



General Troubleshooting

This chapter provides procedures for troubleshooting the most common problems encountered when operating a Cisco ONS 15454 DWDM shelf in ANSI or ETSI platforms. To troubleshoot specific alarms, see [Chapter 2, “Alarm Troubleshooting.”](#) If you cannot find what you are looking for, contact Cisco Technical Support (1-800-553-2447).

Alarms can occur even in those cards that are not explicitly mentioned in the Alarm sections. When an alarm is raised, refer to its clearing procedure.



Note

In this chapter, “ONS 15454” refers to both ANSI and ETSI versions of the platform unless otherwise noted.

This chapter includes the following sections on network problems:



Note

For dense wavelength division multiplexing (DWDM) network acceptance tests, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

- [1.1 Loopback Description, page 1-2](#)—Explains in general terms the types of loopback tests (facility and terminal) that can be run along with general loopback behavior and card loopback behavior.
- [1.2 Troubleshooting MXP or TXP Circuit Paths With Loopbacks, page 1-7](#)—Explains how to use loopbacks tests described in “[1.1 Loopback Description](#)” section on [page 1-2](#) to isolate trouble on muxponder (MXP) and transponder (TXP) circuits.
- [1.3 Troubleshooting DWDM Circuit Paths With ITU-T G.709 Monitoring, page 1-24](#)—Explains how to utilize performance monitoring (PM) and threshold crossing alerts (TCA) to locate signal degrades on DWDM circuit paths.

The remaining sections describe symptoms, problems, and solutions that are categorized according to the following topics:

- [1.4 Using CTC Diagnostics, page 1-32](#)—Explains how to perform card LED tests and download a diagnostic file for Cisco Technical Support.
- [1.5 Restoring the Database and Default Settings, page 1-35](#)—Provides procedures for restoring software data and restoring the node to the default setup.
- [1.6 PC Connectivity Troubleshooting, page 1-36](#)—Provides troubleshooting procedures for PC and network connectivity to the ONS 15454.
- [1.7 CTC Operation Troubleshooting, page 1-41](#)—Provides troubleshooting procedures for Cisco Transport Controller (CTC) login or operation problems.

- [1.8 Timing, page 1-51](#)—Provides troubleshooting procedures for circuit creation and error reporting as well as timing reference errors and alarms.
- [1.9 Fiber and Cabling, page 1-54](#)—Provides troubleshooting procedures for fiber and cabling connectivity errors.
- [1.10 Power Supply Problems, page 1-58](#)—Provides troubleshooting procedures for rack power supply problems.
- [1.11 Power Up Problems for Node and Cards, page 1-60](#)—Provides troubleshooting procedures for shelf and card power supply problems.
- [1.12 Network Level \(Internode\) Problems, page 1-60](#)—Provides troubleshooting procedures for problems between nodes, such as fiber cuts and optical channel network connection (OCHNC) circuit creation failure.
- [1.13 Node Level \(Intranode\) Problems, page 1-84](#)—Provides troubleshooting procedures for variable optical attenuator (VOA) startup problems as well as internal VOA control loop problems in the 32DMX-C and 32DMX-L cards that occur due to counter-propagating light.

1.1 Loopback Description

Use loopbacks and hairpin circuits to test newly created circuits before running live traffic or to logically locate the source of a network failure. All ONS 15454 and ONS 15454 SDH TXP and MXP cards allow loopbacks and hairpin test circuits. Other cards do not allow loopbacks, including OPT-BST, OPT-PRE, OSC-CSM, AD-xB-xx.x, and AD-xC-xx.x cards.

To create a loopback on an ANSI or SONET port, the port must be in the Out-of-Service and Management, Maintenance (OOS-MA,MT) service state. After you create the loopback, the service state becomes Out-of-Service and Management, Loopback and Maintenance (OOS-MA,LPBK & MT).

To create a loopback on an SDH or ETSI port, the port must be in the Locked, maintenance administrative state and the Locked-Enabled, loopback & maintenance administrative state.



Caution

Facility or terminal loopbacks can be service-affecting. To protect traffic, apply a lockout or Force switch to the target loopback port. Basic directions for these procedures exist in [Chapter 2, “Alarm Troubleshooting.”](#) For more information about these operations, refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.



Note

In CTC, a facility loopback is sometimes called “facility (line)” loopback, and a terminal loopback is sometimes called a “terminal (inward)” loopback. This is done to indicate the terminating direction of the signal: a facility loopback is sent outward toward the span, whereas a terminal loopback is redirected inward toward its originating port.

1.1.1 Facility Loopbacks

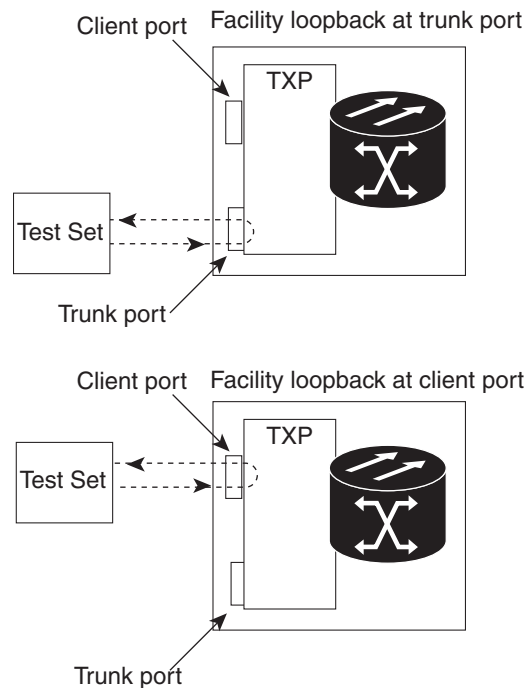
The following sections give general information about facility loopback operations and specific information about ONS 15454 or ONS 15454 SDH card loopback activity.

1.1.1.1 General Behavior

A facility loopback tests the line interface unit (LIU) of a card, the electrical interface assembly (EIA), and related cabling. After applying a facility loopback on a port, use a test set to run traffic over the loopback. A successful facility loopback isolates the LIU, the EIA, or the cabling plant as the potential cause of a network problem.

To test a card LIU, connect an optical test set to a trunk or client port and perform a facility loopback. Alternately, use a loopback or hairpin circuit on a card that is farther along the circuit path. For example, [Figure 1-1](#) shows a facility loopback at a trunk port and at a client port on a TXP card.

Figure 1-1 Facility Loopback Path on a Near-End Transponder Card



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Caution

Before performing a facility loopback on a TXP card, be sure that the card contains at least two data communications channel (DCC) paths to the node where the card is installed. A second DCC provides a nonlooped path to log into the node after the loopback is applied, enabling you to remove the facility loopback. Ensuring a second DCC is not necessary if you are directly connected to the node containing the loopback card.



Caution

Ensure that the facility being loopbacked is not being used by the node for line timing. If it is, a timing loop will be created.

1.1.1.2 Card Behavior

Port loopbacks either terminate or bridge the loopback signal. All MXP and TXP facility loopbacks are terminated as shown in [Table 1-1](#).

When a port terminates a facility loopback signal, the signal only loops back to the originating port and is not transmitted downstream. When a port bridges a loopback signal, the signal loops back to the originating port and is also transmitted downstream.

**Note**

In [Table 1-1](#), no alarm indication signal (AIS) is injected if the signal is bridged. If the signal is terminated, an applicable AIS is injected downstream.

Table 1-1 DWDM Card Facility Loopback Behavior

Card/Port	Facility Loopback Signal
TXP_MR_10E/TXP_MR_10E_C/TXP_MR_10E_L client ports	Bridged
TXP_MR_10E/TXP_MR_10E_C/TXP_MR_10E_L trunk ports	Terminated
TXP_MR_2.5G/TXPP_MR_2.5G client ports	Terminated
TXP_MR_2.5G/TXPP_MR_2.5G trunk ports	Terminated
MXP_2.5G_10E_C/MXP_2.5G_10E_L client ports	Bridged
MXP_2.5G_10E_C/MXP_2.5G_10E_L trunk ports	Terminated
MXP_MR_10DME client ports	Bridged
MXP_MR_10DME trunk ports	Terminated
MXP_MR_2.5G/MXPP_MR_2.5G client ports	Bridged
MXP_MR_2.5G/MXPP_MR_2.5G trunk ports	Terminated

The loopback itself is listed in the Conditions window. For example, the window would list the LPBKFACILITY condition for a tested port. (The Alarms window would show the AS-MT condition which means that alarms are suppressed on the facility during loopback.)

With a client-side SONET or ANSI facility loopback, the client port service state is OOS-MA,LPBK & MT. However, any remaining client and trunk ports can be in any other service state. For SONET or ANSI cards in a trunk-side facility loopback, the trunk port service state is OOS-MA,LPBK & MT and the remaining client and trunk ports can be in any other service state.

With a client-side SDH or ESTI facility loopback, the client port is in the Locked-enabled,maintenance & loopback service state. However, the remaining client and trunk ports can be in any other service state. For MXP and TXP cards in a SDH or ETSI trunk-side facility loopback, the trunk port is in the Locked-enabled,maintenance & loopback service state and the remaining client and trunk ports can be in any other service state.

1.1.2 Terminal Loopbacks

The following sections give general information about terminal loopback operations and specific information about ONS 15454 card loopback activity.

1.1.2.1 General Behavior

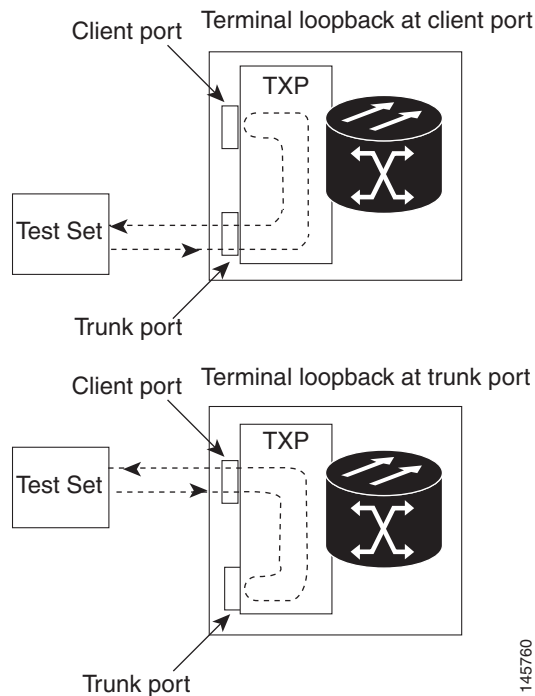
A terminal loopback tests a circuit path as it passes through a TXP or MXP card and loops back. For example, as shown in [Figure 1-2](#), there are two types of terminal loopbacks shown for a TXP card.

The first is a terminal loopback at the client port. In this situation, the test set traffic comes in through the TXP trunk port, travels through the card, and turns around because of the terminal loopback in effect on the card just before it reaches the LIU of the client port. The signal is then sent back through the card to the trunk port and back to the test set.

The second is a terminal loopback at the trunk port. In this situation, the test set traffic comes in through the TXP client port, travels through the card, and turns around because of the terminal loopback in effect on the card just before it reaches the LIU of the trunk port. The signal is then sent back through the card to the client port and back to the test set.

This test verifies that the terminal circuit paths are valid, but does not test the LIU on the TXP card.

Figure 1-2 Terminal Loopback on a TXP Card



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1.1.2.2 Card Behavior

ONS 15454 and ONS 15454 SDH terminal port loopbacks can either terminate or bridge the signal. TXP terminal loopbacks are terminated as shown in [Table 1-2](#). During terminal loopbacks, if a port terminates a terminal loopback signal, the signal only loops back to the originating port and is not transmitted downstream. If the port bridges a loopback signal, the signal loops back to the originating port and is also transmitted downstream. Client card terminal loopback bridging and terminating behaviors are listed in [Table 1-2](#).

**Note**

In [Table 1-2](#), no AIS signal is injected if the signal is bridged. If the signal is terminated, an applicable AIS is injected downstream.

Table 1-2 *Client Card Terminal Loopback Behavior*

Card/Port	Terminal Loopback Signal
TXP_MR_10E/TXP_MR_10E_C/TXP_MR_10E_L client ports	Bridged
TXP_MR_10E/TXP_MR_10E_C/TXP_MR_10E_L trunk ports	Bridged
TXP_MR_2.5G/TXPP_MR_2.5G client ports	Bridged
TXP_MR_2.5G/TXPP_MR_2.5G trunk ports	Bridged
MXP_2.5G_10E_C/MXP_2.5G_10E_L client ports	Bridged
MXP_2.5G_10E_C/MXP_2.5G_10E_L trunk ports	Bridged
MXP_MR_10DME client ports	Bridged
MXP_MR_10DME trunk ports	Bridged
MXP_MR_2.5G/MXPP_MR_2.5G client ports	Terminated
MXP_MR_2.5G/MXPP_MR_2.5G trunk ports	Bridged

The MXP and TXP trunk and client ports can simultaneously maintain different service states:

- For SONET or ANSI TXP and TXPP cards with a client-side terminal loopback, the client port is in the OOS-MA,LPBK & MT service state and trunk port must be in IS-NR service state.
- For SONET or ANSI MXP and MXPP cards with a client-side terminal loopback, the client port is in the OOS-MA,LPBK & MT service state and the remaining client and trunk ports can be in any service state.
- In SONET or ANSI MXP or TXP trunk-side terminal loopbacks, the trunk port is in the OOS-MA,LPBK & MT service state and the client ports must be in IS-NR service state for complete loopback functionality. A terminal loopback affects all client ports because it is performed on the aggregate signal.
- For SDH or ETSI TXP and TXPP client-side facility loopbacks, the client port is in the Locked-enabled,maintenance & loopback service state and the trunk port must be in Unlocked-enabled service state.
- For SDH or ETSI MXP and MXPP cards with a client-side terminal loopback, the client port is in the Locked-enabled,maintenance & loopback service state and remaining client and trunk ports can be in any service state.
- In SDH and ETSI MXP or TXP trunk-side terminal loopbacks, the trunk port is in the Locked-enabled,maintenance & loopback service state and the client ports must be in Unlocked-enabled service state for complete loopback functionality. A facility loopback affects all client ports because it is performed on the aggregate signal.

The loopback itself is listed in the Conditions window. For example, the window would list the LPBKTERMINAL condition or LPBKFACILITY condition for a tested port. (The Alarms window would show the AS-MT condition, which indicates that all alarms are suppressed on the port during loopback testing.)

