TE link is unlocked (ETSI) or IS (ANSI) and not disabled (ETSI) or OOS-DSBLD (ANSI). The TE link does not transition to the Up state until a data link has been provisioned.
- Init—Verify that the Remote Node ID and Remote TE Link ID values are correct for the remote node. Verify that the remote node is using the Cisco ONS 15454 or the Cisco CRS-1 or Cisco ASR 9000 router IP address for its remote node IP and that the remote node is using the local TE link index for its remote TE link index.

Step 7 To delete a TE link, click the link row to highlight it and click **Delete**. A confirmation dialog box appears that allows you to click **OK** or **Cancel**.

Step 8 To edit a TE link, click the link row to highlight it and click **Edit**. A dialog box appears that allows you to change the TE link parameters. You can then click **OK** or **Cancel**.

Step 9 Return to your originating procedure (NTP).

DLP-G378 Create, Edit, and Delete LMP Data Links

Purpose	This task creates, edits, or deletes one or more data links, which define the node's transport parameters. CTC supports up to 256 LMP data links.
Tools/Equipment	None
Prerequisite Procedures	NTP-G54 Provision and Verify a DWDM Network, page 16-28 DLP-G372 Enable LMP, page 16-37
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note A port cannot be deleted if it is being used by a data link. A card cannot be deleted if any of its ports are being used by data links. Changing the state of the port impacts the state of a data link using the port.

Step 1 In node view, click the **Provisioning > Comm Channels > LMP > Data Links** tabs.

Step 2 To create a data link, click **Create**. The Create LMP Data Link dialog box appears.

Step 3 In the Create LMP Data Link dialog box, complete the following:

- Local Port—Select one of the available local ports for the data link.
- Local Port Id—(Display only) Displays the local port identifier.
- Data Link Type—Select **Port** or **Component**. A data link is considered to be either a port or a component link on each node where it terminates, depending on the multiplexing capability of the endpoint on that link; component links are multiplex capable, whereas ports are not multiplex capable.
- Local TE Link Id—Select an identifier for one of the local TE links that has already been created.
- Remote CRS Port Id—Select one of the available remote Cisco CRS-1 or Cisco ASR 9000 ports for the data link. This option is not available if you are creating a data link between two Cisco ONS 15454 nodes.
- Remote Port Id—Enter an unsigned 32-bit value (such as 0x00000001) to identify the remote node identifier for the other end of the data link. This option is not available if you have chosen the automatic LMP configuration in the "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 16-46.

Step 4 Click **OK** to accept the parameters you have entered and create the data link, or click **Cancel** to return to the Data Links tab without creating a data link.

Step 5 If you are creating a data link that involves a Cisco CRS-1 or Cisco ASR 9000 router and if you have chosen the automatic LMP configuration in the "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 16-46, a confirmation dialog box is displayed to indicate that this operation will also change the configuration of the Cisco CRS-1 or Cisco ASR 9000 router. Click **Yes**.

Step 6 If you created a data link, verify that the parameters for the new data link now appear properly in the Data Links tab.

Step 7 After the data link has been created, observe its status in the Operational State column of the Data Links tab, and take the appropriate action as shown in the following list:

- Up–Alloc or Up–Free—If the data link state does not transition to Up–Alloc or Up–Free, verify that the port is in service. Verification must be done using the CTC card view > Provisioning tab for the cards. (The difference between Up–Alloc and Up–Free is that an Up–Alloc data link is allocated for data traffic. An Up–Free data link is not allocated for traffic. The far end is either not ready to receive traffic through this port, or the path is being used as a backup in case some other allocated data link goes down).
- Down—The data link will be in the Down state if the port is not unlocked or not in-service. Verify that the remote port ID for the far-end data link is correct. On the far end, verify that the data link is using the local port ID as its remote port ID.

Step 8 To delete a data link, click the data link row to highlight it and click **Delete**. A confirmation dialog box appears that allows you to click **OK** or **Cancel**.

Step 9 To edit a data link, click the data link row to highlight it and click **Edit**. A dialog box appears that allows you to change the data link parameters. You can then click **OK** or **Cancel**. If you are editing a data link that involves a Cisco CRS-1 or Cisco ASR 9000 router, a confirmation dialog box is displayed. Click **Yes**.

Step 10 Return to your originating procedure (NTP).

NTP-G233 Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node

Purpose	This procedure configures LMP on the Cisco ONS 15454 DWDM node and on the corresponding Cisco CRS-1 or Cisco ASR 9000 physical layer interface module (PLIM) port.
Tools/Equipment	None
Prerequisite Procedures	NTP-G51 Verify DWDM Node Turn Up, page 16-2
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure is normally required only when the Cisco ONS 15454 DWDM node must run traffic to and from a Cisco CRS-1 or Cisco ASR 9000 router.

Step 1 Complete the DLP-G46 Log into CTC task to log in to a DWDM node on the network.

Step 2 Complete the "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 16-46 to configure the Cisco CRS-1 or Cisco ASR 9000 router parameters.

Step 3 Complete the "DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration" task on page 16-47 to establish a Telnet session with the Cisco CRS-1 or Cisco ASR 9000 router.

