



Turn Up DWDM Network

This chapter explains how to turn up and test a Cisco ONS 15454 dense wave division multiplexing (DWDM) network. For DWDM topology reference information and span loss tables, refer to the “DWDM Topologies” chapter in the *Cisco ONS 15454 Reference Manual*.

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. Metro Core networks often include multiple spans and amplifiers, thus making optical signal to noise ratio (OSNR) the limiting factor for channel performance. Metro Access networks often include a few spans with very low span loss; therefore, the signal link budget is the limiting factor for performance. 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), anti-amplified spontaneous emissions (ASE), and line amplifier. The hybrid node types supported are 1+1 protected flexible terminal, scalable terminal, hybrid terminal, hybrid OADM, hybrid line amplifier, and amplified time division multiplexing (TDM). For DWDM and hybrid node turn up procedures, see [Chapter 5, “Turn Up a DWDM Node.”](#)



Note

To support pure DWDM or hybrid networks, the ONS 15454 must be running Software Release 4.6.

Before You Begin

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

1. [NTP-A232 Verify DWDM Node Turn Up, page 7-2](#)—Complete this procedure before beginning network turn up.
2. [NTP-A280 Provision DWDM or Hybrid Network Connections, page 7-3](#)—Complete this procedure to provision OSC, GCC, LDCC or DCC connections and to check span attenuation as needed.
3. [NTP-A281 Provision and Verify a DWDM Network, page 7-11](#)—Complete as needed.
4. [NTP-A282 Verify the Optical Receive Power, page 7-18](#)—Complete as needed.
5. [NTP-A283 Verify the OSNR, page 7-19](#)—Complete as needed.
6. [NTP-A284 Convert a Pass-Through Connection to an Add/Drop Connection, page 7-20](#)—Complete as needed.

NTP-A232 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.
Tools/Equipment	None
Prerequisite Procedures	Chapter 5, “Turn Up a DWDM Node”
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Provisioning or higher

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- Step 1** Log into an ONS 15454 on the network that you will test. See the [“DLP-A60 Log into CTC” task on page 3-24](#). If you are already logged in, proceed to Step 2.
- Step 2** Click the **Alarms** tab.
- Verify that the alarm filter is not turned on. See the [“DLP-A227 Disable Alarm Filtering” task on page 9-32](#) as necessary.
 - Verify that no unexplained alarms appear. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 Troubleshooting Guide* for procedures.
- Step 3** Verify that the software version and Defaults shown in the node view status area match the software version and NE defaults shown in your site plan. If either are not correct, complete the following procedures as needed:
- If the software is not the correct version, install the correct version from the ONS 15454 software CD. Upgrade procedures are located in the *Cisco ONS 15454 Software Upgrade Guide*. Follow the upgrade procedures appropriate to the software currently installed on the node. TCC2 cards can also be ordered with the latest software release.
 - If the node defaults are not correct, import the network element defaults. Refer to the *Cisco ONS 15454 Network Element Defaults* for Software R4.6.
- Step 4** Click the **Provisioning > General** tabs. Verify that all general node information settings match the settings of your site plan. If not, see the [“NTP-A81 Change Node Management Information” procedure on page 12-2](#).
- Step 5** Click the **Provisioning > Timing** tabs. Verify that timing settings match the settings of your site plan. If not, see the [“NTP-A85 Change Node Timing” procedure on page 12-23](#).
- Step 6** Click the **Provisioning > Network** tabs. Ensure that the IP settings and other Cisco Transport Controller (CTC) network access information is correct. If not, see the [“NTP-A201 Change CTC Network Access” procedure on page 12-4](#).
- Step 7** Click the **Provisioning > Protection** tabs. Verify that all protection groups have been created according to your site plan. If not, see the [“NTP-A203 Modify or Delete Card Protection Settings” procedure on page 12-15](#).
- Step 8** Click the **Provisioning > Security** tabs. Verify that all users have been created and that their security levels match the settings indicated by your site plan. If not, see the [“NTP-A205 Modify Users and Change Security” procedure on page 12-25](#).
- Step 9** If Simple Network Management Protocol (SNMP) is provisioned on the node, click the **Provisioning > SNMP** tabs. Verify that all SNMP settings match the settings of your site plan. If not, see the [“NTP-A87 Change SNMP Settings” procedure on page 12-33](#).

- Step 10** Provision the network connections using the [“NTP-A280 Provision DWDM or Hybrid Network Connections” procedure on page 7-3](#).
- Stop. You have completed this procedure.**

NTP-A280 Provision DWDM or Hybrid Network Connections

Purpose	This procedure verifies OSC terminations, provisions GCC terminations, and checks span attenuation. Cross-references are also provided for LDCC and DCC terminations if they are required for your hybrid network. For more information about DWDM and hybrid topologies, refer to the “DWDM Topologies” chapter in the <i>Cisco ONS 15454 Reference Manual</i> .
Tools/Equipment	None
Prerequisite Procedures	NTP-A232 Verify DWDM Node Turn Up, page 7-2
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Provisioning or higher

- Step 1** Check the fiber connections. See the [“NTP-A244 Install Fiber-Optic Cables on DWDM Cards” procedure on page 2-41](#) for instructions.
- Step 2** Complete the [“DLP-A60 Log into CTC” task on page 3-24](#).
- Step 3** Verify the OSC terminations from the **Provisioning > DCC/GCC/OSC > OSC** tabs. All termination alarms disappear after the terminations are created for each node in your site plan and the correct port is in the IS state. If the OSC terminations were created correctly, complete [Step 5](#). If problems occurred with the OSC terminations, complete [Steps 4 and 5](#).
- Step 4** If the OSC link is not working or the span measurement is not consistent with the value shown in the MetroPlanner file, Cisco qualified personnel must measure the span insertion loss by using an optical time domain reflectometer (OTDR).



Note For information about using an OTDR, refer to the OTDR user guide.

OTDR measurement requires the far-end fiber to be disconnected. If the new span insertion loss value is acceptable, a new MetroPlanner configuration file is generated.