1.2 Troubleshooting MXP or TXP Circuit Paths With Loopbacks

Facility loopbacks and terminal loopbacks are often used together to test the circuit path through the network or to logically isolate a fault. Performing a loopback test at each point along the circuit path systematically isolates possible points of failure. MXP or TXP loopback tests differ from other testing in that loopback testing does not require circuit creation. MXP or TXP client ports are statically mapped to the trunk ports so no signal needs to traverse the cross-connect card (in a circuit) to test the loopback.

You can use these procedures on transponder cards (TXP, TXPP) or muxponder cards (MXP, MXPP) cards. The example in this section tests an MXP or TXP circuit on a three-node bidirectional line switched ring (BLSR) or multiplex section-shared protection ring (MS-SPRing). Using a series of facility loopbacks and terminal loopbacks, the example scenario traces the circuit path, tests the possible failure points, and eliminates them. The logical progression contains six network test procedures:

**Note**

MXP and TXP card client ports do not appear when you click the Maintenance > Loopback tab unless they have been provisioned. Do this in the card view by clicking the Provisioning > Pluggable Port Modules tab. For information about provisioning client ports, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

**Note**

The test sequence for your circuits will differ according to the type of circuit and network topology.

1. A facility loopback on the source-node MXP or TXP port
2. A terminal loopback on the source-node MXP or TXP port
3. A facility loopback on the intermediate-node MXP or TXP port
4. A terminal loopback on the intermediate-node MXP or TXP port
5. A facility loopback on the destination-node MXP or TXP port
6. A terminal loopback on the destination-node MXP or TXP port

**Note**

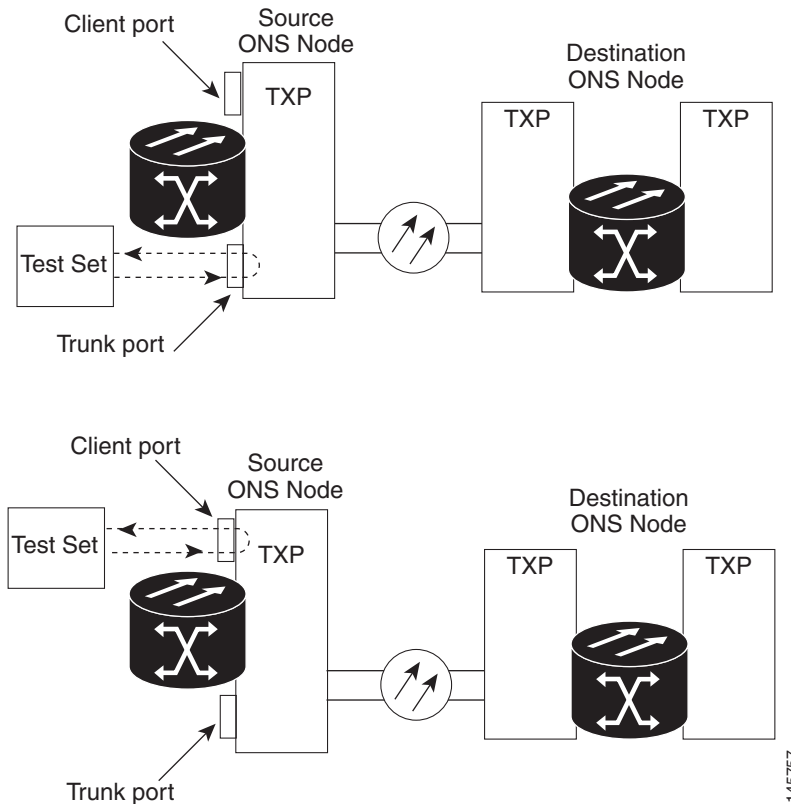
Facility and terminal loopback tests require on-site personnel.

1.2.1 Perform a Facility Loopback on a Source-Node MXP or TXP Port

This facility loopback test is performed on the node source port in the network circuit. In the testing situation used in this example, the source muxponder or transponder port under test is located in the source node. Facility loopback can be performed at the trunk port or at a client port. Completing a successful facility loopback on this port isolates the source MXP or TXP port as a possible failure point. [Figure 1-3](#) shows the facility loopback examples on source ONS node TXP ports (client and trunk).

1.2.1 Perform a Facility Loopback on a Source-Node MXP or TXP Port

Figure 1-3 Facility Loopback on a Circuit Source MXP or TXP Port



Caution

Performing a loopback on an in-service circuit is service-affecting.



Note

Facility loopbacks require on-site personnel.

Complete the [“Create the Facility Loopback on the Source-Node MXP or TXP Port”](#) procedure on page 1-8.

Create the Facility Loopback on the Source-Node MXP or TXP Port

Step 1 Connect an optical test set to the port you are testing.



Note

For specific procedures to connect, set up, and use the test set equipment, consult the manufacturer.

Use appropriate cabling to attach the transmit (Tx) and receive (Rx) terminals of the optical test set to the port you are testing. The Tx and Rx terminals connect to the same port.

Step 2 Adjust the test set accordingly. (Refer to manufacturer instructions for test set use.)

- Step 3** In node view (single-shelf mode) or shelf view (multishelf mode), double-click the card to display the card view.
- Step 4** Click the **Maintenance > Loopback** tabs.
- Step 5** Choose **OOS,MT** (or **locked,maintenance**) from the Admin State column for the port being tested. If this is a multiport card, select the appropriate row for the desired port.
- Step 6** Choose **Facility (Line)** from the Loopback Type column for the port being tested. If this is a multiport card, select the appropriate row for the desired port.
- Step 7** Click **Apply**.
- Step 8** Click **Yes** in the confirmation dialog box.

**Note**

It is normal for the “[LPBKFACILITY \(ESCON\)](#)” condition on page 2-95, “[LPBKFACILITY \(FC\)](#)” condition on page 2-95, “[LPBKFACILITY \(GE\)](#)” condition on page 2-96, “[LPBKFACILITY \(ISC\)](#)” condition on page 2-96 or the “[LPBKFACILITY \(TRUNK\)](#)” condition on page 2-97 to appear during loopback setup. The condition clears when you remove the loopback.

- Step 9** Complete the “[Test and Clear the MXP or TXP Facility Loopback Circuit](#)” procedure on page 1-9.

Test and Clear the MXP or TXP Facility Loopback Circuit

- Step 1** If the test set is not already sending traffic, send test traffic on the loopback circuit.
- Step 2** Examine the traffic received by the test set. Look for errors or any other signal information that the test set is capable of indicating.
- Step 3** If the test set indicates no errors, no further testing is necessary with the facility loopback. Clear the facility loopback:
- Click the **Maintenance > Loopback** tabs.
 - Choose **None** from the Loopback Type column for the port being tested.
 - Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 4** Complete the “[Test the MXP or TXP Card](#)” procedure on page 1-9.

Test the MXP or TXP Card

- Step 1** Complete the “[Physically Replace a Card](#)” procedure on page 2-172 for the suspected bad card and replace it with a known-good one.

**Warning**

High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag. Statement 201

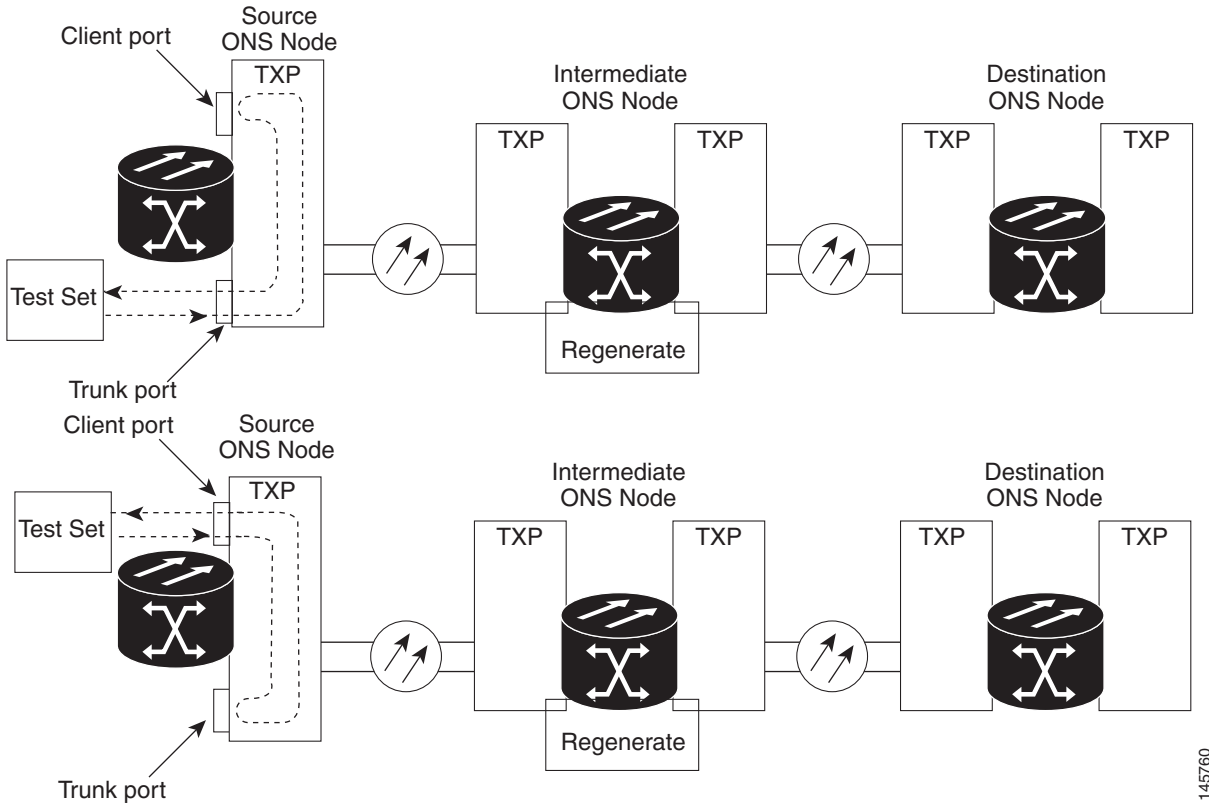
**Caution**

Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. Refer to the procedures in the [“2.8.1 Protection Switching, Lock Initiation, and Clearing” section on page 2-167](#). For more information, refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

- Step 2** Resend test traffic on the loopback circuit with a known-good card installed.
- Step 3** If the test set indicates no errors, the problem was probably the defective card. Return the defective card to Cisco through the Return Materials Authorization (RMA) process. Contact Cisco Technical Support (1-800-553-2447).
- Step 4** Complete the [“Physically Replace a Card” procedure on page 2-172](#) for the faulty card.
- Step 5** Clear the facility loopback:
- Click the **Maintenance > Loopback** tabs.
 - Choose **None** from the Loopback Type column for the port being tested.
 - Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 6** Complete the [“1.2.2 Perform a Terminal Loopback on a Source-Node MXP or TXP Port” procedure on page 1-10](#).

1.2.2 Perform a Terminal Loopback on a Source-Node MXP or TXP Port

The terminal loopback test is performed on the node source MXP or TXP muxponder or transponder port. For the circuit in this example, it is the source TXP trunk port or a client port in the source node. Completing a successful terminal loopback to a node source port verifies that the circuit is through the source port. [Figure 1-4](#) shows an example of a terminal loopback on a source TXP port and a client TXP port.

Figure 1-4 Terminal Loopback on a Source-Node MXP or TXP Port**Caution**

Performing a loopback on an in-service circuit is service-affecting.

**Note**

Terminal loopbacks require on-site personnel.

Complete the [“Create the Terminal Loopback on a Source-Node MXP or TXP Port”](#) procedure on page 1-11.

Create the Terminal Loopback on a Source-Node MXP or TXP Port

Step 1 Connect an optical test set to the port you are testing:

**Note**

For specific procedures to connect, set up, and use the test set equipment, consult the manufacturer.

- a. If you just completed the [“1.2.1 Perform a Facility Loopback on a Source-Node MXP or TXP Port”](#) procedure on page 1-7, leave the optical test set hooked up to the MXP or TXP port in the source node.

1.2.2 Perform a Terminal Loopback on a Source-Node MXP or TXP Port

- b. If you are starting the current procedure without the optical test set hooked up to the source port, use appropriate cabling to attach the Tx and Rx terminals of the optical test set to the port you are testing. Both Tx and Rx connect to the same port.
 - Step 2** Adjust the test set accordingly. (Refer to manufacturer instructions for test set use.)
 - Step 3** In node view (single-shelf mode) or shelf view (multishelf mode), double-click the card that requires the loopback.
 - Step 4** Click the **Maintenance > Loopback** tabs.
 - Step 5** Select **OOS,MT** (or **locked,maintenance**) from the Admin State column. If this is a multiport card, select the row appropriate for the desired port.
 - Step 6** Select **Terminal (Inward)** from the Loopback Type column. If this is a multiport card, select the row appropriate for the desired port.
 - Step 7** Click **Apply**.
 - Step 8** Click **Yes** in the confirmation dialog box.
 - Step 9** Complete the [“Test and Clear the MXP or TXP Port Terminal Loopback Circuit” procedure on page 1-12](#).
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Test and Clear the MXP or TXP Port Terminal Loopback Circuit

- Step 1** If the test set is not already sending traffic, send test traffic on the loopback circuit.
 - Step 2** Examine the test traffic being received by the test set. Look for errors or any other signal information that the test set is capable of indicating.
 - Step 3** If the test set indicates no errors, no further testing is necessary on the loopback circuit. Clear the terminal loopback state on the port:
 - a. Double-click the card in the source node with the terminal loopback.
 - b. Click the **Maintenance > Loopback** tabs.
 - c. Select **None** from the Loopback Type column for the port being tested.
 - d. Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
 - e. Click **Apply**.
 - f. Click **Yes** in the confirmation dialog box.
 - Step 4** Complete the [“Test the MXP or TXP Card” procedure on page 1-12](#).
-

Test the MXP or TXP Card

- Step 1** Complete the [“Physically Replace a Card” procedure on page 2-172](#) for the suspected bad card and replace it with a known-good one.