Step 4 Complete the "DLP-G510 Create a Task Group, User Group, and User Account on the Cisco CRS-1 or Cisco ASR 9000 Series Router" task on page 16-48 to create task groups, user groups, and user accounts on the Cisco CRS-1 or Cisco ASR 9000 router.

Step 5 If you have chosen the automatic LMP configuration in Step 2, complete the "NTP-G234 Automatically Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node" procedure on page 16-44.

If you have chosen the manual LMP configuration in Step 2, complete the "NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node" procedure on page 16-44.

Stop. You have completed this procedure.

NTP-G234 Automatically Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node

Purpose	This procedure automatically configures LMP on the Cisco ONS 15454 DWDM node and on the corresponding Cisco CRS-1 or Cisco ASR 9000 PLIM port.
Tools/Equipment	None
Prerequisite Procedures	NTP-G233 Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 16-43
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G372 Enable LMP, page 16-37 to enable the LMP function on the DWDM node.

Step 2 Complete the DLP-G373 Create, Edit, and Delete LMP Control Channels, page 16-37 to create the LMP control channel between the Cisco CRS-1 or Cisco ASR 9000 router and the DWDM node.

Step 3 Complete the DLP-G374 Create, Edit, and Delete LMP TE Links, page 16-40 to create TE links between the Cisco CRS-1 or Cisco ASR 9000 router and the DWDM node.

Step 4 Complete the DLP-G378 Create, Edit, and Delete LMP Data Links, page 16-41 to create a data link, which define the node's transport parameters.

Stop. You have completed this procedure.

NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node

Purpose	This procedure manually configures LMP on the Cisco ONS 15454 DWDM node and on the corresponding Cisco CRS-1 or Cisco ASR 9000 PLIM port.
Tools/Equipment	None
Prerequisite Procedures	NTP-G233 Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 16-43
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note For more information about the Cisco IOS XR commands used in the DLPs, see the *Cisco IOS XR Command Reference* publication at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

Step 1 Complete the DLP-G372 Enable LMP, page 16-37 to enable the LMP function on the DWDM node.

Step 2 Complete the DLP-G373 Create, Edit, and Delete LMP Control Channels, page 16-37 to create the LMP control channel between the Cisco CRS-1 or Cisco ASR 9000 router and the DWDM node.

Step 3 Complete the DLP-G374 Create, Edit, and Delete LMP TE Links, page 16-40 to create TE links between the Cisco CRS-1 or Cisco ASR 9000 router and the DWDM node.

Step 4 In node view, click the **Provisioning > Comm Channels > LMP > TE Links** tab and write down the value of the **Local TE Link** field so that it can be used later.

Step 5 Complete the DLP-G378 Create, Edit, and Delete LMP Data Links, page 16-41 to create a data link, which define the node's transport parameters.

Step 6 In node view, click the **Provisioning > Comm Channels > LMP > Data Links** tab and write down the value of the **Local Port Id** field so that it can be used later.

Step 7 Complete the DLP-G482 Configure a Static Route, page 16-50 to configure a static route.

Step 8 Complete the DLP-G483 Configure Local and Remote TE Links, page 16-52 to configure the local and remote TE links.

Step 9 Complete the DLP-G484 Enable the LMP Message Exchange, page 16-53 to enable LMP message exchange with the LMP neighbor.

Step 10 In node view, click the **Provisioning > Comm Channels > LMP > Data Links** tab and from the **Local Port** field**,** write down the card and the port involved in the LMP link. Double-click the card involved in the LMP link. In card view, click the **Provisioning > Optical Chn > Parameters** tabs and write down the value of the **Actual Wavelength** field for the port involved in the LMP link.

Step 11 Complete the DLP-G511 Configure the Wavelength on the Cisco CRS-1 or Cisco ASR 9000 Router, page 16-55 to configure the wavelength on the PLIM port of the Cisco CRS-1 or Cisco ASR 9000 router.

Step 12 If you need RADIUS AAA services, complete the DLP-G494 Configure the RADIUS Server, page 16-57 to configure a RADIUS server.

Step 13 Complete the DLP-G485 Enable Index Persistency on an SNMP Interface, page 16-58 to enable index persistency on an SNMP interface.

Step 14 Complete the DLP-G486 Configure the LMP Router ID, page 16-59 to configure LMP router ID.

Step 15 Complete the DLP-G487 Configure the 10 Gigabit Ethernet (GE) or POS Interface, page 16-60 to configure an interface and specify the IPv4 address for the interface.

Note Only users with proper task privileges, or a system administrator, can perform DLP-G482, DLP-G483, DLP-G484, DLP-G494, DLP-G485, and DLP-G486. The task privileges required to perform these DLPs are similar to the privileges required for automatic LMP configuration.

Step 16 Complete the DLP-G488 Display Summary of Link Management Information, page 16-61 to display the interface resource or a summary of link management information.

Step 17 Complete the DLP-G374 Create, Edit, and Delete LMP TE Links, page 16-40 to edit the TE link created in Step 3. Change the Remote TE Link ID value to the value (Local TE Link ID) noted in Step 1 of the DLP-G488 Display Summary of Link Management Information, page 16-61.