- Step 5** Complete the [“DLP-A344 Check OSC Span Attenuation” task on page 7-5](#).
- Step 6** If you are setting up a hybrid DWDM network, complete the following, as necessary, after you have checked span attenuation:
- Provision any of the following:
 - [DLP-A354 Provision SONET DCC Terminations, page 6-4](#)
 - [DLP-A355 Provision SONET LDCC Terminations, page 6-5](#)
 - [DLP-A343 Provision GCC Terminations, page 7-4](#)

**Note**

Perform this procedure before you create circuits for the TXP_MR_10G, TXP_MR_2.5G, TXPP_MR_2.5G, and MXP_2.5G_10G cards.

- b. Verify the GCC, DCC, or LDCC terminations. All termination alarms disappear after the terminations are created for each node in your site plan and the correct port is in the IS state. If problems occurred with the GCC, DCC, or LDCC terminations, repeat Step 6 and make sure terminations were created for all nodes in your site.

Step 7 Complete the “[DLP-A345 Provision the Ring ID](#)” task on page 7-9.

Stop. You have completed this procedure.

DLP-A343 Provision GCC Terminations

Purpose	This task creates the DWDM GCC terminations required for network setup when using the TXP_MR_10G, TXP_MR_2.5G, TXPP_MR_2.5G, and MXP_2.5G_10G cards. Perform this task before you create circuits for these cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-A60 Log into CTC , page 3-24
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view click the **Provisioning > DCC/GCC/OSC > GCC** tabs.

Step 2 In the GCC Terminations pane, click **Create**.

Step 3 In the Create optical transport network (OTN) GCC Terminations dialog box, click the ports where you want to create the GCC termination. To select more than one port, press the **Shift** key or the **Ctrl** key.

**Note**

GCC refers to the G.709 communications channel, which is used for ONS 15454 transponders and muxponders in DWDM applications.

Step 4 (Optional) From the GCC Rate drop-down menu, choose from two options:

- 192k is the line rate of Section DCC (SDCC)—This is the default option in Software R4.6.
- 576k is the line rate of Line DCC (LDCC)—This option will be supported in a future software release.

Step 5 Click **Set to IS** if you want to put ports in service.

Step 6 Click **OK**. Until all network GCC terminations are created and the ports are in service, GCC-EOC alarms appear.

Step 7 Return to your originating procedure (NTP).

DLP-A344 Check OSC Span Attenuation

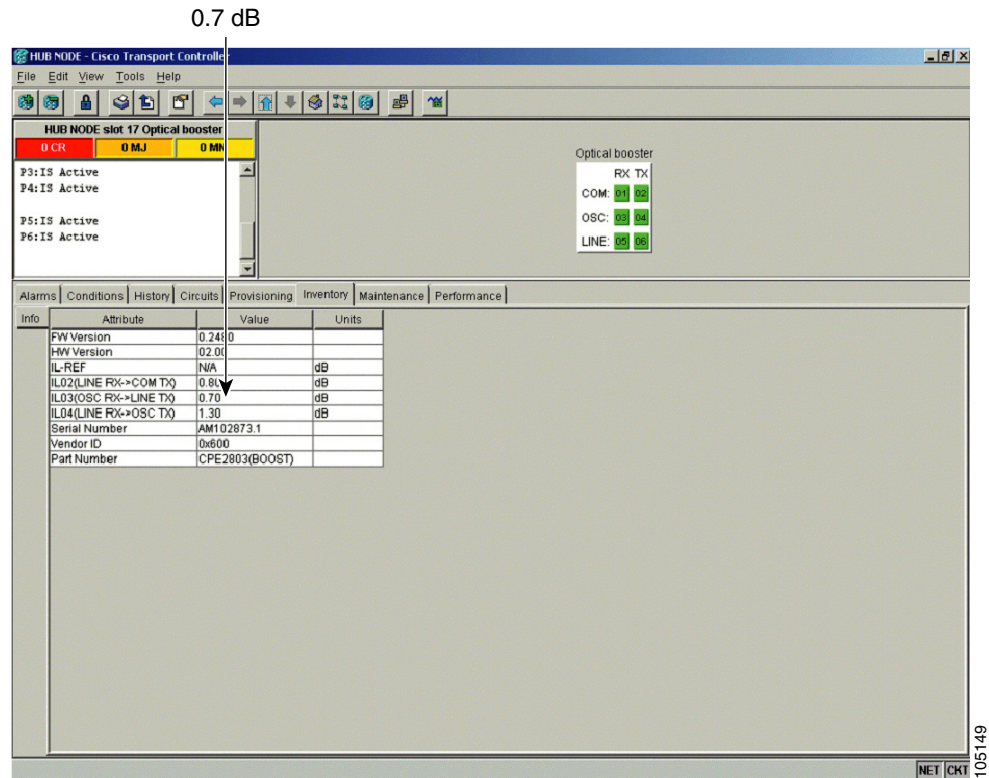
Purpose	This task checks OSC span attenuation between two DWDM nodes.
Tools/Equipment	None
Prerequisite Procedures	DLP-A60 Log into CTC, page 3-24
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

- Step 1** Check span attenuation by calculating the difference between transmitted OSC power at the beginning of the span and the received OSC power at the end of the span. These calculated values must be consistent with the data provided by the MetroPlanner installation file, plus or minus 2 dB. The MetroPlanner span losses are read directly from the network diagram.
- To read the transmit power on an OSCM card at the beginning of the span, double-click the OSCM card in node view and click the **Provisioning > Optical Line > Parameters** tabs. Make note of the line-Tx (OSC output) power level listed in the Power field for the row labeled as 3 LINE-X-1-TX where X equals 8 or 11. Next go to the associated downstream OPT-BST card view and click the **Inventory** tab ([Figure 7-1](#)). Find the row labeled IL03(OSC RX->LINE TX). Make note of this insertion loss listed in the Value field. Subtract this OPT-BST insertion loss from the OSCM TX power level. Use this value and subtract it from the power level on the receiver to calculate the span loss.