**Warning**

High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag. Statement 201

**Caution**

Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. Refer to the procedures in the [“2.8.1 Protection Switching, Lock Initiation, and Clearing” section on page 2-167](#). For more information, refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

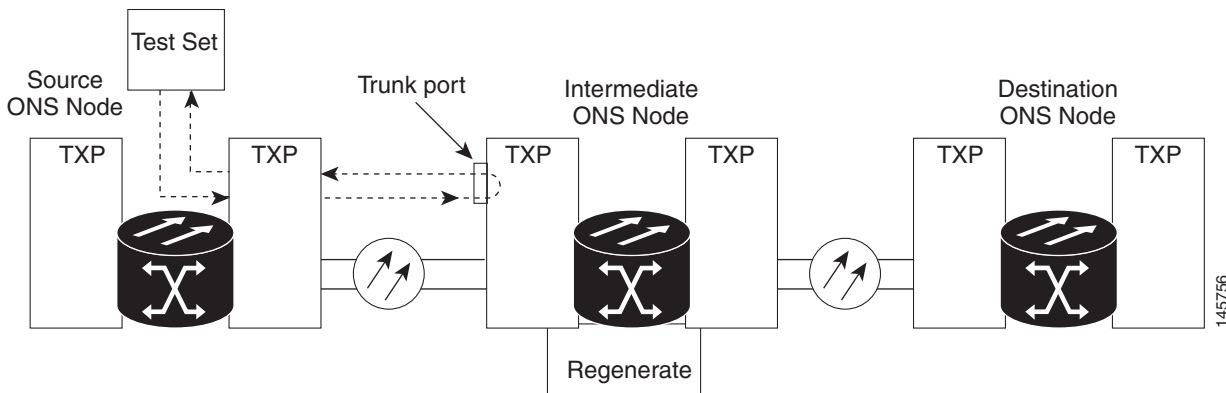
- Step 2** Resend test traffic on the loopback circuit with a known-good card.
- Step 3** If the test set indicates no errors, the problem was probably the defective card. Return the defective card to Cisco through the RMA process. Contact Cisco Technical Support (1-800-553-2447).
- Step 4** Complete the [“Physically Replace a Card” procedure on page 2-172](#) for the defective card.
- Step 5** Clear the terminal loopback on the port before testing the next segment of the network circuit path:
- Double-click the card in the source node with the terminal loopback.
 - Click the **Maintenance > Loopback** tabs.
 - Select **None** from the Loopback Type column for the port being tested.
 - Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 6** Complete the [“1.2.3 Create a Facility Loopback on an Intermediate-Node MXP or TXP Port” procedure on page 1-13](#).

1.2.3 Create a Facility Loopback on an Intermediate-Node MXP or TXP Port

Performing the facility loopback test on an intermediate port isolates whether this node is causing circuit failure. In the situation shown in [Figure 1-5](#), the test is being performed on an intermediate MXP or TXP port.

1.2.3 Create a Facility Loopback on an Intermediate-Node MXP or TXP Port

Figure 1-5 Facility Loopback on an Intermediate-Node MXP or TXP Port



Caution

Performing a loopback on an in-service circuit is service-affecting.

Note

Facility loopbacks require on-site personnel.

Complete the [“Create a Facility Loopback on an Intermediate-Node MXP or TXP Port” procedure on page 1-14](#).

Create a Facility Loopback on an Intermediate-Node MXP or TXP Port

Step 1 Connect an optical test set to the port you are testing:



Note For specific procedures to connect, set up, and use the test set equipment, consult the manufacturer.

- a. If you just completed the [“1.2.2 Perform a Terminal Loopback on a Source-Node MXP or TXP Port” procedure on page 1-10](#), leave the optical test set hooked up to the source-node port.
- b. If you are starting the current procedure without the optical test set hooked up to the source port port, use appropriate cabling to attach the Tx and Rx terminals of the optical test set to the port you are testing. Both Tx and Rx connect to the same port.

Step 2 Adjust the test set accordingly. (Refer to manufacturer instructions for test set use.)

Step 3 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the intermediate-node card that requires the loopback.

Step 4 Click the **Maintenance > Loopback** tabs.

Step 5 Select **OOS,MT** (or **locked,maintenance**) from the Admin State column. If this is a multiport card, select the row appropriate for the desired port.

Step 6 Select **Facility (Line)** from the Loopback Type column. If this is a multiport card, select the row appropriate for the desired port.

Step 7 Click **Apply**.

Step 8 Click **Yes** in the confirmation dialog box.

- Step 9** Complete the “[Test and Clear the MXP or TXP Port Facility Loopback Circuit](#)” procedure on page 1-15.

Test and Clear the MXP or TXP Port Facility Loopback Circuit

- Step 1** If the test set is not already sending traffic, send test traffic on the loopback circuit.
- Step 2** Examine the traffic received by the test set. Look for errors or any other signal information that the test set is capable of indicating.
- Step 3** If the test set indicates no errors, no further testing is necessary with the facility loopback. Clear the facility loopback from the port:
- a. Click the **Maintenance > Loopback** tabs.
 - b. Choose **None** from the Loopback Type column for the port being tested.
 - c. Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
 - d. Click **Apply**.
 - e. Click **Yes** in the confirmation dialog box.
- Step 4** Complete the “[Test the MXP or TXP Card](#)” procedure on page 1-15.

Test the MXP or TXP Card

- Step 1** Complete the “[Physically Replace a Card](#)” procedure on page 2-172 for the suspected bad card and replace it with a known-good one.



Warning

High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag. Statement 201



Caution

Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. Refer to the procedures in the “[2.8.1 Protection Switching, Lock Initiation, and Clearing](#)” section on page 2-167. For more information, refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

- Step 2** Resend test traffic on the loopback circuit with a known-good card installed.
- Step 3** If the test set indicates no errors, the problem was probably the defective card. Return the defective card to Cisco through the RMA process. Contact Cisco Technical Support (1-800-553-2447).
- Step 4** Complete the “[Physically Replace a Card](#)” procedure on page 2-172 for the faulty card.
- Step 5** Clear the facility loopback from the port:
- a. Click the **Maintenance > Loopback** tabs.
 - b. Choose **None** from the Loopback Type column for the port being tested.

1.2.4 Create a Terminal Loopback on Intermediate-Node MXP or TXP Ports

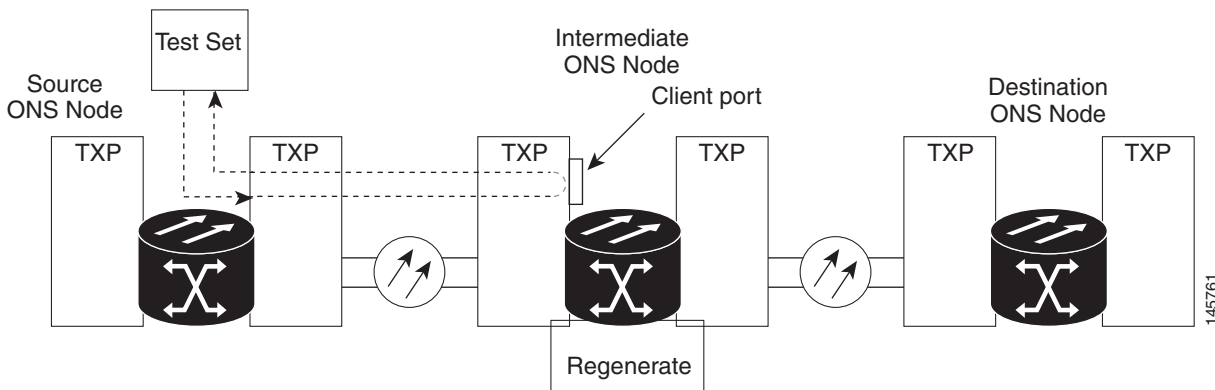
- c. Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
- d. Click **Apply**.
- e. Click **Yes** in the confirmation dialog box.

Step 6 Complete the “[1.2.4 Create a Terminal Loopback on Intermediate-Node MXP or TXP Ports](#)” procedure on page 1-16.

1.2.4 Create a Terminal Loopback on Intermediate-Node MXP or TXP Ports

In the next troubleshooting test, you perform a terminal loopback on the intermediate-node port to isolate whether the intermediate client or trunk port is causing circuit trouble. In the example situation in [Figure 1-6](#), the terminal loopback is performed on an intermediate MXP or TXP port in the circuit. If you successfully complete a terminal loopback on the node, this node is excluded from possible sources of circuit trouble.

Figure 1-6 Terminal Loopback on an Intermediate-Node MXP or TXP Port



Caution

Performing a loopback on an in-service circuit is service-affecting.



Note

Terminal loopbacks require on-site personnel.

Complete the “[Create a Terminal Loopback on Intermediate-Node MXP or TXP Ports](#)” procedure on page 1-17.

Create a Terminal Loopback on Intermediate-Node MXP or TXP Ports

Step 1 Connect an optical test set to the port you are testing:



Note For specific procedures to connect, set up, and use the test set equipment, consult the manufacturer.

- a. If you just completed the [“1.2.3 Create a Facility Loopback on an Intermediate-Node MXP or TXP Port” section on page 1-13](#), leave the optical test set hooked up to the source-node port.
- b. If you are starting the current procedure without the optical test set hooked up to the source port, use appropriate cabling to attach the Tx and Rx terminals of the optical test set to the port you are testing. Both Tx and Rx connect to the same port.

Step 2 Adjust the test set accordingly. (Refer to manufacturer instructions for test set use.)

Step 3 Create the terminal loopback on the destination port being tested:

- a. Go to node view (single-shelf mode) or shelf view (multishelf mode) of the intermediate node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node (or shelf) from the drop-down list in the Select Node dialog box and click **OK**.
- b. In node view (single-shelf mode) or shelf view (multishelf mode), double-click the card that requires the loopback.
- c. Click the **Maintenance > Loopback** tabs.
- d. Select **OOS,MT** (or **locked,maintenance**) from the Admin State column. If this is a multiport card, select the row appropriate for the desired port.
- e. Select **Terminal (Inward)** from the Loopback Type column. If this is a multiport card, select the row appropriate for the desired port.
- f. Click **Apply**.
- g. Click **Yes** in the confirmation dialog box.

Step 4 Complete the [“Test and Clear the MXP or TXP Terminal Loopback Circuit” procedure on page 1-17](#).

Test and Clear the MXP or TXP Terminal Loopback Circuit

Step 1 If the test set is not already sending traffic, send test traffic on the loopback circuit.

Step 2 Examine the test traffic being received by the test set. Look for errors or any other signal information that the test set is capable of indicating.

Step 3 If the test set indicates no errors, no further testing is necessary on the loopback circuit. Clear the terminal loopback from the port:

- a. Double-click the intermediate-node card with the terminal loopback to display the card view.
- b. Click the **Maintenance > Loopback** tabs.
- c. Select **None** from the Loopback Type column for the port being tested.
- d. Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.

1.2.5 Perform a Facility Loopback on a Destination-Node MXP or TXP Port

- e. Click **Apply**.
- f. Click **Yes** in the confirmation dialog box.

Step 4 Complete the “[Test the MXP or TXP Card](#)” procedure on page 1-18.

Test the MXP or TXP Card

Step 1 Complete the “[Physically Replace a Card](#)” procedure on page 2-172 for the suspected bad card and replace it with a known-good one.



Warning

High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag. Statement 201



Caution

Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. Refer to the procedures in the “[2.8.1 Protection Switching, Lock Initiation, and Clearing](#)” section on page 2-167. For more information, refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

Step 2 Resend test traffic on the loopback circuit with a known-good card.

Step 3 If the test set indicates no errors, the problem was probably the defective card. Return the defective card to Cisco through the RMA process. Contact Cisco Technical Support (1-800-553-2447).

Step 4 Complete the “[Physically Replace a Card](#)” procedure on page 2-172 for the defective card.

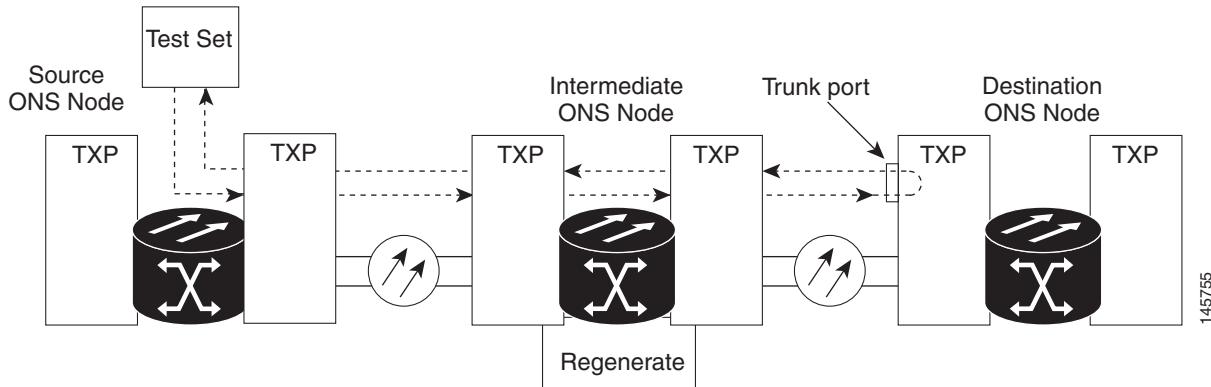
Step 5 Clear the terminal loopback on the port:

- a. Double-click the source-node card with the terminal loopback.
- b. Click the **Maintenance > Loopback** tabs.
- c. Select **None** from the Loopback Type column for the port being tested.
- d. Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
- e. Click **Apply**.
- f. Click **Yes** in the confirmation dialog box.

Step 6 Complete the “[1.2.5 Perform a Facility Loopback on a Destination-Node MXP or TXP Port](#)” procedure on page 1-18.

1.2.5 Perform a Facility Loopback on a Destination-Node MXP or TXP Port

You perform a facility loopback test at the destination port to determine whether this local port is the source of circuit trouble. The example in [Figure 1-7](#) shows a facility loopback being performed on a TXP client or trunk port at a destination node.

Figure 1-7 Facility Loopback on a Destination-Node MXP or TXP Port**Caution**

Performing a loopback on an in-service circuit is service-affecting.

**Note**

Facility loopbacks require on-site personnel.

Complete the [“Create the Facility Loopback on a Destination-Node MXP or TXP Port” procedure on page 1-19](#).

Create the Facility Loopback on a Destination-Node MXP or TXP Port

Step 1 Connect an optical test set to the port you are testing:

**Note**

For specific procedures to connect, set up, and use the test set equipment, consult the manufacturer.

- a. If you just completed the [“1.2.4 Create a Terminal Loopback on Intermediate-Node MXP or TXP Ports” procedure on page 1-16](#), leave the optical test set hooked up to the source-node port.
- b. If you are starting the current procedure without the optical test set hooked up to the source port, use appropriate cabling to attach the Tx and Rx terminals of the optical test set to the port you are testing. Both Tx and Rx connect to the same port.

Step 2 Adjust the test set accordingly. (Refer to manufacturer instructions for test set use.)

Step 3 Create the facility loopback on the destination port being tested:

- a. Go to the node view (single-shelf mode) or shelf view (multishelf mode) of the destination node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node (or shelf) from the drop-down list in the Select Node dialog box and click **OK**.
- b. In node view (single-shelf mode) or shelf view (multishelf mode), double-click the card that requires the loopback.
- c. Click the **Maintenance > Loopback** tabs.
- d. Select **OOS,MT** (or **locked,maintenance**) from the Admin State column. If this is a multiport card, select the row appropriate for the desired port.