Step 18 Complete the DLP-G378 Create, Edit, and Delete LMP Data Links, page 16-41 to edit the data link created in Step 5. Change the Remote Port Id value to the value (Local Data Link ID) noted in Step 1 of the DLP-G488 Display Summary of Link Management Information, page 16-61.

Stop. You have completed this procedure.

DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters

Purpose	This task configures the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router.
Tools/Equipment	None
Prerequisite Procedures	• NTP-G54 Provision and Verify a DWDM Network, page 16-28. • (Cisco CRS-1 and Cisco ASR 9000 series routers only) DLP-G372 Enable LMP, page 16-37. • DLP-G46 Log into CTC.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the Edit menu, choose **Preferences**. The Preferences dialog box is displayed.

Step 2 In the Preferences dialog box, click the **Router** tab.

Step 3 (Cisco CRS-1 and Cisco ASR 9000 series routers only) Leave the Skip automatic LMP configuration on routers check box unchecked if you want CTC to automatically configure an interface on the Cisco CRS-1 or Cisco ASR 9000 series router for the data link. Check this check box if you want to manually configure an interface on the Cisco CRS-1 or Cisco ASR 9000 series router.

Step 4 In the Router login area, enter the following:

- Username—Specify the name of the user on the Cisco CRS-1, Cisco ASR 9000, or Cisco 7600 router.
- Password—Specify the user password.
- Confirm Password—Specify the password again to confirm it.

Note If you leave the Username and Password fields blank, the CTC login information (username and password) will be used for the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router.

Step 5 Click **OK**.

Step 6 Return to your originating procedure (NTP).

DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration

Purpose	This task establishes a Telnet session with the Cisco CRS-1 or Cisco ASR 9000 router and verifies the node configuration, SSH, and/or XML module configuration.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

	Command or Action	Purpose
Step 1	**telnet** {*ip-address* | *host-name*} **Example:** `router# telnet 10.58.41.169`	Establishes a Telnet session with the Cisco CRS-1 or Cisco ASR 9000 router. When the session is established, you can log in with the root-system username and password. After you log in, the router displays the CLI prompt for the Cisco IOS XR software.

Step 2	**show install active summary**
	
	Example:
	`router# show install active summary`
		Displays a summary of the active packages in a system or secure domain router. Ensure that the output of the **show install active summary** command includes the following lines:
		`hfr-mpls-3.9.x`
		`hfr-k9sec-3.9.x`
		`hfr-mgbl-3.9.x`

Step 3	**show running-config**
	
	Example:
	`router# show running-config`
		Displays the contents of the currently running configuration and verifies that Extensible Markup Language (XML) agent service and Secure Shell (SSH) client are installed on the Cisco CRS-1 or Cisco ASR 9000 router. Ensure that the output of the **show running-config** command includes the following lines:
		`ssh server v2`
		`ssh server session-limit` *sessions*
		`ssh server rate-limit` *maxsessions_per_minute*
		`vty-pool default` *first-vty last-vty* `line-template default`
		`xml agent tty`
		
		If the output does not contain the above lines, check the SSH and/or XML module configuration. Refer to *Cisco IOS XR System Security Command Reference* and *Cisco IOS XR System Management Command Reference* for details about SSH and XML configuration.

Step 4	Return to your originating procedure (NTP).	—

DLP-G510 Create a Task Group, User Group, and User Account on the Cisco CRS-1 or Cisco ASR 9000 Series Router

Purpose	This task creates task groups, user groups, and user accounts on the Cisco CRS-1 or Cisco ASR 9000 series router.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users who have permission to create new task groups and configure required task privileges, or a system administrator, can perform this task.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**taskgroup** *taskgroup-name* **Example:** `router# taskgroup ipodwdmop`	Creates a new task group and enters task group configuration submode. If you have chosen the automatic LMP configuration in the DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters, page 16-46, perform Step 3. If you have chosen the manual LMP configuration in the DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters, page 16-46, perform Step 4.

	Command or Action	Purpose

Step 3	**task {read | write | execute | debug}** *taskid-name*
	
	Example:
	`router(config-tg)# task read cef`
		Specifies a task ID to be associated with the task group named in Step 2. Task IDs grant permission to perform certain tasks.
		
		Ensure that you specify the following task IDs to set up required privileges for the automatic LMP configuration:
		
		`task read cef`
		`task read dwdm`
		`task read ouni`
		`task read snmp`
		`task read static`
		`task read sysmgr`
		`task read logging`
		`task read mpls-te`
		`task read network`
		`task read interface`
		`task read basic-services`
		`task write dwdm`
		`task write ipv4`
		`task write ouni`
		`task write snmp`
		`task write static`
		`task write mpls-te`
		`task write network`
		`task write interface`

Step 4	**task {read | write | execute | debug}** *taskid-name*
	
	Example:
	`router(config-tg)# task read cef`
		Specifies a task ID to be associated with the task group named in Step 2. Task IDs grant permission to perform certain tasks.
		
		Ensure that you specify the following task IDs to set up required privileges for the manual LMP configuration:
		
		`task read cef`
		`task read dwdm`
		`task read ouni`
		`task read snmp`
		`task read static`
		`task read sysmgr`
		`task read logging`
		`task read mpls-te`
		`task read network`
		`task read interface`
		`task read basic-services`
		`task write interface`

Step 5	**end** **Example:** `router(config-tg)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 7	**usergroup** *usergroup-name* **Example:** `router# usergroup ipodwdmop`	Creates a new user group and enters user group configuration submode.