**Note**

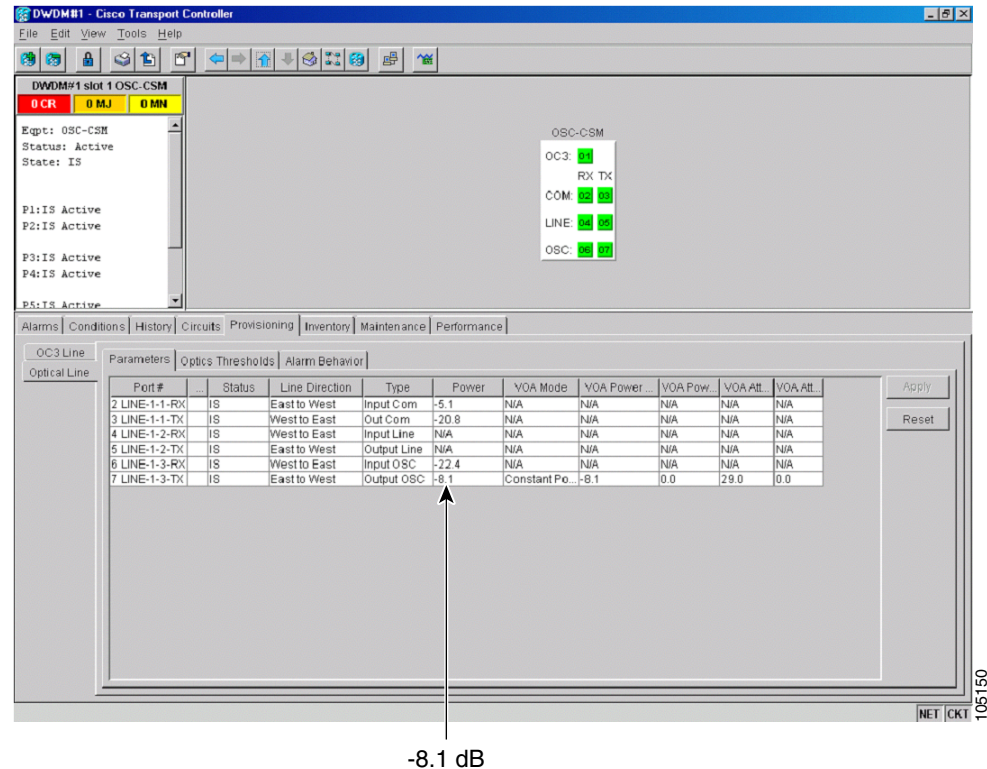
The OSCM cannot be used in hybrid nodes where you use OC-N cards, electrical cards, or cross-connect cards. The OSCM uses Slots 8 and 10, which are also cross-connect card slots. The OSC-CSM card is recommended for hybrid node configurations.

Figure 7-1 Inventory Window



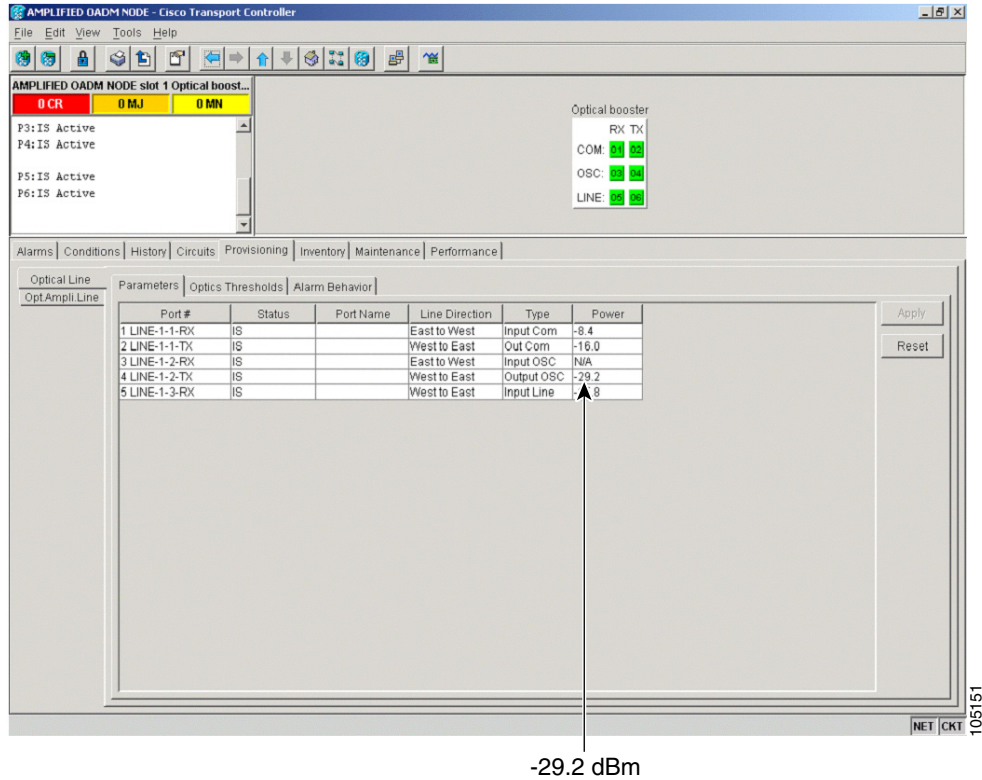
- To read the transmit power on an OSC-CSM card at the beginning of the span, in node view double-click the OSC-CSM card and click the **Provisioning > Optical Line** tabs. Read the Output OSC power value listed in the Power field for the row labeled as 7 LINE-X-3-TX where X equals the slot number (Figure 7-2).