1.2.5 Perform a Facility Loopback on a Destination-Node MXP or TXP Port

- e. Select **Facility (Line)** from the Loopback Type column. If this is a multiport card, select the row appropriate for the desired port.
- f. Click **Apply**.
- g. Click **Yes** in the confirmation dialog box.

Step 4 Complete the [“Test and Clear the MXP or TXP Facility Loopback Circuit” procedure on page 1-20](#).

Test and Clear the MXP or TXP Facility Loopback Circuit

- Step 1** If the test set is not already sending traffic, send test traffic on the loopback circuit.
 - Step 2** Examine the traffic received by the test set. Look for errors or any other signal information that the test set is capable of indicating.
 - Step 3** If the test set indicates no errors, no further testing is necessary with the facility loopback. Clear the facility loopback from the port:
 - a. Click the **Maintenance > Loopback** tabs.
 - b. Choose **None** from the Loopback Type column for the port being tested.
 - c. Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
 - d. Click **Apply**.
 - e. Click **Yes** in the confirmation dialog box.
 - Step 4** Complete the [“Test the MXP or TXP Card” procedure on page 1-20](#).
-

Test the MXP or TXP Card

- Step 1** Complete the [“Physically Replace a Card” procedure on page 2-172](#) for the suspected bad card and replace it with a known-good one.



Warning

High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag. Statement 201



Caution

Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. Refer to the procedures in the [“2.8.1 Protection Switching, Lock Initiation, and Clearing” section on page 2-167](#). For more information, refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

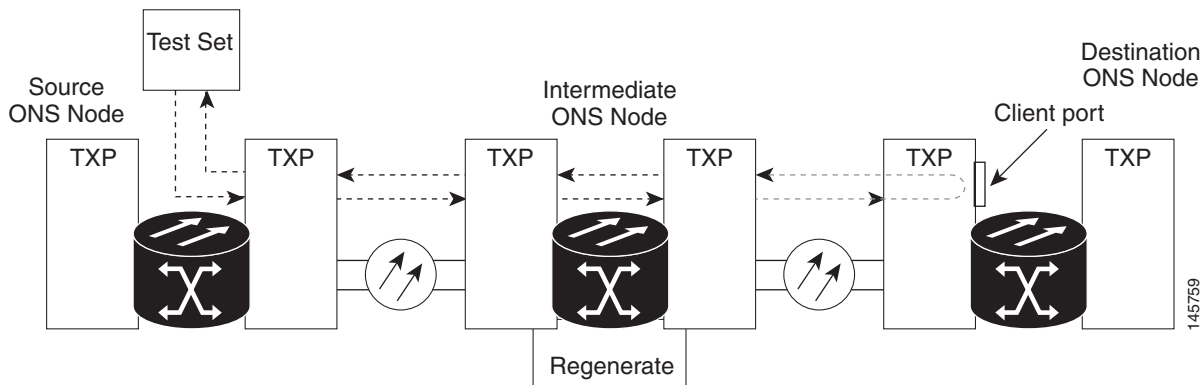
- Step 2** Resend test traffic on the loopback circuit with a known-good card installed.
- Step 3** If the test set indicates no errors, the problem was probably the defective card. Return the defective card to Cisco through the RMA process. Contact Cisco Technical Support (1-800-553-2447).
- Step 4** Complete the [“Physically Replace a Card” procedure on page 2-172](#) for the faulty card.

- Step 5** Clear the facility loopback on the port:
- Click the **Maintenance > Loopback** tabs.
 - Choose **None** from the Loopback Type column for the port being tested.
 - Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 6** Complete the [“1.2.6 Perform a Terminal Loopback on a Destination-Node MXP or TXP Port” procedure on page 1-21.](#)

1.2.6 Perform a Terminal Loopback on a Destination-Node MXP or TXP Port

The terminal loopback at the destination-node port is the final local hardware error elimination in the circuit troubleshooting process. If this test is completed successfully, you have verified that the circuit is good up to the destination port. The example in [Figure 1-8](#) shows a terminal loopback on an destination node TXP port.

Figure 1-8 Terminal Loopback on a Destination-Node MXP or TXP Port



Caution

Performing a loopback on an in-service circuit is service-affecting.



Note

Terminal loopbacks require on-site personnel.

Complete the [“Create the Terminal Loopback on a Destination-Node MXP or TXP Port” procedure on page 1-22.](#)

Create the Terminal Loopback on a Destination-Node MXP or TXP Port

Step 1 Connect an optical test set to the port you are testing:



Note For specific procedures to connect, set up, and use the test set equipment, consult the manufacturer.

- a. If you just completed the [“1.2.5 Perform a Facility Loopback on a Destination-Node MXP or TXP Port” procedure on page 1-18](#), leave the optical test set hooked up to the source port.
- b. If you are starting the current procedure without the optical test set hooked up to the source port, use appropriate cabling to attach the Tx and Rx terminals of the optical test set to the port you are testing. Both Tx and Rx connect to the same port.

Step 2 Adjust the test set accordingly. (Refer to manufacturer instructions for test set use.)



Note It is normal for the [“LPBKTERMINAL \(ESCON\)” condition on page 2-97](#), [“LPBKTERMINAL \(FC\)” condition on page 2-98](#), [“LPBKTERMINAL \(GE\)” condition on page 2-98](#), [“LPBKTERMINAL \(ISC\)” condition on page 2-99](#) or the [“LPBKTERMINAL \(TRUNK\)” condition on page 2-99](#) to appear during loopback setup. The condition clears when you remove the loopback.

Step 3 Create the terminal loopback on the destination port being tested:

- a. Go to the node view (single-shelf mode) or shelf view (multishelf mode) of the destination node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node (or shelf) from the drop-down list in the Select Node dialog box and click **OK**.
- b. In node view (single-shelf mode) or shelf view (multishelf mode), double-click the card that requires the loopback.
- c. Click the **Maintenance > Loopback** tabs.
- d. Select **OOS,MT** (or **locked,maintenance**) from the Admin State column. If this is a multiport card, select the row appropriate for the desired port.
- e. Select **Terminal (Inward)** from the Loopback Type column. If this is a multiport card, select the row appropriate for the desired port.
- f. Click **Apply**.
- g. Click **Yes** in the confirmation dialog box.

Step 4 Complete the [“Test and Clear the MXP or TXP Terminal Loopback Circuit” procedure on page 1-22](#).

Test and Clear the MXP or TXP Terminal Loopback Circuit

Step 1 If the test set is not already sending traffic, send test traffic on the loopback circuit.

Step 2 Examine the test traffic being received by the test set. Look for errors or any other signal information that the test set is capable of indicating.

- Step 3** If the test set indicates no errors, no further testing is necessary on the loopback circuit. Clear the terminal loopback from the port:
- Double-click the intermediate-node card with the terminal loopback.
 - Click the **Maintenance > Loopback** tabs.
 - Select **None** from the Loopback Type column for the port being tested.
 - Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 4** If the test set indicates errors, the problem might be a faulty card.
- Step 5** Complete the [“Test the MXP or TXP Card” procedure on page 1-23](#).
-

Test the MXP or TXP Card

- Step 1** Complete the [“Physically Replace a Card” procedure on page 2-172](#) for the suspected bad card and replace it with a known-good one.



Warning

High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag. Statement 201



Caution

Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. Refer to the procedures in the [“2.8.1 Protection Switching, Lock Initiation, and Clearing” section on page 2-167](#). For more information, refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

- Step 2** Resend test traffic on the loopback circuit with a known-good card.
- Step 3** If the test set indicates no errors the problem was probably the defective card. Return the defective card to Cisco through the RMA process. Contact Cisco Technical Support (1-800-553-2447).
- Step 4** Complete the [“Physically Replace a Card” procedure on page 2-172](#) for the defective card.
- Step 5** Clear the terminal loopback on the port:
- Double-click the source-node card with the terminal loopback.
 - Click the **Maintenance > Loopback** tabs.
 - Select **None** from the Loopback Type column for the port being tested.
 - Choose the appropriate state to place the port in service, out of service and disabled, out of service for maintenance, or automatically in service from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.

The entire circuit path has now passed its comprehensive series of loopback tests. This circuit qualifies to carry live traffic.

1.3 Troubleshooting DWDM Circuit Paths With ITU-T G.709 Monitoring

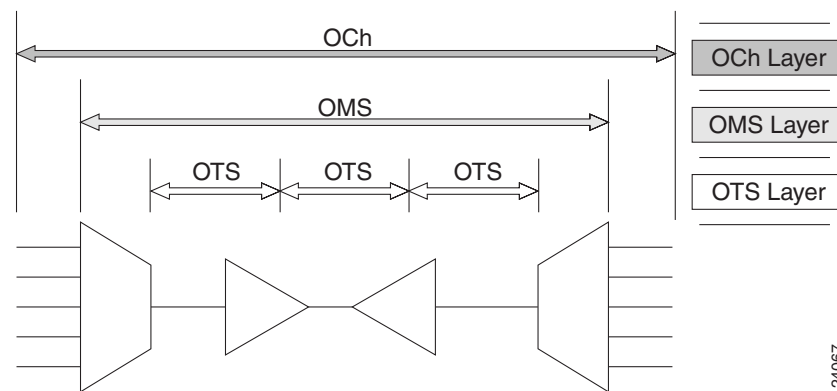
This section provides an overview of the optical transport network (OTN) specified in ITU-T G.709, *Network Node Interface for the Optical Transport Network*, and provides troubleshooting procedures for DWDM circuit paths in the ITU-T G.709 OTN using PM and TCAs.

1.3.1 ITU-T G.709 Monitoring in Optical Transport Networks

ITU-T Recommendation G.709 is part of a suite of recommendations covering the full functionality of an OTN. ITU-T G.709 enables single-wavelength SONET transparent optical wavelength-based networks. ITU-T G.709 adds the Operation, Administration, Maintenance, and Provisioning (OAM&P) functionality of SONET/SDH to DWDM optical networks. It adds extra overhead to existing SONET, Ethernet, or asynchronous transfer mode (ATM) bit streams for performance management and improvement.

Like traditional SONET networks, ITU-T G.709 optical networks have a layered design (Figure 1-9). This structure enables localized monitoring that helps you isolate and troubleshoot network problems.

Figure 1-9 Optical Transport Network Layers



1.3.2 Optical Channel Layer

The optical channel (OCH) layer is the outermost part of the OTN and spans from client to client. The optical channel is built as follows:

1. A client signal such as SONET, Gigabit Ethernet, IP, ATM, Fibre Channel, or enterprise system connection (ESCON) is mapped to a client payload area and combined with an overhead to create the optical channel payload unit (OPUk).

2. A second overhead is added to the OPuK unit to create the optical channel data unit (ODuK).
3. A third overhead including forward error correction (FEC) is added to the ODuK to create the optical channel transport unit (OTuK).
4. A fourth overhead is added to the OTuK to create the entire OCH layer.

1.3.3 Optical Multiplex Section Layer

The optical multiplex section (OMS) of the OTN allows carriers to identify errors occurring within DWDM network sections. The OMS layer consists of a payload and an overhead (OMS-OH). It supports the ability to monitor multiplexed sections of the network, for example, the span between an optical multiplexer such as the 32MUX-O card and an optical demultiplexer such as the 32DMX-O card.

1.3.4 Optical Transmission Section Layer

The optical transmission section (OTS) layer supports monitoring partial spans of a network's multiplexed sections. This layer consists of a payload and an overhead (OTS-OH). It is a transmission span between two elements in an optical network, such as between:

- A multiplexer such as the 32MUX-O card and an amplifier such as the OPT-PRE card
- An amplifier and another amplifier, such as the OPT-BST card and the OPT-PRE card
- An amplifier such as the OPT-BST card and a demultiplexer such as the 32DMX card

1.3.5 Performance Monitoring Counters and Threshold Crossing Alerts

PM counters and TCAs can be used for identifying trouble and troubleshooting problems in ITU-T G.709 optical transport networks. ITU-T Recommendation M.2401 recommends that the following PM parameters be monitored at the ODuK layer:

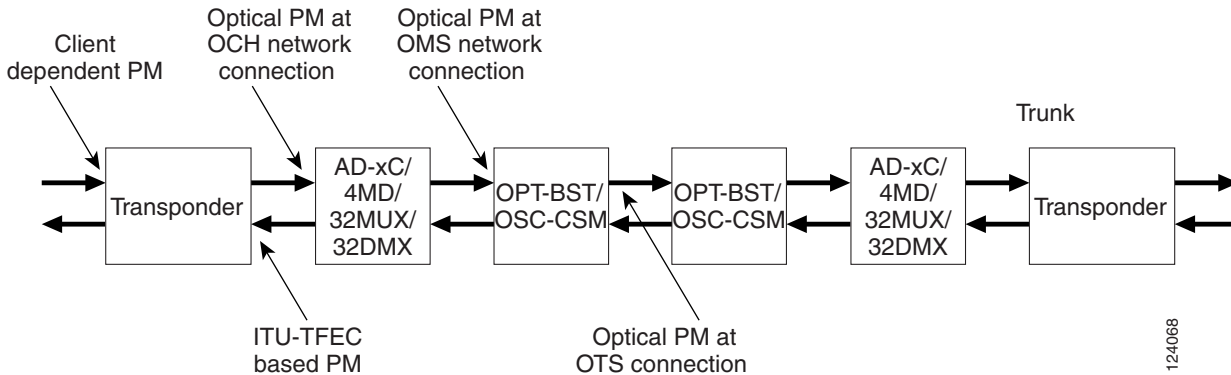
- SES (severely errored seconds)—A one-second period that contains greater than or equal to 30 percent errored blocks or at least one defect. SES is a subset of the errored second (ES) parameter, which is a one-second period with one or more errored blocks or at least one defect.
- BBE (background block error counter)—An errored block not occurring as part of an SES. BBE is a subset of the errored block (EB) parameter, which is a block in which one or more bits are in error.

Different PM count parameters are associated with different read points in a network. [Figure 1-10](#) illustrates the PM read points that are useful in identifying DWDM circuit points of failure. The “Performance Monitoring” chapter in the *Cisco ONS 15454 DWDM Reference Manual* lists all PM parameters and provides block diagrams of signal entry points, exit points, and interconnections between the individual circuit cards. Consult these specifications to determine which PM parameters are associated with the system points you want to monitor or provision with CTC or TL1. The monitoring points might vary according to your configuration.



Note

When LOS, LOS-P, or LOF alarms occur on TXP and MXP trunks, G709/SONET/SDH TCAs are suppressed. For details, see the “Alarm and TCA Monitoring and Management” chapter in the *Cisco ONS 15454 DWDM Reference Manual*.