	Command or Action	Purpose
Step 8	**taskgroup** *taskgroup-name* **Example:** `router(config-ug)# taskgroup ipodwdmop`	Associates the user group named in Step 7 with the task group named in this step. The user group takes on the configuration attributes (task ID list and permissions) already defined for the entered task group.
Step 9	**end** **Example:** `router(config-ug)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 10	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 11	**username** *user-name* **Example:** `router# username user123`	Creates a name for a new user (or identifies a current user) and enters username configuration submode. The *user-name* argument can be only one word. Spaces and quotation marks are not allowed. **Note** The user that you specify for this command must be the user you have specified in the DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters, page 16-46.
Step 12	**password {0 | 7}** *password* **Example:** `router(config-un)# password 0 passwd`	Specifies a password for the user named in Step 11. Entering 0 following the **password** command specifies that an unencrypted (clear-text) password follows. Entering 7 following the **password** command specifies that an encrypted password follows.
Step 13	**group** *group-name* **Example:** `router(config-un)# group ipodwdmop`	Assigns the user named in Step 11 to a user group that has already been defined through the **usergroup** command in Step 7. • The user takes on all attributes of the user group, as defined by that user group's association to various task groups. • Each user must be assigned to at least one user group. A user may belong to multiple user groups.
Step 14	**end** **Example:** `router(config-ug)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 15	Return to your originating procedure (NTP).	—

DLP-G482 Configure a Static Route

Purpose	This task explains how to configure a static route.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 16-47
Required/As Needed	As needed

Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the DWDM node is 10.58.41.22 and the IP address of the Cisco CRS-1 or Cisco ASR 9000 router is 10.58.41.169. To remove the static route configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**router static** **Example:** `router(config)# router static`	Enters static router configuration mode.
Step 3	**address-family ipv4 unicast** **Example:** `router(config-static)# address-family ipv4 unicast`	Enters address family configuration mode while configuring static routes.
Step 4	*destination-prefix prefix-mask* {*ip-address* | *interface-type interface-instance*} **Example:** `router(config-static-afi)# 10.58.41.22/32 MgmtEth 0/RP0/CPU0/0`	Establishes static routes in address family configuration mode. Specify the following options for this command: • *destination-prefix*—IP route prefix for the destination (that is, DWDM node involved in the LMP link). • *prefix-mask*—Prefix mask for the destination. The network mask can be specified as either a four-part, dotted-decimal address or can be indicated as a slash (/) and number. • *ip-address*—(Optional) IP address of the next hop that can be used to reach that network. The IP address is required, not optional, if the interface type and number are not specified. You can specify an IP address and an interface type and interface number. • *interface-type*—(Optional) Interface type. • *interface-instance*—(Optional) Either a physical interface instance or a virtual interface instance. **Note** The interface that you specify for this command must be the management interface that connects the CRS-1 or ASR 9000 router to the DWDM node.

	Command or Action	Purpose
Step 5	**end** **Example:** `router(config-static-afi)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	Return to your originating procedure (NTP).	—

DLP-G483 Configure Local and Remote TE Links

Purpose	This task explains how to configure the local and remote TE links.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 16-47
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the DWDM node is 10.58.41.22 and the IP address of the Cisco CRS-1 or Cisco ASR 9000 router is 10.58.41.169. To remove the local and remote TE link configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**mpls traffic-eng interface** *interface-type interface-instance* **Example:** `router(config)# mpls traffic-eng interface TenGigE 0/1/0/1`	Enables Multiprotocol Label Switching-Traffic Engineering (MPLS-TE) on an interface and enters MPLS-TE interface submode. **Note** The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
Step 3	**lmp data-link adjacency** **Example:** `router(config-mpls-te-if)# lmp data-link adjacency`	Enters the LMP neighbor adjacency configuration mode.

	Command or Action	Purpose
Step 4	**neighbor** *neighbor-name* **Example:** `router(config-mpls-ouni-if-adj)# neighbor 10.58.41.22`	Associates an interface with a given LMP neighbor.
Step 5	**remote te-link-id unnum** *identifier* **Example:** `router(config-mpls-te-if-adj)# remote te-link-id unnum 1`	Configures the LMP neighbor remote TE link ID. **Note** Specify the value (converted to decimal format) noted in Step 4 of NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 16-44 for the **te-link-id unnum** *identifier* keywords and argument.
Step 6	**remote interface-id unnum** *identifier* **Example:** `router(config-mpls-te-if-adj)# remote interface-id unnum 57410`	Configures the LMP neighbor remote interface identifier. **Note** Specify the value (converted to decimal format) noted in Step 6 of NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 16-44 for the **interface-id unnum** *identifier* keywords and argument.
Step 7	**remote switching-capability fsc** **Example:** router(config-mpls-te-if-adj)# remote `switching-capability fsc`	Configures the LMP neighbor remote TE interface switching capability.
Step 8	**end** **Example:** `router(config-mpls-te-if-adj)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 9	Return to your originating procedure (NTP).	—