Figure 7-2 OSC-CSM Window



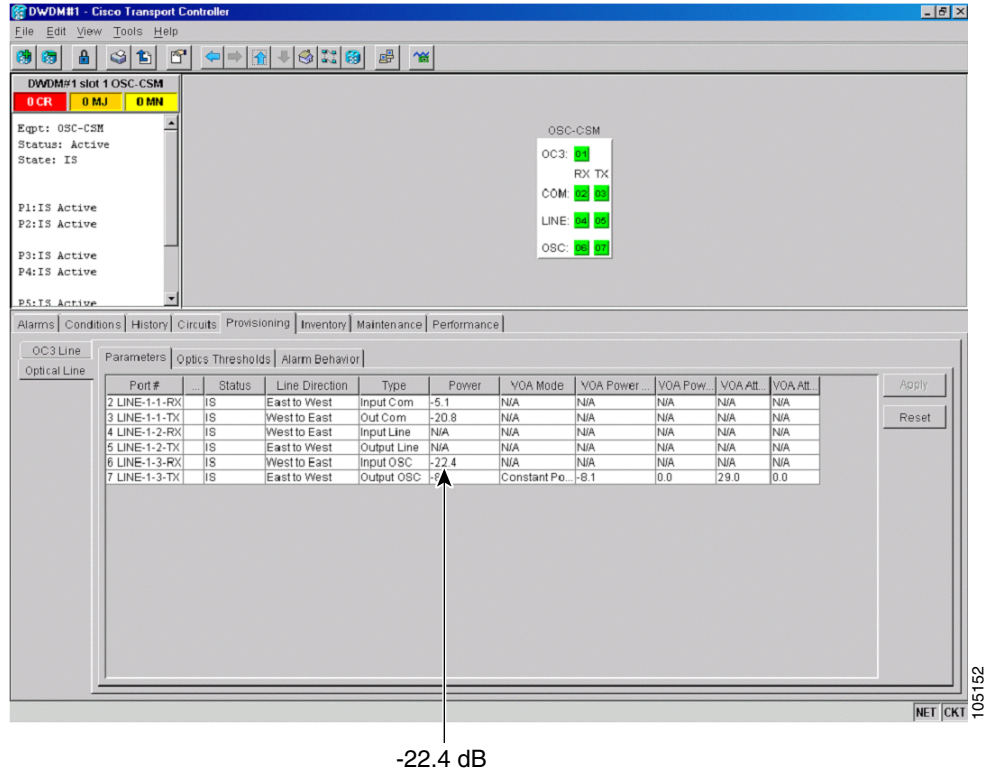
- To read the received power at the end of the span when you are using an OPT-BST amplifier card, double-click the OPT-BST card and go to the OSC Tx port. Click the **Provisioning > Optical Line** tabs and read the Output OSC power value listed in the Power field for the row labeled as 4 LINE-X-2-TX where X equals the slot number (Figure 7-3). Click the **Inventory** tab and find the row labeled IL04(LINE RX->OSC TX). Make note of the insertion loss listed in the Value field. Subtract this OPT-BST insertion loss from the Output OSC power level.

Figure 7-3 Optical Booster Window



- To read the received power on an OSC-CSM card, double-click the OSC-CSM card in node view to open the card view. Click the **Provisioning > Optical Line** tabs and read the Input OSC power value listed in the Power field for the row labeled as 6 LINE-X-3-RX where X equals the slot number (Figure 7-4).

Figure 7-4 OSC-CSM Window



- Step 2** (Optional) If the calculated span attenuation values are not consistent with the values in the MetroPlanner file, check the fiber connection between the line Tx port and the connector at each end of the span. Also check the fiber connection between the OSCM card and the OPT-BST amplifier and repeat Step 1.
- Step 3** (Optional) If the calculated span attenuation values are still not consistent, clean the fiber connectors. See the “[NTP-A112 Clean Fiber Connectors](#)” procedure on page 17-21. After you have cleaned the fiber connectors, repeat Step 1.
- Step 4** Return to your originating procedure (NTP).

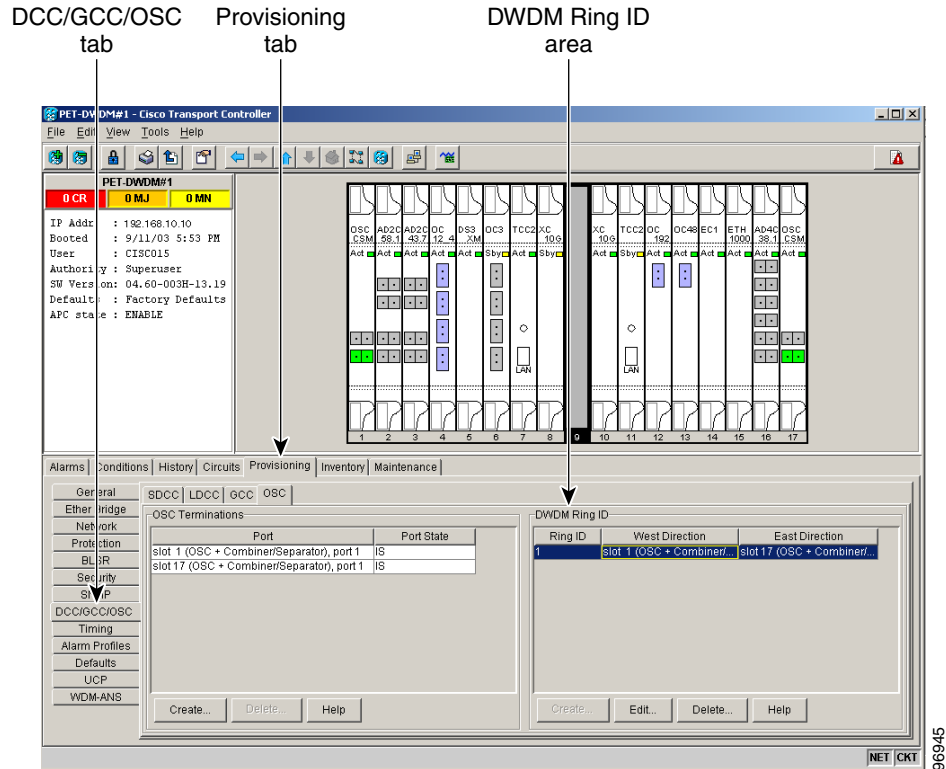
DLP-A345 Provision the Ring ID

Purpose	This task creates a DWDM ring ID.
Tools/Equipment	None
Prerequisite Procedures	DLP-A60 Log into CTC , page 3-24
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

- Step 1** In node view, click the **Provisioning > DCC/GCC/OSC** tabs.