Figure 1-10 Performance Monitoring Points on ONS DWDM

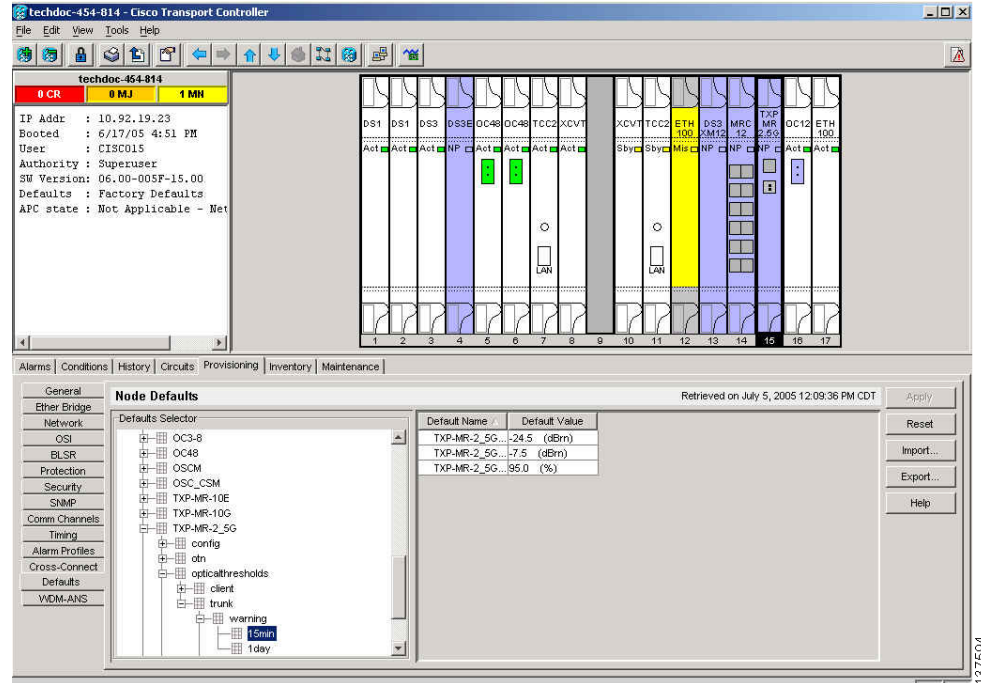
TCAs are used to monitor performance through the management interface by indicating whether preset thresholds have been crossed, or whether a transmission (such as a laser transmission) is degraded. TCAs are not associated with severity levels. They are usually associated with rate, counter, and percentage parameters that are available at transponder monitoring points. The “Performance Monitoring” chapter in the *Cisco ONS 15454 DWDM Reference Manual* contains more information about these alerts.

Select and complete the following procedures according to your network parameters.

Set Node Default BBE or SES Card Thresholds

Complete the following procedure to provision default node ODUk BBE and SES PM thresholds for TXP cards.

-
- Step 1** In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Defaults** tabs (Figure 1-11).

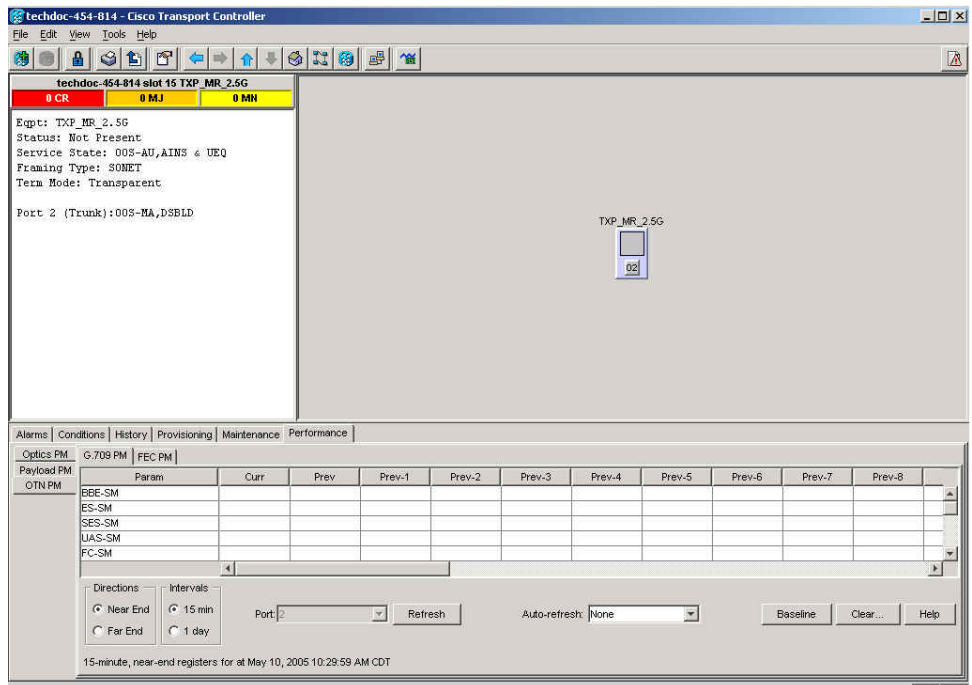
Figure 1-11 Set Default BBE/SES Card Thresholds

- Step 2** In the Defaults Selector field, click the transponder or muxponder card you wish to provision, then click **opticalthresholds > trunk > warning > 15min** in the drop-down list.

Provision Individual Card BBE or SES Thresholds in CTC

Complete the following procedure to provision BBE or SES PM thresholds in CTC for an individual TXP card.

- Step 1** In node view (single-shelf mode) or shelf view (multishelf mode), double-click the applicable transponder or muxponder card (TXP_MR_10G, TXPP_MR_2.5G, or MXP_2.5G_10G.)
- Step 2** Click the **Provisioning > OTN > G.709 Thresholds** tabs (Figure 1-12).

Figure 1-12 Provision Card BBE/SES Thresholds

- Step 3** In the Directions area, click the **Near End** radio button.
- Step 4** In the Intervals area, click the **15 Min** radio button.
- Step 5** In the Types area, click the **PM (ODUk)** radio button.
- Step 6** In the SES and BBE fields, enter threshold numbers, for example 500 and 10000.

Provision Card PM Thresholds Using TL1

Complete the following procedure if you wish to provision PM thresholds in TL1 rather than in CTC.

- Step 1** Open a TL1 command line (click **Tools > Open TL1 Connection**).
- Step 2** In the TL1 command line, enter a command using the following syntax:
- ```
SET-TH-OCH:[<TID>]:<AID>:<CTAG>::<MONTYPE>,<THLEV>,[<LOCN>],[<TMPER>];
```
- where:

- Access Identifier (AID) identifies the NE to which the command pertains. All the STS, VT1, facility, and DS1 AIDs are supported.
- The parameter MONTYPE is the monitored type.
- The parameter THLEV is optional and indicates a threshold count value (the number of errors that must be exceeded before the threshold is crossed).
- The parameter LOCN specifies the location associated with the particular command.
- The parameter TMPER is optional and is an accumulation time period for performance counters, with possible values of 1-DAY, 1-HR, 1-MIN, 15-MIN, and RAW-DATA.

**Note**

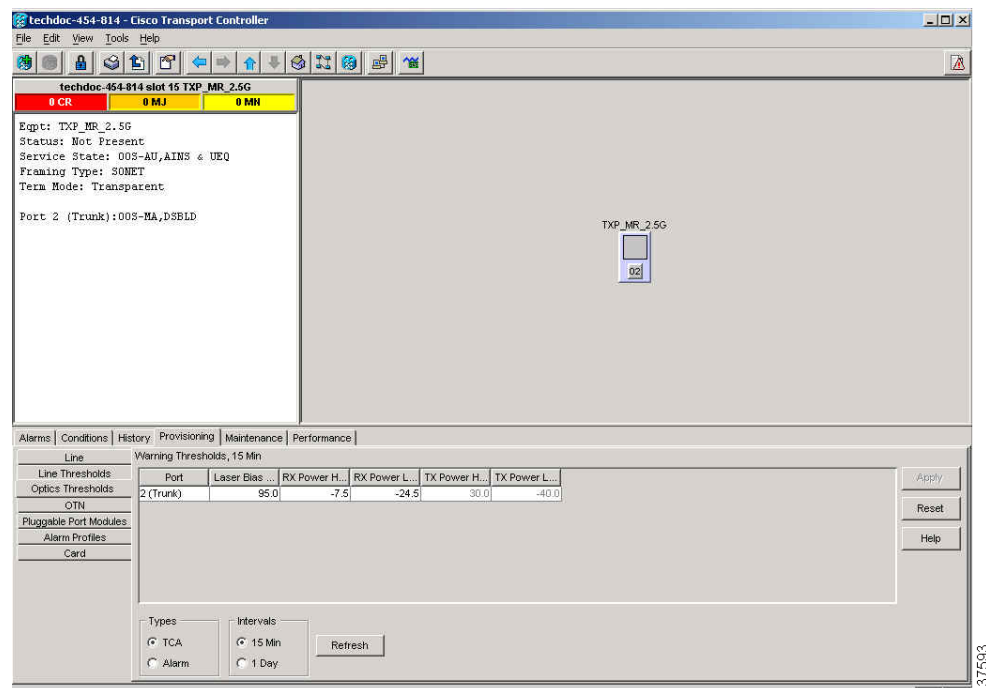
For a more information about this command and a list of TL1 commands, refer to the *Cisco SONET TL1 Command Guide* at the following link:  
[http://www.cisco.com/en/US/products/hw/optical/ps2006/products\\_command\\_reference\\_book09186a0080483b9b.html](http://www.cisco.com/en/US/products/hw/optical/ps2006/products_command_reference_book09186a0080483b9b.html)

## Provision Optical TCA Thresholds

Complete the following procedure to provision TCA thresholds in CTC.

- Step 1** In card view, click the **Provisioning > Optics Thresholds** tabs (Figure 1-13).

**Figure 1-13 Provision Optical TCA Thresholds**



- Step 2** In the Types area, click **TCA**.
- Step 3** In the Intervals area, click **15 Min**.
- Step 4** In the Laser Bias High (%) field, enter the threshold value, for example, 81.0 percent.

## 1.3.6 Forward Error Correction

In DWDM spans, FEC reduces the quantities of retiming, reshaping, and regeneration (3R) needed to maintain signal quality. The following two PM parameters are associated with FEC:

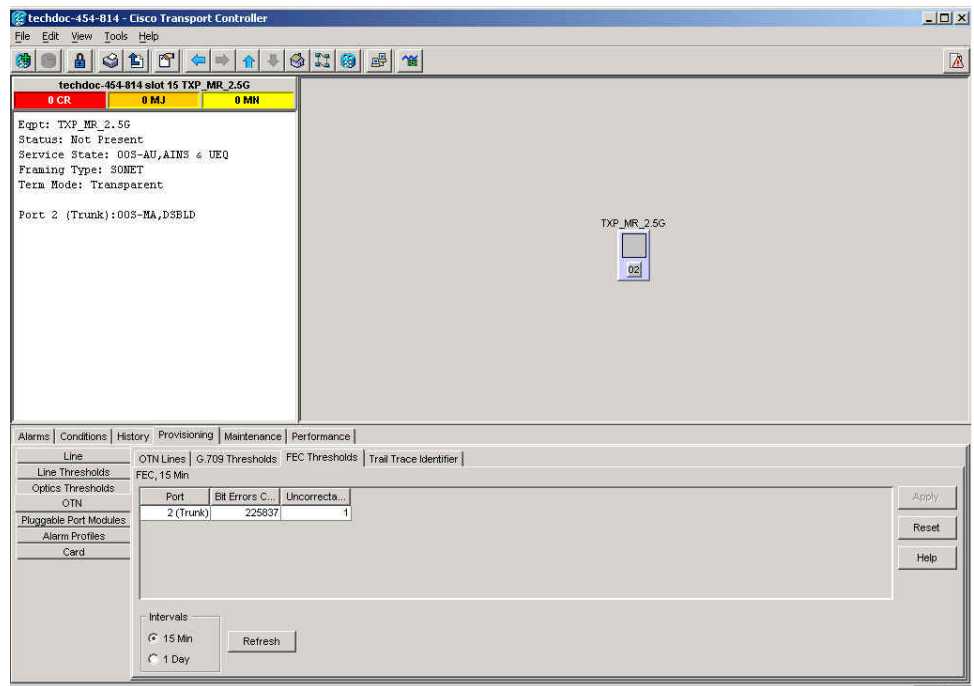
- **BIT-EC**—Bit errors corrected (BIT-EC) indicates the number of bit errors corrected in the DWDM trunk line during the PM time interval.
- **UNC-WORDS**—The number of uncorrectable words detected in the DWDM trunk line during the PM time interval.

Complete the following procedure to provision BIT-EC and UNC-WORDS PM parameters for FEC.

### Provision Card FEC Thresholds

- Step 1** In node view (single-shelf mode) or shelf view (multishelf mode), double-click a transponder or muxponder card to open the card view. (In this example, cards such as the TXP\_MR\_10G, TXPP\_MR\_2.5G, and MXP\_2.5G\_10G are applicable.)
- Step 2** Click the **Provisioning > OTN > FEC Thresholds** tabs (Figure 1-14).

**Figure 1-14 Provision Card FEC Thresholds**



- Step 3** In the Bit Errors Corrected field, enter a threshold number, for example 225837.
- Step 4** In the Uncorrectable Words field, enter a threshold number, for example, 2.
- Step 5** In the Intervals area, click **15 Min**.

## 1.3.7 Sample Trouble Resolutions

The following sample trouble resolutions use PM and TCAs to isolate degrade points.

**Symptom** There is a BBE TCA on a single transponder pair.

**Possible Cause** The transponder input power is out of range.

**Recommended Action** Check the input power on the transponder. It should be within the specified/supported range.

**Possible Cause** There are dirty trunk connectors on the transponder.

**Recommended Action** Check the connector on the trunk port.

**Possible Cause** There is a degraded trunk patchcord between the transponder and the DWDM port.

**Recommended Action** Check the patchcord on the transponder DWDM port.

**Possible Cause** There are dirty client connectors on the ADxC-xx.x card transmit port or the demultiplexer (DMX) has crossed the near-end TCA.

**Recommended Action** Check the connector on the OCH port of the ADxC-xx.x card.

**Possible Cause** There are dirty client connectors on the ADxC-xx.x card receive port or the multiplexer (MUX) has crossed the far-end TCA point.