DLP-G484 Enable the LMP Message Exchange

Purpose	This task explains how to enable the LMP message exchange with the LMP neighbor.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 16-47
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the DWDM node is 10.58.41.22 and the IP address of the Cisco CRS-1 or Cisco ASR 9000 router is 10.58.41.169. To remove the LMP message exchange configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**mpls traffic-eng signalling advertise explicit-null** **Example:** `router(config)# mpls traffic-eng signalling advertise explicit-null`	Specifies that tunnels terminating on a router use explicit-null labels.
Step 3	**mpls traffic-eng lmp neighbor** *neighbor-name* **Example:** `router(config)# mpls traffic-eng lmp neighbor 10.58.41.22`	Configures or updates a new or existing LMP neighbor.
Step 4	**ipcc routed** **Example:** `router(config-mpls-te-nbr-10.58.41.22)# ipcc routed`	Configures a routed Internet Protocol Control Channel (IPCC) for the LMP neighbor.
Step 5	**remote node-id** *ip-address* **Example:** `router(config-mpls-te-nbr-10.58.41.22)# remote node-id 10.58.41.22`	Configures the remote node ID for the LMP neighbor (DWDM node).
Step 6	**end** **Example:** `router(config-mpls-te-nbr-10.58.41.22)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 7	Return to your originating procedure (NTP).	—

DLP-G511 Configure the Wavelength on the Cisco CRS-1 or Cisco ASR 9000 Router

Purpose	This task explains how to configure the wavelength on the PLIM port of the Cisco CRS-1 or Cisco ASR 9000 router.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 16-47
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note To remove the wavelength setting, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

	Command or Action	Purpose

Step 1	**show controllers dwdm** *interface-instance* **wavelength-map**
	
	Example:
	`router# show controllers dwdm 0/1/0/0 wavelength-map`
		Displays the wavelength information of an interface.
		
		Note The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
		
		The output of the **show** command will include the following lines:
		
		`Wavelength band: C-band`
		`MSA ITU channel range supported: 3~84`
		
		`03 196.00 1529.553`
		`----------`
		`04 195.95 1529.944`
		`----------`
		`05 195.90 1530.334`
		`----------`
		`06 195.85 1530.725`
		`----------`
		
		From the output of the **show** command, write down the channel number of the wavelength that matches that of the wavelength noted in Step 10 of NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 16-44.

Step 2	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 3	**controller dwdm** *interface-instance* **Example:** `router(config)# controller dwdm 0/1/0/0`	Configures the DWDM controller. **Note** The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
Step 4	**wavelength** *channel-number* **Example:** `router(config)# wavelength 04`	Configures a specific wavelength to the DWDM controller. **Note** The channel number that you specify for this command must be the value noted down in Step 1.
Step 5	**end** **Example:** `router(config-mpls-te-nbr-10.58.41.22)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	Return to your originating procedure (NTP).	—

DLP-G494 Configure the RADIUS Server

Purpose	This task explains how to configure the RADIUS server.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 16-47 For details on configuring a node for RADIUS authentication, see the DLP-G281 Configure the Node for RADIUS Authentication task. See the *User Guide for Cisco Secure ACS for Windows Server* for more information about configuring the RADIUS server.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the RADIUS server is 10.58.39.57. To remove the RADIUS server configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* document.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**radius-server host** *ip-address* [**auth-port** *port-number*] [**acct-port** *port-number*] [**key** *string*] **Example:** `router(config)# radius-server host 10.58.39.57 auth-port 1812 acct-port 1813 key 7 12485043475F`	Specifies the RADIUS server host.
Step 3	**aaa group server radius** *group-name* **Example:** `router(config)# aaa group server radius radgroup1`	Groups different RADIUS server hosts into distinct lists and enters server group configuration mode.
Step 4	**server** *ip-address* [**auth-port** *port-number*] [**acct-port** *port-number*] **Example:** `router(config-sg-radius)# server 10.58.39.57 auth-port 1812 acct-port 1813`	Associates a particular RADIUS server with a defined server group.

	Command or Action	Purpose
Step 5	**end** **Example:** `router(config-sg-radius)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 7	**aaa authentication login** {{**console** | **default**} {**group** *group_name* | **local** | **none**}} **Example:** `router(config)# aaa authentication login default group radgroup1 local`	Configures the authentication method used for login to the Virtual Firewall (VFW) application CLI.
Step 8	**end** **Example:** `router(config-if)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 9	Return to your originating procedure (NTP).	—

DLP-G485 Enable Index Persistency on an SNMP Interface

Purpose	This task explains how to enable index persistency on a Simple Network Management Protocol (SNMP) interface.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 16-47
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note To remove the index persistency configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* document.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**snmp-server interface** *interface-type interface-instance* **Example:** `router(config)# snmp-server interface TenGigE 0/1/0/1`	Enables an interface to send SNMP trap notifications and enters SNMP interface configuration mode. **Note** The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
Step 3	**index persistence** **Example:** `router(config-snmp-if)# index persistence`	Enables index persistency on an SNMP interface. This command must be performed to ensure that the LMP IDs are persistent even after a system reload.
Step 4	**end** **Example:** `router(config-snmp-if)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 5	Return to your originating procedure (NTP).	—