- Step 2** Click the **OSC** tab.
- Step 3** In the DWDM Ring ID area, click **Create** (Figure 7-5).

Figure 7-5 DWDM Ring ID



- Step 4** In the DWDM Ring ID dialog box, enter the following information:
- Ring ID—Enter the same ID for all nodes on the ring. Choose a number from 1 to 255.
 - West Line—Select a card from the drop-down menu. Selectable cards are OSCM or OSC-CSM. Slots 1 through 8 represent the west-side of the node.
 - East Line—Select a card from the drop-down menu. Selectable cards are OSCM or OSC-CSM. Slots 10 through 17 represent the east-side of the node.
- Step 5** Click **OK**.
- Step 6** Return to your originating procedure (NTP).

NTP-A281 Provision and Verify a DWDM Network

Purpose	This procedure verifies the performance of all cable connections and cards in a network topology. You can also use this procedure to troubleshoot any problems with DWDM network set up. For information about hybrid or DWDM topologies, refer to the “DWDM Topologies” chapter in the <i>Cisco ONS 15454 Reference Manual</i> .
Tools/Equipment	Test set or protocol analyzer
Prerequisite Procedures	DLP-A60 Log into CTC, page 3-24
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

- Step 1** Complete the “[DLP-A60 Log into CTC](#)” task on page 3-24 to log into an ONS 15454 on the network.
- Step 2** Review the MetroPlanner file and determine the first channel (ITU wavelength) to be provisioned. Use the transponder, muxponder, or line card that corresponds to the selected wavelength.



Note Provision and measure only one channel.

- Step 3** Configure the TXP_MR_10G, TXP_MR_2.5G, TXPP_MR_2.5G, MXP_2.5G_10G, or line card according to the MetroPlanner file or according to your site plan. For provisioning information see the following:
- [NTP-A206 Modify Line Settings and PM Parameter Thresholds for TXP_MR_10G Cards, page 13-28](#)
 - [NTP-A207 Modify Line Settings and PM Parameter Thresholds for MXP_2.5G_10G Cards, page 13-37](#)
 - [NTP-A237 Modify Line Settings and PM Parameter Thresholds for TXP_MR_2.5G and TXPP_MR_2.5G Cards, page 13-46](#)
- Step 4** If you are using cards with tunable optical wavelengths on the output port, in node view click the **Provisioning > Line > Wavelength** tabs and select the ITU wavelength according to your site plan. For TXP_MR_10G cards see the “[DLP-A274 Change Card Settings for TXP_MR_10G Cards](#)” task on page 13-29.
- Step 5** Create the optical channels according to your site plan. Complete the “[NTP-A227 Provision a DWDM Optical Channel Network Connection](#)” procedure on page 8-98.



Note The amplifiers automatically calculate the optical output power to maintain a constant power level on each channel every time a channel is created on the DWDM network. Automatic power control (APC) also starts every 60 minutes. If the span length changes, APC modifies amplifier gains and express variable optical attenuation (VOA). For more information about APC, refer to the “DWDM Topologies” chapter in the *Cisco ONS 15454 Reference Manual*.

- Step 6** If OPT-PRE amplifiers are being turned up for the first time:
- In node view, double-click the OPT-PRE card to open card view.
 - Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs.

- c. The Power field on amplifier port #2 must reach the provisioned set point shown in the Power Ref. field. The value reported by CTC includes ASE power. These values must be consistent within plus or minus 1 dB.
- d. For each OPT-PRE amplifier that is turned up for the first time on your network, repeat Steps a through c.

Step 7 If OPT-BST amplifiers are being turned up for the first time:

- a. In node view, double-click the OPT-BST card to open card view.
- b. Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs.
- c. The Power field on amplifier port #6 must reach the provisioned set point shown in the Power Ref. field. The value reported by CTC includes ASE power. These values must be consistent within plus or minus 1 dB.
- d. Verify that the amplifiers have switched to constant gain mode. The amplifiers automatically calculate their gain and then switch to constant gain mode.
- e. For each OPT-BST amplifier that is turned up for the first time on your network, repeat Steps a through d.

Step 8 If OADM nodes have a new circuit running traffic for the first time, check the power values:



Note This step checks the Pin OADM Stage value and the Pout OADM Stage value that characterize every OADM Node. The APC tool use these values make all of the VOA adjustments.

- If the circuit is terminated inside the node, go to node view and click the **Provisioning > WDM-ANS > Provisioning** tabs. In the OADM West Side pane, check the Pin OADM Stage value. It should match the value for the first OADM card in your circuit heading west to east shown in the COM RX port, plus or minus 2 dB. If the values are outside of the error margins, contact Cisco qualified personnel to create another MetroPlanner file or refer to the next level of support.
- If the circuit passes through the node, go to node view and click the **Provisioning > WDM-ANS > Provisioning** tabs. In the OADM West Side pane, check the Pin OADM Stage value. It should match the value for the first OADM card in your circuit heading west to east shown in the COM RX port, plus or minus 2 dB. In the OADM East Side pane, check the Pout OADM Stage value. It should match the value for the first OADM card in your circuit heading west to east shown in the COM TX port, plus or minus 1 dB. If the values are outside of the error margins, contact Cisco qualified personnel to create another MetroPlanner file or refer to the next level of support.
- If the circuit starts from the node, go to node view and click the **Provisioning > WDM-ANS > Provisioning** tabs. In the OADM East Side pane, check the Pout OADM Stage value. It should match the value for the first OADM card in your circuit heading west to east shown in the COM TX port, plus or minus 1 dB. If the values are outside of the error margins, contact Cisco qualified personnel to create another MetroPlanner file or refer to the next level of support.