**Recommended Action** If an optical channel bypass exists along the line, check the connectors.

**Symptom** There is a BBE TCA on all transponders connected to an ADxB-xx.x card.

**Possible Cause** The transponder input power is out of range.

**Recommended Action** Check the input power on the transponder. It should be within the specified/supported range.

**Possible Cause** There is a dirty connector on the 4MD-xx.x card port.

**Recommended Action** Check the connector on the drop port of the 4MD-xx.x card.

**Possible Cause** There is a dirty connector on the ADxB-xx.x card drop port, and it has crossed the near-end TCA point.

**Recommended Action** Check the connector on the drop port of the ADxB-xx.x card.

**Possible Cause** There is a dirty connector on the ADxB-xx.x card add port and it has crossed the far-end TCA.

**Recommended Action** Check the patchcord on the 4MD-xx.x or AD1B-xx.x card.

**Possible Cause** There is a degraded patchcord between the ADxB-xx.x and 4MD-xx.x cards.

**Recommended Action** If an optical band bypass exists along the line, check the band connectors.

**Symptom** There is a BBE TCA on all transponders that the OCH passes through a single OTS section.

**Possible Cause** This is not a transponder or channel-related issue.

**Recommended Action** The problem is in the intercabinet signal path preceding the transponder. Refer to the *Cisco ONS 15454 DWDM Procedure Guide* for more information about configurations and acceptance tests for this area.

**Symptom** You have a laser bias current (LBC) TCA on a single transponder.

**Possible Cause** The laser of the transponder is degrading.

**Recommended Action** The problem is within the laser circuitry. Check the OPT-PRE or OPT-BST optical amplifier cards. Refer to the *Cisco ONS 15454 DWDM Procedure Guide* for more information about setting up these cards.

## 1.4 Using CTC Diagnostics

In Software Release 7.0, CTC provides diagnostics for the following functions:

- Verifying proper card application-specific integrated circuit (ASIC) functionality
- Verifying standby card operation
- Verifying proper card LED operation
- Diagnostic circuit creation
- Customer problem notifications detected by alarms
- Provision of a downloadable, machine-readable diagnostic information file to be used by Cisco Technical Support

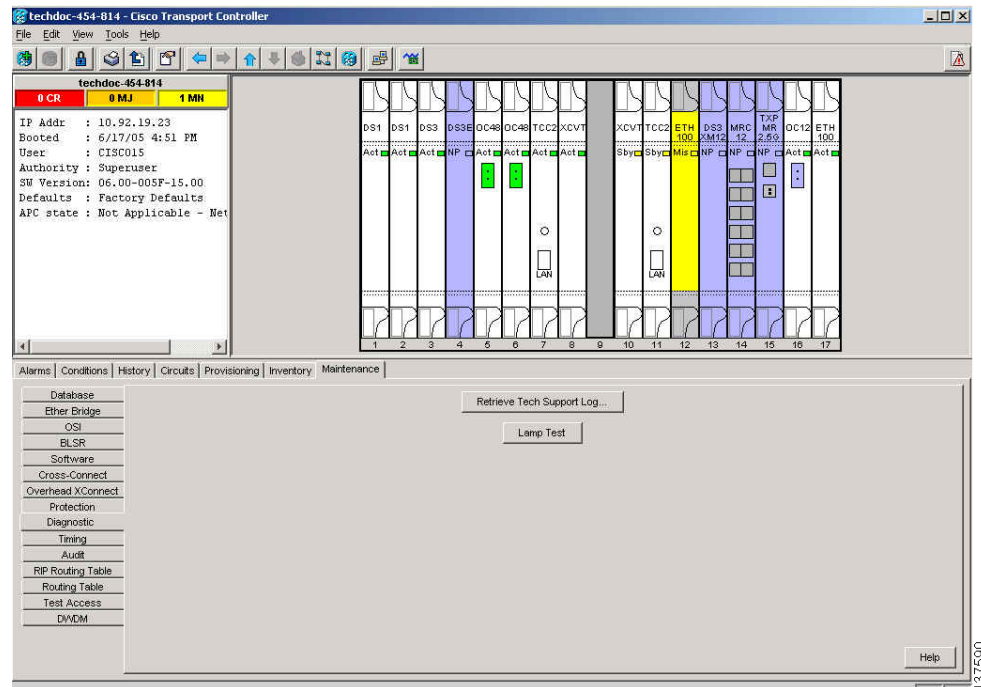
Some of these functions, such as ASIC verification and standby card operation, are invisibly monitored in background functions. Change or problem notifications are provided in the Alarms and Conditions windows. Other diagnostic functions—verifying card LED function, creating bidirectional diagnostic circuits, and also downloading diagnostic files for technical support—are available to the user in the node view (single-shelf mode) or shelf view (multishelf mode) Maintenance > Diagnostic tab. The user-operated diagnostic features are described in the following paragraphs.

### 1.4.1 Card LED Lamp Tests

A card LED lamp test determines whether card-level indication LEDs are operational. This diagnostic test is run as part of the initial ONS 15454 turn-up, during maintenance routines, or any time you question whether an LED is in working order. Maintenance or higher-level users can complete the following tasks to verify LED operation.

#### Verify Card LED Operation

- 
- Step 1** In node view (single-shelf mode) or shelf view (multishelf mode), click the **Maintenance > Diagnostic** tabs ([Figure 1-15](#)).

**Figure 1-15** ONS 15454 Node View Diagnostic Window

**Step 2** Click **Lamp Test**.

**Step 3** Watch to make sure all the port LEDs illuminate simultaneously for several seconds, with the following durations:

- For tri-color LEDs: three 5-second cycles
- For dual-color LEDs: one 5-second cycle and one 10-second cycle
- For the AIC or AIC-I: one 15-second cycle

**Step 4** Click **OK** in the Lamp Test Run dialog box.

## 1.4.2 Retrieve Diagnostics File Button

When you click the Retrieve Diagnostics File button in the Maintenance window, CTC retrieves system data that can be off-loaded by a Maintenance or higher-level user to a local directory and sent to Technical Support for troubleshooting purposes. The diagnostics file is in machine language and is not human-readable, but can be used by Cisco Technical Support for problem analysis. Complete the following task to off-load the diagnostics file.



### Note

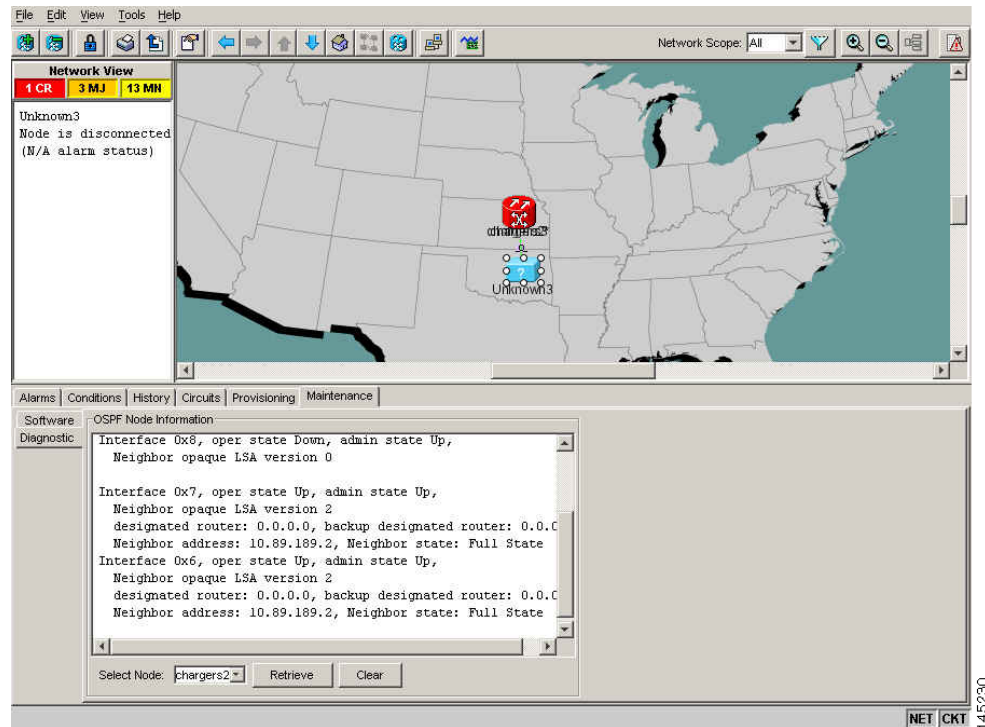
In addition to the machine-readable diagnostics file, the ONS 15454 also stores an audit trail of all system events such as user logins, remote logins, configuration, and changes. This audit trail is considered a record-keeping feature rather than a troubleshooting feature. Information about the feature is located in the “Maintain the Node” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

## Off-Load the Diagnostics File

- 
- Step 1** In node view (single-shelf mode) or shelf view (multishelf mode), click the **Maintenance > Diagnostic** tabs ([Figure 1-15](#)).
- Step 2** Click **Retrieve Tech Support Log**.
- Step 3** In the Saving Diagnostic File dialog box, navigate to the directory (local or network) where you want to save the file.
- Step 4** Enter a name in the File Name field.
- You do not have to give the archive file a particular extension. It is a compressed file (gzip) that can be unzipped and read by Cisco Technical Support.
- Step 5** Click **Save**.
- The Get Diagnostics status window shows a progress bar indicating the percentage of the file being saved, then shows “Get Diagnostics Complete.”
- Step 6** Click **OK**.
- 

## 1.4.3 Data Communications Network Tool

CTC contains a data communications network (DCN) tool that assists with network troubleshooting for Open Shortest Path First (OSPF) networks. This tool, located in network view, is shown in [Figure 1-16](#). It executes an internal dump command to retrieve information about all nodes accessible from the entry point.

**Figure 1-16** DCN Tools OSPF Dump

The dump, which provides the same information as a dump executed by special networking commands, is available at the network view in the Maintenance > Diagnostic tab. You can select the access point node in the Select Node drop-down list. To create the dump, click Retrieve. (To clear the dump, click Clear.)

The contents of the dump file can be saved or printed and furnished to Cisco Technical Support for use in OSPF network support.

## 1.5 Restoring the Database and Default Settings

This section contains troubleshooting for node operation errors that require restoration of software data or the default node setup.

### 1.5.1 Restore the Node Database

**Symptom** One or more nodes do not function properly or have incorrect data.

**Possible Cause** Incorrect or corrupted node database.

**Recommended Action** Complete the procedures in the “Maintain the Node” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

## 1.6 PC Connectivity Troubleshooting

This section contains information about system minimum requirements, supported platforms, browsers, and Java Runtime Environments (JREs) for Software R7.0, and troubleshooting procedures for PC and network connectivity to the ONS 15454.

### 1.6.1 PC System Minimum Requirements

Workstations running CTC Software R7.0 for the Optical Networking System (ONS) products on Windows platforms need to have the following minimum requirements:

- Pentium III or higher processor
- Processor speed of at least 700 MHz
- 256 MB or more of RAM
- 50 MB or more of available hard disk space
- 20 GB or larger hard drive

### 1.6.2 Sun System Minimum Requirements

Workstations running Software R7.0 for the ONS products on Sun workstations need to have the following minimum requirements:

- UltraSPARC or faster processor
- 256 MB or more of RAM
- 50 MB or more of available hard disk space

### 1.6.3 Supported Platforms, Browsers, and JREs

Software R7.0 supports the following platforms:

- Windows NT
- Windows 98
- Windows XP
- Windows 2000
- Solaris 8
- Solaris 9

Software R7.0 supports the following browsers and JREs:

- Netscape 7 browser (PC or Solaris 8 or 9 with Java plug-in 1.4.2 or 5.0)
- PC platforms with Java plug-in 1.4.2 or 5.0
- Internet Explorer 6.0 browser (on PC platforms with Java plug-in 1.4.2 or 5.0)
- Mozilla 1.7 (Solaris only)

**Note**

You can obtain browsers at the following URLs:

- Netscape: <http://channels.netscape.com/ns/browsers/default.jsp>
- Internet Explorer: <http://www.microsoft.com>
- Mozilla: <http://mozilla.org>

**Note**

JRE 1.4.2 or JRE 5.0 is required to run Software R7.0. JRE 1.4.2 is provided on the software CD.

## 1.6.4 Unsupported Platforms and Browsers

Software R7.0 does not support the following platforms:

- Windows 95
- Solaris 2.5
- Solaris 2.6

Software R7.0 does not support the following browsers and JREs:

- Netscape 4.73 for Windows.
- Netscape 4.76 on Solaris.
- Netscape 7 on Solaris 8 or 9 is only supported with JRE 1.4.2 and above.

## 1.6.5 Unable to Verify the IP Configuration of Your PC

**Symptom** When connecting your PC to the ONS 15454, you are unable to successfully ping the IP address of your PC to verify the IP configuration.

**Possible Cause** The IP address was entered incorrectly.

**Recommended Action** Verify that the IP address used to ping the PC matches the IP address displayed when in the Windows IP Configuration information retrieved from the system. See the [“Verify the IP Configuration of Your PC” procedure on page 1-37](#).

**Possible Cause** The IP configuration of your PC is not properly set.

**Recommended Action** Verify the IP configuration of your PC. Complete the [“Verify the IP Configuration of Your PC” procedure on page 1-37](#). If this procedure is unsuccessful, contact your network administrator for instructions to correct the IP configuration of your PC.

### Verify the IP Configuration of Your PC

- 
- Step 1** Open a DOS command window by selecting **Start > Run** from the Start menu.
- Step 2** In the Open field, type **command** and then click **OK**. The DOS command window appears.

- Step 3** At the prompt in the DOS window, type **ipconfig** and press the **Enter** key.
- The Windows IP configuration information appears, including the IP address, the subnet mask, and the default gateway.



**Note** The winipcfg command only returns the information above if you are on a network.

- Step 4** At the prompt in the DOS window, type **ping** followed by the IP address shown in the Windows IP configuration information previously displayed.
- Step 5** Press the **Enter** key to execute the command.
- If the DOS window returns multiple (usually four) replies, the IP configuration is working properly.
- If you do not receive a reply, your IP configuration might not be properly set. Contact your network administrator for instructions to correct the IP configuration of your PC.

## 1.6.6 Browser Login Does Not Launch Java

**Symptom** The message “Loading Java Applet” does not appear and the JRE does not launch during the initial login.

**Possible Cause** The PC operating system and browser are not properly configured.

**Recommended Action** Reconfigure the PC operating system Java Plug-in Control Panel and the browser settings. Complete the [“Reconfigure the PC Operating System Java Plug-in Control Panel” procedure on page 1-38](#) and the [“Reconfigure the Browser” procedure on page 1-39](#).