DLP-G486 Configure the LMP Router ID

Purpose	This task explains how to configure the LMP router ID.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 16-47
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the DWDM node is 10.58.41.22 and the IP address of the Cisco CRS-1 or Cisco ASR 9000 router is 10.58.41.169. To remove the LMP router ID configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* document.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**mpls traffic-eng lmp router-id** *ip-address* **Example:** `router(config)# mpls traffic-eng lmp router-id 10.58.41.169`	Configures the LMP router ID.
Step 3	**end** **Example:** `router(config)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 4	Return to your originating procedure (NTP).	—

DLP-G487 Configure the 10 Gigabit Ethernet (GE) or POS Interface

Purpose	This task explains how to configure the 10 GE or POS interface.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 16-47
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note To remove the POS interface configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* document.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**interface** *interface-type interface-instance* **Example:** `router(config)# interface TenGigE 0/1/0/1`	Enters interface configuration mode. **Note** The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
Step 3	**ipv4 point-to-point** **Example:** `router(config-if)# ipv4 point-to-point`	Configures a 10 GE interface to act as a point-to-point interface. **Note** For a POS interface, skip this step and continue with Step 4.
Step 4	**ipv4 unnumbered** *interface-type interface-instance* **Example:** `router(config-if)# ipv4 unnumbered MgmtEth 0/RP0/CPU0/0`	Specifies the MPLS-TE tunnel IPv4 address for the interface. **Note** The interface that you specify for this command must be the management interface that connects the CRS-1 or ASR 9000 router to the DWDM node.
Step 5	**end** **Example:** `router(config-if)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	Return to your originating procedure (NTP).	—

DLP-G488 Display Summary of Link Management Information

Purpose	This task displays the interface resource or a summary of link management information.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 16-47
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

	Command or Action	Purpose
Step 1	**show mpls traffic-eng lmp interface** [*interface-type interface-instance*] **Example:** `router(config-if)# show mpls traffic-eng lmp interface TenGigE 0/1/0/1`	Displays the interface resource or a summary of link management information. From the output of the **show** command, write down the value of the Local TE Link ID and the Local Data Link ID parameters.
Step 2	Return to your originating procedure (NTP).	—

NTP-G337 Configure Provisioning Parameters for an Interface on the Cisco CRS-1 Router

Purpose	This procedure configures the provisioning parameters such as administrative state, wavelength, loopback, proactive protection, and OTN for an interface on the Cisco CRS-1 router.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View** to view the circuits for an entire network.

Step 2 Double-click the Cisco CRS-1 router node in the circuit.

Step 3 Choose an interface on the Cisco CRS-1 router.

Step 4 Choose **Provisioning > General** to provision the administrative state, wavelength, and loopback settings for an interface on the Cisco CRS-1 router according to the following table.

Item	Description
Admin State	Choose an administrative state from the drop-down list and click **Apply** to configure the transport administration state on a router interface. Admin states include: • IS—Places the interface in In Service (IS) state, to support all the normal operations. This is the default. • OOS,DSBLD—Places the interface in Out of Service Disabled (OOS,DSBLD) state. The laser is turned off and all traffic flow is stopped. • OOS,MT—Places the interface in Out of Service Maintenance (OOS,MT) state to perform configuration, while the laser and G.709 framer remain up.
Wavelength	Allows you to set the wavelength on a router interface to a specific ITU channel.
Loopback	Configures the loopback facility on a router interface. • None—Clears the current loopback setting. • Internal—Specifies that all the packets be looped back to the router. • Line—Specifies that the incoming network packets be looped back to the DWDM network.

Step 5 Choose **Provisioning > Proactive Protection** to provision the Proactive Protection settings for an interface on the Cisco CRS-1 router according to the following table.

Item	Description
Trigger threshold	Configures the trigger threshold of Forward Error Correction-Fast Re-Route (FEC-FRR). The available options are: • 1E-3 through 1E-9 • 2E-3 through 2E-9 • 3E-3 through 3E-9 • 4E-3 through 4E-9 • 5E-3 through 5E-9 • 6E-3 through 6E-9 • 7E-3 through 7E-9 • 8E-3 through 8E-9 • 9E-3 through 9E-9
Trigger window (ms)	Configures the trigger window in which Fast Re-Route might be triggered. The range is from 10 to 10000 milliseconds.
Revert Threshold	Configures the revert threshold to trigger reverting from the FEC-FRR route back to the original route. The available options are: • 1E-4 through 1E-10 • 2E-4 through 2E-10 • 3E-4 through 3E-10 • 4E-4 through 4E-10 • 5E-4 through 5E-10 • 6E-4 through 6E-10 • 7E-4 through 7E-10 • 8E-4 through 8E-10 • 9E-4 through 9E-10
Revert window (ms)	Configures the revert window in which reverting from the FEC-FRR route back to the original route is triggered. The range is from 2000 to 100000 milliseconds.

Step 6 Choose **Provisioning > OTN** to provision the OTN settings for an interface on the Cisco CRS-1 router according to the following table.

Item	Description
ITU-T G.709 OTN	Enables or disables the ITU-T G.709 monitoring on the OTN.