Step 9 Check the received power range:

- a. Complete the “[DLP-A349 Clear Selected PM Counts](#)” task on page 10-8 for the transponder, muxponder, or line card.
- b. Click the **Optics PM** tab.
- c. Read and make note of the values shown in the RX Optical Pwr (Min, dBm) and RX Optical Pwr (Max, dBm) fields.
- d. Click the **Provisioning > Optics Thresholds** tabs.

- e. Compare the values shown in Step c with the values listed in the RX Power High and RX Power Low columns. Check that the received power on the transponder, muxponder, or line card is within the allowed receiving range according to optical card sensitivity specifications. See the *Cisco ONS 15454 Reference Manual* for information about card specifications.

Step 10 Perform a short-term BER test:

- a. Complete the “[DLP-A349 Clear Selected PM Counts](#)” task on page 10-8 for the transponder, muxponder, or line card.
- b. Click the **Payload PM** tab, or if OTN is provisioned click the **OTN PM** tab.
- c. Perform a short-term BER test using a test set or protocol analyzer.



Note

To see an accurate performance monitoring 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, refer to the test set or protocol analyzer user guide.

Step 11 Repeat Steps 2 through 10 for each channel in your site plan.

Step 12 (Optional) If you have DWDM cards on nodes in your network, complete the “[DLP-A346 Verify DWDM Card Parameters](#)” task on page 7-13.

Step 13 Complete the “[DLP-A497 DWDM Node Acceptance Test](#)” task on page 7-17.

Stop. You have completed this procedure.

DLP-A346 Verify DWDM Card Parameters

Purpose	This task checks start of life (SOL) network conditions on DWDM cards. This procedure is recommended, but it is not mandatory.
Tools/Equipment	None
Prerequisite Procedures	DLP-A60 Log into CTC , page 3-24
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**.

Step 2 If OPT-BST amplifiers are used, retrieve parameters for each OPT-BST amplifier on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first OPT-BST amplifier to open it in card view.
- b. Click the **Provisioning > Optical Line > Parameters** tabs.
- c. In the Power field, check the power values for Output COM, port #2 and Output OSC, port #4.
- d. Click the **Opt. Ampli. Line > Parameters** tabs.

- e. In the Power field, check the power value for Output Line, port #6.
- f. In the Mode field, check the value for Output Line, port #6.
- g. In the Gain field, check the value for Output Line, port #6.
- h. In the Tilt Reference field, check the value for Output Line, port #6.
- i. Click the **Maintenance > ALS** tabs and verify that the ALS Mode column displays Auto Restart. Auto Restart is the default Automatic Laser Shutdown (ALS) mode.
- j. Repeat Steps a through i for each OPT-BST amplifier.

Step 3 If OPT-PRE amplifiers are used, retrieve parameters for each OPT-PRE amplifier on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first OPT-PRE amplifier to open it in card view.
- b. Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs.
- c. In the Power field, check the power value for Output COM, port #2.
- d. In the Mode field, check the value for Output COM, port #2.
- e. In the Gain field, check the value for Output COM, port #2.
- f. In the Tilt Reference field, check the value for Output COM, port #2.
- g. In the DCU Insertion Loss field, check the value for Output COM, port #2.
- h. Click the **Maintenance > ALS** tabs and verify that the ALS Mode column displays Auto Restart. Auto Restart is the default ALS mode.
- i. Repeat Steps a through h for each OPT-PRE amplifier.

Step 4 If 32 MUX-O cards are used, retrieve parameters for each 32 MUX-O card on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first 32 MUX-O card to open it in card view.
- b. Click the **Provisioning > Optical Chn > Parameters** tabs.
- c. In the Power field, check the value for Add ports 1 through 32.
- d. In the VOA Attenuation Ref. field, check the value for Add ports 1 through 32.
- e. Repeat Steps a through d for each 32 MUX-O card.

Step 5 If 32 DMX-O cards are used, retrieve parameters for each 32 DMX-O card on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first 32 DMX-O card to open it in card view.
- b. Click the **Provisioning > Optical Chn > Parameters** tabs.
- c. In the Power field, check the value for Drop ports 1 through 32.
- d. In the VOA Attenuation Ref. field, check the value for Drop ports 1 through 32.
- e. Repeat Steps a through d for each 32 DMX-O card.

Step 6 If AD-4B-xx.x cards are used, retrieve parameters for each AD-4B-xx.x card on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first AD-4B-xx.x card to open it in card view.
- b. Click the **Provisioning > Optical Line > Parameters** tabs.
- c. In the VOA Attenuation Ref. field, check the value for output express port #10.
- d. Click the **Optical Band > Parameters** tabs.

- e. In the Power field, check the values for the even numbered ports 2 through 8.
- f. In the VOA Attenuation Ref. field, check the values for the even numbered ports 2 through 8.
- g. In the Power field, check the values for the odd numbered ports 1 through 7.
- h. Repeat Steps a through g for each AD-4B-xx.x card.

Step 7 If AD-1B-xx.x cards are used, retrieve parameters for each AD-1B-xx.x card on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first AD-1B-xx.x card to open it in card view.
- b. Click the **Provisioning > Optical Line > Parameters** tabs.
- c. In the VOA Attenuation Ref. field, check the value for output express port #4.
- d. Click the **Optical Band > Parameters** tabs.
- e. In the Power field, check the value for Drop port #2.
- f. In the VOA Attenuation Ref. field, check the value for Drop port #2.
- g. In the Power field, check the value for Add port #1.
- h. Repeat Steps a through g for each AD-1B-xx.x card.

Step 8 If AD-1C-xx.x cards are used, retrieve parameters for each AD-1C-xx.x card on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first AD-1C-xx.x card to open it in card view.
- b. Click the **Provisioning > Optical Line > Parameters** tabs.
- c. In the VOA Attenuation Ref. field, check the value for output express port #4.
- d. Click the **Optical Channel > Parameters** tabs.
- e. In the Power field, check the value for Add port #1.
- f. In the VOA Attenuation Ref. field, check the value for Add port #1.
- g. In the Power field, check the value for Drop port #2.
- h. Repeat Steps a through g for each AD-1C-xx.x card.