### Reconfigure the PC Operating System Java Plug-in Control Panel

- Step 1** From the Windows start menu, click **Settings > Control Panel**.
- Step 2** If **Java Plug-in** does not appear, the JRE might not be installed on your PC:
- Run the Cisco ONS 15454 software CD.
  - Open the *CD-drive:\Windows\JRE* folder.
  - Double-click the **j2re-1\_4\_2-win** icon to run the JRE installation wizard.
  - Follow the JRE installation wizard steps.
- Step 3** From the Windows start menu, click **Settings > Control Panel**.
- Step 4** In the Java Plug-in Control Panel window, double-click the **Java Plug-in 1.4.2** icon.
- Step 5** Click the **Advanced** tab on the Java Plug-in Control Panel.
- Step 6** Navigate to **C:\ProgramFiles\JavaSoft\JRE\1.4.2**.
- Step 7** Select **JRE 1.4**.
- Step 8** Click **Apply**.

- Step 9** Close the Java Plug-in Control Panel window.
- 

## Reconfigure the Browser

---

- Step 1** From the Start Menu, launch your browser application.
- Step 2** If you are using Netscape Navigator:
- a. From the Netscape Navigator menu bar, click the **Edit > Preferences** menus.
  - b. In the Preferences window, click the **Advanced > Proxies** categories.
  - c. In the Proxies window, click the **Direct connection to the Internet** check box and click **OK**.
  - d. From the Netscape Navigator menu bar, click the **Edit > Preferences** menus.
  - e. In the Preferences window, click the **Advanced > Cache** categories.
  - f. Confirm that the Disk Cache Folder field shows one of the following paths:
    - For Windows 98/ME: **C:\ProgramFiles\Netscape\Communicator\cache**
    - For Windows NT/2000/XP: **C:\ProgramFiles\Netscape\username\Communicator\cache**
  - g. If the Disk Cache Folder field is not correct, click **Choose Folder**.
  - h. Navigate to the file listed in Step f, and click **OK**.
  - i. Click **OK** in the Preferences window and exit the browser.
- Step 3** If you are using Internet Explorer:
- a. From the Internet Explorer menu bar, click the **Tools > Internet Options** menus.
  - b. In the Internet Options window, click the **Advanced** tab.
  - c. In the Settings menu, scroll down to Java (Sun) and click the **Use Java 2 v1.4.2 for applet (requires restart)** check box.
  - d. Click **OK** in the Internet Options window and exit the browser.
- Step 4** Temporarily disable any virus-scanning software on the computer. See the [“1.7.4 Browser Stalls When Downloading CTC JAR Files From TCC2/TCC2P Card”](#) section on page 1-44.
- Step 5** Verify that the computer does not have two network interface cards (NICs) installed. If the computer does have two NICs, remove one.
- Step 6** Restart the browser and log onto the ONS 15454.
- 

## 1.6.7 Unable to Verify the NIC Connection on Your PC

**Symptom** When connecting your PC to the ONS 15454, you are unable to verify that the NIC connection is working properly because the link LED is not illuminated or flashing.

**Possible Cause** The CAT-5 cable is not plugged in properly.

**Recommended Action** Confirm that both ends of the cable are properly inserted. If the cable is not fully inserted due to a broken locking clip, the cable should be replaced.

**Possible Cause** The CAT-5 cable is damaged.

**Recommended Action** Ensure that the cable is in good condition. If in doubt, use a known-good cable. Often, cabling is damaged due to pulling or bending. (For information about installing cable, refer to the “Install Cards and Fiber-Optic Cable” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.)

**Possible Cause** Incorrect type of CAT-5 cable is being used.

**Recommended Action** If connecting an ONS 15454 directly to your laptop, a PC, or a router, use a straight-through CAT-5 cable. When connecting the ONS 15454 to a hub or a LAN switch, use a crossover CAT-5 cable. For details on the types of CAT-5 cables, see the “[1.9.2.1 Crimp Replacement LAN Cables](#)” section on page 1-55.

**Possible Cause** The NIC is improperly inserted or installed.

**Recommended Action** If you are using a Personal Computer Memory Card International Association (PCMCIA)-based NIC, remove and reinsert the NIC to make sure the NIC is fully inserted. (If the NIC is built into the laptop or PC, verify that the NIC is not faulty.)

**Possible Cause** The NIC is faulty.

**Recommended Action** Confirm that the NIC is working properly. If you have no issues connecting to the network (or any other node), then the NIC should be working correctly. If you have difficulty connecting a to the network (or any other node), then the NIC might be faulty and needs to be replaced.

## 1.6.8 Verify PC Connection to the ONS 15454 (ping)

**Symptom** The TCP/IP connection was established and then lost.

**Possible Cause** A lost connection between the PC and the ONS 15454.

**Recommended Action** Use a standard ping command to verify the TCP/IP connection between the PC and the ONS 15454 TCC2/TCC2P card. A ping command should work if the PC connects directly to the TCC2/TCC2P card or uses a LAN to access the TCC2/TCC2P card. Complete the “[Ping the ONS 15454](#)” procedure on page 1-40.

### Ping the ONS 15454

- 
- Step 1** Display the command prompt:
- a. If you are using a Microsoft Windows operating system, from the Start Menu choose **Run**, enter **command** in the Open field of the Run dialog box, and click **OK**.
  - b. If you are using a Sun Solaris operating system, from the Common Desktop Environment (CDE) click the **Personal Application** tab and click **Terminal**.
- Step 2** For both the Sun and Microsoft operating systems, at the prompt enter:
- ping** *ONS-15454-IP-address*
- For example:

**ping 198.168.10.10**

- Step 3** If the workstation has connectivity to the ONS 15454, the ping is successful and displays a reply from the IP address. If the workstation does not have connectivity, a “Request timed out” message appears.
  - Step 4** If the ping is successful, it demonstrates that an active TCP/IP connection exists. Restart CTC.
  - Step 5** If the ping is not successful, and the workstation connects to the ONS 15454 through a LAN, check that the workstation’s IP address is on the same subnet as the ONS node.
  - Step 6** If the ping is not successful and the workstation connects directly to the ONS 15454, check that the link light on the workstation’s NIC is illuminated.
- 

## 1.6.9 The IP Address of the Node is Unknown

**Symptom** The IP address of the node is unknown and you are unable to login.

**Possible Cause** The node is not set to the default IP address.

**Recommended Action** Leave one TCC2/TCC2P card in the shelf. Connect a PC directly to the remaining TCC2/TCC2P card and perform a hardware reset of the card. The TCC2/TCC2P card transmits the IP address after the reset to enable you to capture the IP address for login. Complete the [“Retrieve Unknown Node IP Address” procedure on page 1-41](#).

### Retrieve Unknown Node IP Address

- 
- Step 1** Connect your PC directly to the active TCC2/TCC2P card Ethernet port on the faceplate.
  - Step 2** Start the Sniffer application on your PC.
  - Step 3** Perform a hardware reset by pulling and reseating the active TCC2/TCC2P card.
  - Step 4** After the TCC2/TCC2P card completes resetting, it broadcasts its IP address. The Sniffer software on your PC will capture the IP address being broadcast.
- 

## 1.7 CTC Operation Troubleshooting

This section contains troubleshooting procedures for CTC login or operation problems.

## 1.7.1 CTC Colors Do Not Appear Correctly on a UNIX Workstation

**Symptom** When running CTC on a UNIX workstation, the colors do not appear correctly. For example, both major and minor alarms appear in the same color.

**Possible Cause** When running in 256-color mode on a UNIX workstation, color-intensive applications such as Netscape might use all of the colors.

**Recommended Action** CTC requires a full 24-color palette to run properly. When logging into CTC on a UNIX workstation, run as many colors as your adapter will support. In addition, you can use the `-install` or the `-ncols 32` command line options to limit the number of colors that Netscape uses. Complete the [“Limit Netscape Colors” procedure on page 1-42](#). If the problem persists after limiting Netscape colors, exit any other color-intensive applications in use.

### Limit Netscape Colors

- 
- Step 1** Close the current session of Netscape.
- Step 2** Launch Netscape from the command line by entering one of the following commands:
- **netscape -install** (installs Netscape colors for Netscape use)
  - **netscape -ncols 32** (limits Netscape to 32 colors so that if the requested color is not available, Netscape chooses the closest color option)
- 

## 1.7.2 Unable to Launch CTC Help After Removing Netscape

**Symptom** After removing Netscape and running CTC using Internet Explorer, you are unable to launch CTC Help and receive an “MSIE is not the default browser” error message.

**Possible Cause** Loss of association between browser and Help files.

**Recommended Action** When the CTC software and Netscape are installed, the Help files are associated with Netscape by default. When you remove Netscape, the Help files are not automatically associated with Internet Explorer as the default browser. Reset Internet Explorer as the default browser so that CTC associates the Help files to the correct browser. Complete the [“Reset Internet Explorer as the Default Browser for CTC” procedure on page 1-42](#) to associate the CTC Help files to the correct browser.

### Reset Internet Explorer as the Default Browser for CTC

- 
- Step 1** Open the Internet Explorer browser.
- Step 2** From the menu bar, click **Tools > Internet Options**. The Internet Options window appears.
- Step 3** In the Internet Options window, click the **Programs** tab.
- Step 4** Click the **Internet Explorer should check to see whether it is the default browser** check box.

- Step 5** Click **OK**.
- Step 6** Exit any and all open and running CTC and Internet Explorer applications.
- Step 7** Launch Internet Explorer and open a new CTC session. You should now be able to access the CTC Help.
- 

## 1.7.3 Unable to Change Node View to Network View

**Symptom** When activating a large, multinode BLSR from Software R3.2 to Software R3.3, some of the nodes appear grayed out. Logging into the new CTC, the user is unable to change node view (single-shelf mode) or shelf view (multishelf mode) to network view on any nodes, from any workstation. This is accompanied by an “Exception occurred during event dispatching: java.lang.OutOfMemoryError” in the java window.

**Possible Cause** The large, multinode BLSR requires more memory for the graphical user interface (GUI) environment variables.

**Recommended Action** Set the system or user CTC\_HEAP environment variable to increase the memory limits. Complete the “[Set the CTC\\_HEAP and CTC\\_MAX\\_PERM\\_SIZE\\_HEAP Environment Variables for Windows](#)” procedure on page 1-43 or the “[Set the CTC\\_HEAP and CTC\\_MAX\\_PERM\\_SIZE\\_HEAP Environment Variables for Solaris](#)” procedure on page 1-44 to enable the CTC\_HEAP variable change.



**Note** This problem typically affects large networks where additional memory is required to manage large numbers of nodes and circuits.

---

### Set the CTC\_HEAP and CTC\_MAX\_PERM\_SIZE\_HEAP Environment Variables for Windows



**Note** Before proceeding with the following steps, ensure that your system has a minimum of 1 GB of RAM. If your system does not have a minimum of 1 GB of RAM, contact the Cisco Technical Assistance Center (TAC).

---

- Step 1** Close all open CTC sessions and browser windows.
- Step 2** From the Windows **Start** menu, choose **Control Panel > System**.
- Step 3** In the System Properties window, click the **Advanced** tab.
- Step 4** Click the **Environment Variables** button to open the Environment Variables window.
- Step 5** Click the **New** button under the System variables field.
- Step 6** Type CTC\_HEAP in the Variable Name field.
- Step 7** Type 512 in the Variable Value field, and then click the **OK** button to create the variable.
- Step 8** Again, click the **New** button under the System variables field.
- Step 9** Type CTC\_MAX\_PERM\_SIZE\_HEAP in the Variable Name field.
- Step 10** Type 128 in the Variable Value field, and then click the **OK** button to create the variable.

- Step 11** Click the **OK** button in the Environment Variables window to accept the changes.
- Step 12** Click the **OK** button in the System Properties window to accept the changes.
- 

## Set the CTC\_HEAP and CTC\_MAX\_PERM\_SIZE\_HEAP Environment Variables for Solaris

---

- Step 1** From the user shell window, kill any CTC sessions and browser applications.
- Step 2** In the user shell window, set the environment variables to increase the heap size.

### Example

The following example shows how to set the environment variables in the C shell:

```
% setenv CTC_HEAP 512
% setenv CTC_MAX_PERM_SIZE_HEAP 128
```

---

## 1.7.4 Browser Stalls When Downloading CTC JAR Files From TCC2/TCC2P Card

**Symptom** The browser stalls or hangs when downloading a CTC Java archive (JAR) file from the TCC2/TCC2P card.

**Possible Cause** McAfee VirusScan software might be interfering with the operation. The problem occurs when the VirusScan Download Scan is enabled on McAfee VirusScan 4.5 or later.

**Recommended Action** Disable the VirusScan Download Scan feature. Complete the [“Disable the VirusScan Download Scan” procedure on page 1-44](#).

### Disable the VirusScan Download Scan

---

- Step 1** From the Windows Start menu, choose **Programs > Network Associates > VirusScan Console**.
- Step 2** Double-click the **VShield** icon listed in the VirusScan Console dialog box.
- Step 3** Click **Configure** on the lower part of the Task Properties window.
- Step 4** Click the **Download Scan** icon on the left of the System Scan Properties dialog box.
- Step 5** Uncheck the **Enable Internet download scanning** check box.
- Step 6** Click **Yes** when the warning message appears.
- Step 7** Click **OK** in the System Scan Properties dialog box.
- Step 8** Click **OK** in the Task Properties window.
- Step 9** Close the McAfee VirusScan window.
-

## 1.7.5 CTC Does Not Launch

**Symptom** CTC does not launch; usually an error message appears before the login window appears.

**Possible Cause** The Netscape browser cache might point to an invalid directory.

**Recommended Action** Redirect the Netscape cache to a valid directory. Complete the [“Redirect the Netscape Cache to a Valid Directory” procedure on page 1-45](#).

### Redirect the Netscape Cache to a Valid Directory

- 
- |               |                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | Launch Netscape.                                                                                              |
| <b>Step 2</b> | Open the <b>Edit</b> menu.                                                                                    |
| <b>Step 3</b> | Choose <b>Preferences</b> .                                                                                   |
| <b>Step 4</b> | In the Category column on the left side, expand the <b>Advanced</b> category and choose the <b>Cache</b> tab. |
| <b>Step 5</b> | Change your disk cache folder to point to the cache file location.                                            |

The cache file location is usually C:\ProgramFiles\Netscape\Users\yourname\cache. The *yourname* segment of the file location is often the same as the user name.

---

## 1.7.6 Slow CTC Operation or Login Problems

**Symptom** You experience slow CTC operation or have problems logging into CTC.

[Table 1-3](#) describes the potential cause of the symptom and the solution.