FEC	Configures the FEC mode. The available options are: • Disable • Standard • Enhanced • Enhanced1.4 • Enhanced1.7 • LongHaul • HighGain
SF BER	Configures the signal failure (SF) bit error rate (BER). The available options are 1E-1 through 1E-9.
SD BER	Configures the signal degrade (SD) BER. The available options are 1E-1 through 1E-9.

Stop. You have completed this procedure.

NTP-G303 Configure Virtual links on the Cisco 7600 and Cisco ONS 15454 DWDM Node

Purpose	This procedure configures virtual links on the Cisco 7600 and the Cisco ONS 15454 DWDM node.
Tools/Equipment	None
Prerequisite Procedures	NTP-G51 Verify DWDM Node Turn Up, page 16-2
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure is normally required only when the Cisco ONS 15454 DWDM node must run traffic to and from a Cisco 7600 router.

Step 1 Complete the "DLP-G711 Configure SSH Server on Cisco 7600 Series Nodes" task on page 16-66.

Step 2 To enable IPoDWDM using the Cisco 7600 series router, add the attribute "**ctc.isC7600Supported=1**" in the */users/<username>/***.ctcrc** file. This should be done prior to launching CTC. By default, IPoDWDM using the Cisco 7600 series router is disabled.

Step 3 If you need RADIUS AAA services, configure a RADIUS server. For more information, see "Configuring RADIUS".

Step 4 Complete the DLP-G46 Log into CTC task to log in to a DWDM node on the network.

Step 5 Configure the Cisco 7600 series router parameters in CTC. See "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 16-46".

Step 6 Add a Cisco 7600 series node to the DWDM network in CTC. See DLP-G49 Add a Node to the Current Session or Login Group.

Step 7 Repeat Step 1 through Step 5 to bring up the second Cisco 7600 series node in the network.

Step 8 Create Provisionable Patchcords between the Cisco 7600 series and DWDM nodes. See "NTP-G184 Create a Provisionable Patchcord" task on page 17-77."

Step 9 Create an Optical Channel (OCH) trail between the two Cisco 7600 series nodes. See "DLP-G395 Create an Optical Channel Trail" task on page 17-34". After creating the OCH trails, traffic can be transmitted between the Cisco 7600 nodes.

Stop. You have completed this procedure.

DLP-G711 Configure SSH Server on Cisco 7600 Series Nodes

Purpose	This procedure configures the Secure Shell (SSH) server and performs node authentication for Cisco 7600 series nodes.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The user ID and password configured on the ONS 15454 and Cisco 7600 nodes must be the same.

	Command or Action	Purpose

Step 1	`configure terminal`
	
	Example:
	`router# configure terminal`
		Enters global configuration mode.
		• Enter your password if prompted.

Step 2	`shell processing full`
	
	Example:
	`router(config)# shell processing full`
		Enables shell processing.

Step 3	`hostname` *host-name* **Example:** `router(config)# hostname test124`	Configures the host name on the Cisco 7600 series router.

Step 4	`aaa new-model`
	
	Example:
	`router(config)# aaa new-model`
		Enables authentication, authorization, and accounting (AAA).

	Command or Action	Purpose
Step 5	**username** *username* **password** *password* **Example:** `router(config)# username cisco password cisco123`	Enables the local username and password on the Cisco 7600 series router to be used in the absence of other AAA statements.
Step 6	**username** *username* **privilege** *privilege-level* **Example:** `router(config)# username cisco privilege 1`	Assigns user name and privilege levels to the CTC user.
Step 7	`ip domain-name` *domain-name* **Example:** `router(config)# ip domain-name rtp.cisco.com`	Configures the DNS domain of the Cisco 7600 series router.

Step 8	`crypto key generate rsa`
	
	Example:
	`router(config)# crypto key generate rsa`
		Generates the SSH key that is used with the SSH server.

Step 9	`ip ssh version 2`
	
	Example:
	`router(config)# ip ssh version 2`
		Specifies that version 2 of SSH is configured on the Cisco 7600 series router.

Step 10	`ip ssh time-out` *seconds* **Example:** `router(config)# ip ssh time-out 60`	Indicates the time interval that the Cisco 7600 series router waits for the SSH client to respond. This setting applies to the SSH negotiation phase. When the EXEC session starts, the standard timeouts configured for the vty apply. The value can range from 1 to 120 seconds.
Step 11	`ip ssh authentication-retries` *integer* **Example:** `router(config)#ip ssh authentication-retries 2`	Indicates the number of attempts after which the interface is reset. The number of retries can range from 0 to 5.

Step 12	`line vty 0 4`
	
	Example:
	`router(config)#line vty 0 4`
		Indicates that five terminal sessions are possible.

Step 13	`transport input ssh`
	
	Example:
	`router(config-line)# transport input ssh`
		Disables telnet mode and enables the SSH mode to login to the Cisco 7600 series router.

NTP-G57 Create a Logical Network Map

Purpose	This procedure allows a Superuser to create a consistent network view for all nodes on the network, meaning that all users see the same network view on their login nodes.
Tools	None
Prerequisite Procedures	This procedure assumes that network turn-up is complete.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Complete the DLP-G46 Log into CTC task at a node on the network where you want to create the network map. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Change the position of the nodes in the network view according to your site plan:

a. Click a node to select it, then drag and drop the node icon to a new location.

b. Repeat Step a for each node that you need to position.