Step 9 If AD-2C-xx.x cards are used, retrieve parameters for each AD-2C-xx.x card on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first AD-2C-xx.x card to open it in card view.
- b. Click the **Provisioning > Optical Line > Parameters** tabs.
- c. In the VOA Attenuation Ref. field, check the value for output express port #6.
- d. Click the **Optical Channel > Parameters** tabs.
- e. In the Power field, check the value for odd numbered Add ports 1 through 3.
- f. In the VOA Attenuation Ref. field, check the value for odd numbered Add ports 1 through 3.
- g. In the Power field, check the value for even numbered Drop ports 2 through 4.
- h. Repeat Steps a through g for each AD-2C-xx.x card.

Step 10 If AD-4C-xx.x cards are used, retrieve parameters for each AD-4C-xx.x card on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first AD-4C-xx.x card to open it in card view.
- b. Click the **Provisioning > Optical Line > Parameters** tabs.
- c. In the VOA Attenuation Ref. field, check the value for output express port #10.

- d. Click the **Optical Channel > Parameters** tabs.
- e. In the Power field, check the value for odd numbered Add ports 1 through 7.
- f. In the VOA Attenuation Ref. field, check the value for odd numbered Add ports 1 through 7.
- g. In the Power field, check the value for even numbered Drop ports 2 through 8.
- h. In the VOA Attenuation Ref. field, check the value for even numbered Add ports 2 through 8.
- i. Repeat Steps a through h for each AD-4C-xx.x card.

Step 11 If 4MD-xx.x cards are used, retrieve parameters for each 4MD-xx.x card on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first 4MD-xx.x card to open it in card view.
- b. Click the **Provisioning > Optical Line > Parameters** tabs.
- c. In the VOA Attenuation Ref. field, check the value for output express port #10.
- d. Click the **Optical Channel > Parameters** tabs.
- e. In the Power field, check the value for odd numbered Add ports 1 through 7.
- f. In the VOA Attenuation Ref. field, check the value for odd numbered Add ports 1 through 7.
- g. In the Power field, check the value for even numbered Drop ports 2 through 8.
- h. In the VOA Attenuation Ref. field, check the value for even numbered Add ports 2 through 8.
- i. Repeat Steps a through h for each 4MD-xx.x card.

Step 12 If OSC-CSM cards are used, retrieve parameters for each OSC-CSM card on the network and compare the values with the values in MetroPlanner if available:

- a. In node view double-click the first OSC-CSM card to open it in card view.
- b. Click the **Provisioning > Optical Line > Parameters** tabs.
- c. In the Power field, check the value for output COM port #3.
- d. In the Power field, check the value for input OSC port #6.
- e. In the Power field, check the value for output OSC port #7.
- f. In the VOA Attenuation Ref. field, check the value for output OSC port #7.
- g. Click the **Maintenance > ALS** tabs and verify that the ALS Mode column displays Auto Restart. Auto Restart is the default ALS mode.
- h. Repeat Steps a through g for each OSC-CSM card.

Step 13 If OSCM cards are used, retrieve parameters for each OSCM card on the network and compare the values with the values in MetroPlanner if available:



Note

The OSCM cannot be used in hybrid nodes where you use OC-N cards, electrical cards, or cross-connect cards. The OSCM uses Slots 8 and 10, which are also cross-connect card slots. The OSC-CSM card is recommended for hybrid node configurations.

- a. In node view double-click the first OSCM card to open it in card view.
- b. Click the **Provisioning > Optical Line > Parameters** tabs.
- c. In the Power field, check the value for output OSC port #3.
- d. In the VOA Attenuation Ref. field, check the value for output OSC port #3.

- e. Click the **Maintenance > ALS** tabs and verify that the ALS Mode column displays Auto Restart. Auto Restart is the default ALS mode.
 - f. Repeat Steps a through e for each OSCM card.
- Step 14** If AD-xx-xx.x cards are used, look at the first and the last card along a defined direction such as west to east.
- a. In node view double-click the first AD-xx-xx.x card to open it in card view.
 - b. Click the **Provisioning > Optical Line > Parameters** tabs.
 - c. In the Power field, check the value for input COM port x.
 - d. Go to card view for the last AD-xx-xx.x card and click the **Provisioning > Optical Line > Parameters** tabs.
 - e. In the Power field, check the value for output COM port y.
 - f. Repeat Steps a through e for each direction. For example if you performed the procedure from west to east, now perform the procedure from east to west.
- Step 15** Return to your originating procedure (NTP).

DLP-A497 DWDM Node Acceptance Test

Purpose	This task tests each node in a network topology.
Tools/Equipment	None
Prerequisite Procedures	DLP-A60 Log into CTC, page 3-24
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**.
- Step 2** Click the **Alarms** tab:
- a. Verify that no unexplained conditions appear on the network. If unexplained conditions appear, resolve them before continuing. Refer to the *Cisco ONS 15454 Troubleshooting Guide*.
 - b. Complete the “[DLP-A516 Export CTC Data](#)” task on page 9-4 to export alarm and condition information.
 - c. Verify that the alarm filter is not turned on. See the “[DLP-A227 Disable Alarm Filtering](#)” task on page 9-32 as necessary.
 - d. Verify that no unexplained alarms appear on the network. If unexplained alarms appear, resolve them before continuing. Refer to the *Cisco ONS 15454 Troubleshooting Guide*.
- Step 3** If a node fails any test, repeat the test while verifying correct setup and configuration. If the test fails again, refer to the next level of support.
- After all tests are successfully completed and no alarms exist in the network, the network is ready for service.

Step 4 Return to your originating procedure (NTP).

NTP-A282 Verify the Optical Receive Power

Purpose	This procedure verifies the optical receive power.
Tools/Equipment	Optical power meter
Prerequisite Procedures	DLP-A60 Log into CTC, page 3-24
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 Complete the “[DLP-A60 Log into CTC](#)” task on page 3-24 at an ONS 15454 on the network.

Step 2 Using an optical power meter, check the receive optical power on both ends of the span:

- a. Identify a transmit port on an AD-xC-xx.x card or a 32 DMX-O card in the node that you want to test and connect it to the optical power meter.
- b. Read the values displayed on the optical power meter. These values must be consistent with the data provided by the MetroPlanner installation file, plus or minus 1 dB. To view MetroPlanner values click the **Provisioning > WDM-ANS > Provisioning** tabs. The values are listed in the Pdrop field for demux cards and in the Pout Band field for OADM cards.



Note For information about using an optical power meter, refer to the optical power meter user guide.

Step 3 If the optical power is too low, check the fiber connections as appropriate to your node configuration:

- Check the fiber connections between the OPT-BST amplifier or the OSC-CSM card and the OPT-PRE amplifier or the next OADM card.
- Check the fiber connections between the OADM cards and if needed clean the connectors. See the “[NTP-A112 Clean Fiber Connectors](#)” procedure on page 17-21.

Step 4 If the power coming from the AD-xC-xx.x card is higher than required, put an external optical attenuator before the client interface input in order to meet the power requirement.

Step 5 If the power coming from the 32 DMX-O card is higher or lower than required, you can regulate the VOA in CTC.

- From the 32 DMX-O card view, choose the **Provisioning > Optical Chn > Parameters** tabs. The VOA columns including the VOA power and attenuation reference points can be manually set according to your site plan.
- Changing the VOA power and attenuation calibration values adjusts the power and attenuation reference settings.

Stop. You have completed this procedure.

NTP-A283 Verify the OSNR

Purpose	This procedure verifies the optical signal-to-noise ratio (OSNR). OSNR is the ratio between the signal power level and the noise power level.
Tools/Equipment	Optical spectrum analyzer
Prerequisite Procedures	DLP-A60 Log into CTC, page 3-24
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

- Step 1** Complete the [“DLP-A60 Log into CTC” task on page 3-24](#) 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 LINE Rx monitor port on an OPT-PRE amplifier (MON Rx) or OSC-CSM card (MON Rx) in the node that you want to test and connect it to the optical spectrum analyzer.
 - Calculate the OSNR values, based on the optical spectrum retrieved. These values must be consistent with the data provided by the MetroPlanner installation file, plus or minus 1 dB. The OSNR values in the MetroPlanner file are only valid for the Rx locations of a dropped channel. Therefore, OSNR values of an expressed channel at an OADM cannot be compared to the MetroPlanner values.



Note For information about using a spectrum analyzer, refer to the spectrum analyzer user guide.



Note For OSNR values for each card class, refer to the “DWDM Cards” chapter in the *Cisco ONS 15454 Reference Manual*.

- Step 3** 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 receive (Rx) port power range.

- Check the fiber connections between the OPT-BST amplifier or the OSC-CSM and the OPT-PRE amplifier and if needed clean the connectors. See the [“NTP-A112 Clean Fiber Connectors” procedure on page 17-21](#).
- 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.

Stop. You have completed this procedure.

NTP-A284 Convert a Pass-Through Connection to an Add/Drop Connection

Purpose	This procedure converts a pass-through connection to two add or drop connections (one on the add side and the other on the drop side). Use this procedure during a network upgrade. Pass-through channel connections can be provided between channel input and output ports for the AD-xC-xx.x, the 4MD-xx.x, the 32 MUX-O, and the 32 DMX-O. You can set up pass-through connections in nodes that might require more add or drop channel capability or configuration.
Tools/Equipment	None
Prerequisite Procedures	DLP-A60 Log into CTC, page 3-24
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

-
- Step 1** Complete the “[DLP-A60 Log into CTC](#)” task on page 3-24 at an ONS 15454 on the network.
- Step 2** In node view click the **Circuits** tab. Delete the unidirectional or bidirectional pass-through OCHNC that applies to the pass-through connection to be removed.
- Step 3** Remove the physical pass-through cabling. Click the **Provisioning > WDM-ANS > Connections** tabs to identify the card ports to be removed. The pass through connection you are removing can be connected in both OADM and HUB nodes.
- For a hub node—Connect the 32 DMX-O output port to the 32 MUX-O input port.
 - For an OADM node—Connect the AD-xC-xx.x drop (output) port to the AD-xC-xx.x add (input) port.
- Step 4** Physically connect the proper client interface to the correct ADD and DROP ports.
- Step 5** Delete the filter connections related to the pass-through connection that is being converted to an add/drop connection:
- a. In node view, click the **Provisioning > WDM-ANS > Port Status** tabs.
 - b. Highlight the pass-through connections between ITU channel add and drop ports on filters.
 - c. Click **Delete**.
- Step 6** Create two new unidirectional OCHNCs (one heading east, the other heading west) to support the new add/drop channels. See the “[NTP-A227 Provision a DWDM Optical Channel Network Connection](#)” procedure on page 8-98.
- Step 7** If it is necessary, add an optical attenuator between the Channel-Tx port of the OADM card, 4MD-xx.x card, or the 32 DMX-O card and the DWDM-Rx port on the transponder, muxponder, or line card.



Note If the channel is coming from a 32 DMX-O, the optical power can be adjusted in CTC by modifying the value of the internal per channel VOA.

- Step 8** (Optional) The following verification steps might be needed for an intermediate node when a pass-through connection is converted:
- Verify that the received channels are at the specified power level. See the [“NTP-A282 Verify the Optical Receive Power” procedure on page 7-18](#) for instructions.
 - Verify that the added channels are equalized with the express channels within 1 dB.
 - If the channels are not equalized with the express channels within plus or minus 1 dB, check the attenuation of the VOAs.
 - Also check all the fiber adapters to minimize their insertion losses. See the [“NTP-A112 Clean Fiber Connectors” procedure on page 17-21](#) for instructions.

Stop. You have completed this procedure.