Step 4 On the network view map, right-click and choose **Save Node Position** from the shortcut menu.

Step 5 Click **Yes** in the Save Node Position dialog box.

CTC opens a progress bar and saves the new node positions.

Note Retrieve, Provisioning, and Maintenance users can move nodes on the network map, but only Superusers can save new network map configurations. To restore the view to a previously saved version of the network map, right-click the network view map and choose **Reset Node Position**.

Stop. You have completed this procedure.

NTP-G325 View the Power Levels of Cisco ONS 15454 MSTP Nodes

Purpose	This procedure displays the power levels of the ports of the ONS 15454 MSTP nodes that traverse through an OCH or OCHNC trail using the Photonic Path Trace (PPT). The results are displayed in a histogram.
Tools	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task to log in to an ONS 15454 MSTP node on the network.

Step 2 In the network view, node view (single-node mode), multishelf view (multishelf mode), or card view click the **Circuits** tab.

Note An OCHNC or OCH trail circuit must exist on the optical path on which PPT is launched.

Step 3 Select the OCH trail and click **Edit**. The Edit Circuit window appears.

Step 4 In the Edit Circuit window, click the **Photonic Path Trace** tab.

Step 5 Click **Start** to start the PPT. The PPT creates a histogram that displays the power levels of the nodes versus the threshold levels.

Note The circuit must be in the DISCOVERED state to start the PPT.

Step 6 Click **Export** to export the data in the form of HTML.

Stop. You have completed this procedure.

NTP-G326 Provision SRLG on the Cisco ONS 15454 MSTP Network

Purpose	This procedure provisions Shared Risk Link Groups (SRLGs) for MSTP nodes and spans of the currently managed network using the SRLG management wizard. The SRLG information can be synchronized on Cisco CRS-1 or Cisco ASR 9000 routers and viewed as reports.
Tools	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task to log in to an ONS 15454 MSTP node on the network.

Step 2 To assign, modify, delete, or reset the SRLG attributes for the nodes or links, perform the following steps:

a. Click the **Manage SRLGs** option in the Tools > Manage IPoDWDM menu. The SRLG Management wizard appears.

b. Choose one of the following options from the Select Type drop-down list:

- **Manage Node SRLG**—To add or update the node SRLGs.
- **Manage Link SRLG**—To add or update the link SRLGs.

c. Click **Next**.

d. In the Manage SRLG page, complete the following fields:

- If you chose the **Manage Node SRLG** option in Step b., select the node from the Node drop-down list. If you the chose **Manage Link SRLG** option in Step b., select the span from the Link drop-down list.
- In the Unique SRLG field, an SRLG number is displayed. You can edit the value. If the SRLG value already exists, a message is displayed.

  To reset the SRLG value, click **Set Default**. A confirmation box is displayed. Click **Yes**.

Note The unique SRLG range is from 0 to 4294967294.

- To add an additional SRLG, type a numeric value in the Additional SRLG field and click **Add**.

  If the SRLG value already exists, a message is displayed.

Note A maximum of 20 SRLGs can be added to the SRLG list.

- To delete an additional SRLG, choose the value from the SRLG list and click **Delete**. To reset the value, click **Set Default**. A confirmation box is displayed. Click **Yes**.

e. Click **Finish** to exit the wizard.

Step 3 To view the SRLG values of the nodes and links, perform the following steps:

- To view the SRLG values for the OTS, OSC, or PPC links, go to the Network view and right-click the link, or place the mouse pointer over the link to see the SRLG value as a tooltip.
- To view the node SRLG values, click the **Provisioning > General** tab in the node view (single-shelf mode) or shelf view (multishelf view).

Step 4 To synchronize the SRLG information on the Cisco CRS-1 or Cisco ASR 9000 router, go to Network view, right-click the router and choose **Synchronise IPoDWDM** from the shortcut menu.

Step 5 Complete the "DLP-G540 View SRLG Reports" section on page 16-70 to view SRLG reports.

Stop. You have completed this procedure.

DLP-G540 View SRLG Reports

Purpose	This task explains how to view SRLG reports.
Tools	None
Prerequisite Procedures	NTP-G326 Provision SRLG on the Cisco ONS 15454 MSTP Network, page 16-69
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task to log in to an ONS 15454 MSTP node on the network.

Step 2 To view the SRLG reports, perform the following steps:

- To view the consolidated SRLG report, click the **Consolidated SRLG Report** option in the Tools > Manage IPoDWDM > SRLG Report menu. The report displays the following information:
  - Resource Name—Displays the node name or link name.
  - Resource Type—Displays the resource type (node or link).
  - Unique SRLG—Displays the unique SRLG value.
  - Additional SRLG—Displays additional SRLG values.
- To view the detailed SRLG report, click the **Detailed SRLG Report** option in the Tools > Manage IPoDWDM > SRLG Report menu. The report displays the following information:
  - Resource Name—Displays the node name or link name.
  - Resource Type—Displays the resource type (node or link).
  - SRLG Id—Displays the SRLG value.
  - SRLG Type—Displays the SRLG type (unique or additional).

Step 3 Return to your originating procedure (NTP).