**Table 1-3**      *Slow CTC Operation or Login Problems*

| Possible Problem                                                    | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The CTC cache file might be corrupted or might need to be replaced. | Search for and delete cache files. This operation forces the ONS 15454 to download a new set of Java archive (JAR) files to your computer hard drive. Complete the <a href="#">“Delete the CTC Cache File Automatically” procedure on page 1-46</a> or the <a href="#">“Delete the CTC Cache File Manually” procedure on page 1-47</a> .                                                                                                                                                                                                                                                                                                                                        |
| Insufficient heap memory allocation.                                | <p>Increase the heap size if you are using CTC to manage more than 50 nodes concurrently. See the <a href="#">“Set the CTC_HEAP and CTC_MAX_PERM_SIZE_HEAP Environment Variables for Windows” procedure on page 1-43</a> or the <a href="#">“Set the CTC_HEAP and CTC_MAX_PERM_SIZE_HEAP Environment Variables for Solaris” procedure on page 1-44</a>.</p> <p><b>Note</b> To avoid network performance issues, Cisco recommends managing a maximum of 50 nodes concurrently with CTC. To manage more than 50 nodes, Cisco recommends using Cisco Transport Manager (CTM). Cisco does not recommend running multiple CTC sessions when managing two or more large networks.</p> |

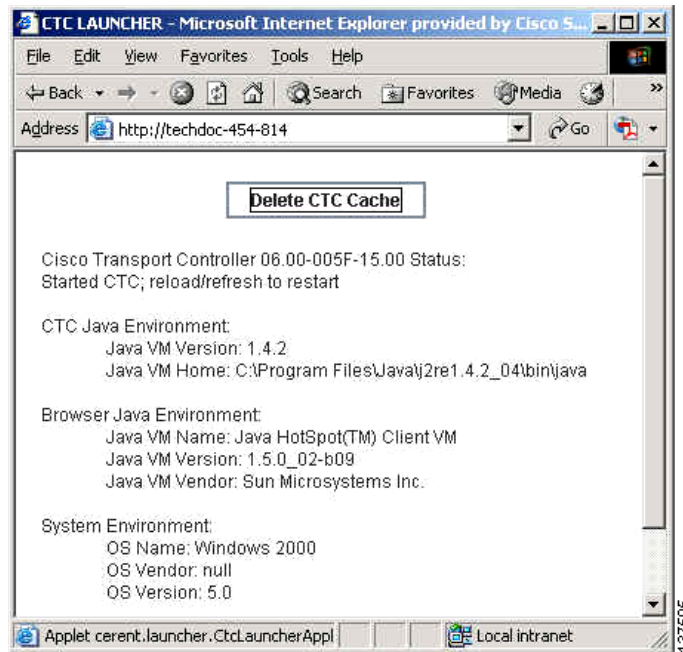
## Delete the CTC Cache File Automatically



### Caution

All running sessions of CTC must be halted before deleting the CTC cache. Deleting the CTC cache might cause any CTC running on this system to behave in an unexpected manner.

- 
- Step 1** Enter an ONS 15454 IP address into the browser URL field. The initial browser window shows a **Delete CTC Cache** button.
- Step 2** Close all open CTC sessions and browser windows. The PC operating system does not allow you to delete files that are in use.
- Step 3** Click **Delete CTC Cache** in the initial browser window to clear the CTC cache. [Figure 1-17](#) shows the Delete CTC Cache window.

**Figure 1-17** Deleting the CTC Cache

## Delete the CTC Cache File Manually



### Caution

All running sessions of CTC must be halted before deleting the CTC cache. Deleting the CTC cache might cause any CTC running on this system to behave in an unexpected manner.

- Step 1** To delete the JAR files manually, from the Windows Start menu choose **Search > For Files or Folders**.
- Step 2** In the Search Results dialog box, enter **ctc\*.jar** or **cms\*.jar** in the Search for Files or Folders Named field and click **Search Now**.
- Step 3** Click the **Modified** column in the Search Results dialog box to find the JAR files that match the date when you downloaded the files from the TCC2/TCC2P.
- Step 4** Highlight the files and press the keyboard **Delete** key.
- Step 5** Click **Yes** in the Confirm dialog box.

## 1.7.7 Node Icon is Gray on CTC Network View

**Symptom** The CTC network view shows one or more node icons as gray in color and without a node name.

**Possible Cause** Different CTC releases do not recognize each other.

**Recommended Action** Correct the core version build as described in the [“1.7.9 Different CTC Releases Do Not Recognize Each Other”](#) section on page 1-49.

**Possible Cause** Username and password do not match.

**Recommended Action** Correct the username and password as described in the [“1.7.10 Username or Password Do Not Match”](#) section on page 1-50.

**Possible Cause** A lost DCC connection.

**Recommended Action** Usually accompanied by an embedded operations channel (EOC) alarm. Clear the EOC alarm and verify the DCC connection as described in the [“EOC”](#) alarm.

## 1.7.8 Java Runtime Environment Incompatible

**Symptom** The CTC application does not run properly.

**Possible Cause** The compatible Java 2 JRE is not installed.

**Recommended Action** The JRE contains the Java virtual machine, runtime class libraries, and Java application launcher that are necessary to run programs written in the Java programming language. The ONS 15454 CTC is a Java application. A Java application, unlike an applet, cannot rely completely on a web browser for installation and runtime services. When you run an application written in the Java programming language, you need the correct JRE installed. The correct JRE for each CTC software release is included on the Cisco ONS 15454 software CD. Complete the [“Launch CTC to Correct the Core Version Build”](#) procedure on page 1-49. If you are running multiple CTC software releases on a network, the JRE installed on the computer must be compatible with the different software releases. [Table 1-4](#) shows JRE compatibility with ONS 15454 software releases.

**Table 1-4 JRE Compatibility**

| Software Release             | JRE 1.2.2 Compatible | JRE 1.3 Compatible | JRE 1.4 Compatible <sup>1</sup> | JRE 5.0 Compatible |
|------------------------------|----------------------|--------------------|---------------------------------|--------------------|
| ONS 15454 R2.2.1 and earlier | Yes                  | No                 | No                              | No                 |
| ONS 15454 R2.2.2             | Yes                  | Yes                | No                              | No                 |
| ONS 15454 R3.0               | Yes                  | Yes                | No                              | No                 |
| ONS 15454 R3.1               | Yes                  | Yes                | No                              | No                 |
| ONS 15454 R3.2               | Yes                  | Yes                | No                              | No                 |
| ONS 15454 R3.3               | Yes                  | Yes                | No                              | No                 |

**Table 1-4** JRE Compatibility (continued)

| Software Release            | JRE 1.2.2 Compatible | JRE 1.3 Compatible | JRE 1.4 Compatible <sup>1</sup> | JRE 5.0 Compatible |
|-----------------------------|----------------------|--------------------|---------------------------------|--------------------|
| ONS 15454 R3.4              | No                   | Yes                | No                              | No                 |
| ONS 15454 R4.0 <sup>2</sup> | No                   | Yes                | No                              | No                 |
| ONS 15454 R4.1              | No                   | Yes                | No                              | No                 |
| ONS 15454 R4.5              | No                   | Yes                | No                              | No                 |
| ONS 15454 R4.6              | No                   | Yes                | Yes                             | No                 |
| ONS 15454 R4.7              | No                   | Yes                | Yes                             | No                 |
| ONS 15454 R5.0              | No                   | Yes                | Yes                             | No                 |
| ONS 15454 R6.0              | No                   | No                 | Yes                             | No                 |
| ONS 15454 R7.0              | No                   | No                 | No                              | Yes                |

1. JRE 1.4.2 is the recommended version and is provided on the software CD.

2. Software Release 4.0 notifies you if an earlier JRE version is running on your PC or UNIX workstation.

## Launch CTC to Correct the Core Version Build

- 
- Step 1** Exit the current CTC session and completely close the browser.
- Step 2** Start the browser.
- Step 3** Enter the ONS 15454 IP address of the node that reported the alarm. This can be the original IP address you logged in with or an IP address other than the original.
- Step 4** Log into CTC. The browser downloads the JAR file from CTC.
- 

## 1.7.9 Different CTC Releases Do Not Recognize Each Other

**Symptom** Different CTC releases do not recognize each other. This situation is often accompanied by the INCOMPATIBLE-SW alarm.

**Possible Cause** The software loaded on the connecting workstation and the software on the TCC2/TCC2P card are incompatible.

**Recommended Action** This occurs when the TCC2/TCC2P software is upgraded but the PC has not yet upgraded the compatible CTC JAR file. It also occurs on login nodes with compatible software that encounter other nodes in the network that have a newer software version. Complete the [“Launch CTC to Correct the Core Version Build” procedure on page 1-50](#).



**Note**

Remember to always log into the ONS node with the latest CTC core version first. If you initially log into an ONS node running a CTC core version of 2.2 or lower and then attempt to log into another ONS node in the network running a higher CTC core version, the lower version node does not recognize the new node.

## Launch CTC to Correct the Core Version Build

- 
- |               |                                                                                                                                                                      |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | Exit the current CTC session and completely close the browser.                                                                                                       |
| <b>Step 2</b> | Start the browser.                                                                                                                                                   |
| <b>Step 3</b> | Enter the ONS 15454 IP address of the node that reported the alarm. This can be the original IP address you logged on with or an IP address other than the original. |
| <b>Step 4</b> | Log into CTC. The browser downloads the JAR file from CTC.                                                                                                           |
- 

## 1.7.10 Username or Password Do Not Match

**Symptom** A username/password mismatch often occurs concurrently with a NOT-AUTHENTICATED alarm.

**Possible Cause** The username or password entered does not match the information stored in the TCC2/TCC2P card.

**Recommended Action** All ONS nodes must have the same username and password created to display every ONS node in the network. You can also be locked out of certain ONS nodes on a network if your username and password were not created on those specific ONS nodes. For initial login to the ONS 15454, enter the CISCO15 user name in capital letters, click **Login**, and use the password **otbu+1**, which is case-sensitive.

Complete the [“Verify Correct Username and Password” procedure on page 1-50](#). If the node has been configured for Remote Authentication Dial In User Service (RADIUS) authentication, the username and password are verified against the RADIUS server database rather than the security information in the local node database. For more information about RADIUS security, refer to the “Security Reference” chapter in the *Cisco ONS 15454 DWDM Reference Manual*.

## Verify Correct Username and Password

- 
- |               |                                                                                                                               |
|---------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | Ensure that your keyboard Caps Lock key is not turned on and affecting the case-sensitive entry of the username and password. |
| <b>Step 2</b> | Contact your system administrator to verify the username and password.                                                        |
| <b>Step 3</b> | Call Cisco Technical Support (1-800-553-2447) to have them enter your system and create a new user name and password.         |
-

## 1.7.11 DCC Connection Lost

**Symptom** DCC connection is lost. The node usually has alarms and the nodes in the network view have a gray icon. This symptom is usually accompanied by an EOC alarm.

**Possible Cause** A lost DCC connection.

**Recommended Action** Usually accompanied by an EOC alarm. Clear the EOC alarm and verify the DCC connection as described in the “[EOC](#)” alarm.

## 1.7.12 “Path in Use” Error When Creating a Circuit

**Symptom** While creating a circuit, you get a “Path in Use” error that prevents you from completing the circuit creation.

**Possible Cause** Another user has already selected the same source port to create another circuit.

**Recommended Action** CTC does not remove a card or port from the available list until a circuit is completely provisioned. If two users simultaneously select the same source port to create a circuit, the first user to complete circuit provisioning gets use of the port. The other user gets the “Path in Use” error. Cancel the circuit creation and start over, or click **Back** until you return to the initial circuit creation window. The source port that was previously selected no longer appears in the available list because it is now part of a provisioned circuit. Select a different available port and begin the circuit creation process again.

## 1.7.13 Calculate and Design IP Subnets

**Symptom** You cannot calculate or design IP subnets on the ONS 15454.

**Possible Cause** The IP capabilities of the ONS 15454 require specific calculations to properly design IP subnets.

**Recommended Action** Cisco provides a free online tool to calculate and design IP subnets. Go to [http://www.cisco.com/techtools/ip\\_addr.html](http://www.cisco.com/techtools/ip_addr.html). For information about ONS 15454 IP capability, refer to the “Management Network Connectivity” chapter in the *Cisco ONS 15454 DWDM Reference Manual*.

## 1.8 Timing

This section provides solutions to common timing reference errors and alarms.

## 1.8.1 ONS 15454 Switches Timing Reference

**Symptom** Timing references switch when one or more problems occur.

**Possible Cause** The optical or building integrated timing supply (BITS) input is receiving loss of signal (LOS), loss of frame (LOF), or AIS alarms from its timing source.

**Possible Cause** The optical or BITS input is not functioning.

**Possible Cause** The synchronization status messaging (SSM) message is set to do not use for synchronization (DUS).

**Possible Cause** SSM indicates a Stratum 3 or lower clock quality.

**Possible Cause** The input frequency is off by more than 15 ppm.

**Possible Cause** The input clock wanders and has more than three slips in 30 seconds.

**Possible Cause** A bad timing reference existed for at least two minutes.

**Recommended Action** The ONS 15454 internal clock operates at a Stratum 3E level of accuracy. This gives the ONS 15454 a free-running synchronization accuracy of  $\pm 4.6$  ppm and a holdover stability of less than 255 slips in the first 24 hours or  $3.7 \times 10^{-7}$ /day, including temperature. ONS 15454 free-running synchronization relies on the Stratum 3 internal clock. Over an extended time period, using a higher quality Stratum 1 or Stratum 2 timing source results in fewer timing slips than a lower quality Stratum 3 timing source.

## 1.8.2 Holdover Synchronization Alarm

**Symptom** The clock is running at a different frequency than normal and the “[HLDVRSYNC](#)” alarm appears.

**Possible Cause** The last reference input has failed.

**Recommended Action** The clock is running at the frequency of the last known-good reference input. This alarm is raised when the last reference input fails. See the “[HLDVRSYNC](#)” alarm on [page 2-65](#) for a detailed description.



**Note**

The ONS 15454 supports holdover timing per Telcordia GR-436 when provisioned for external (BITS) timing.

## 1.8.3 Free-Running Synchronization Mode

**Symptom** The clock is running at a different frequency than normal and the “FRNGSYNC” alarm appears.

**Possible Cause** No reliable reference input is available.

**Recommended Action** The clock is using the internal oscillator as its only frequency reference. This occurs when no reliable, prior timing reference is available. See the “FRNGSYNC” alarm on [page 2-54](#) for a detailed description.

## 1.8.4 Daisy-Chained BITS Not Functioning

**Symptom** You are unable to daisy chain the BITS sources.

**Possible Cause** Daisy-chained BITS sources are not supported on the ONS 15454.

**Recommended Action** Daisy-chained BITS sources cause additional wander buildup in the network and are therefore not supported. Instead, use a timing signal generator to create multiple copies of the BITS clock and separately link them to each ONS 15454.

## 1.8.5 Blinking STAT LED after Installing a Card

**Symptom** After installing a card, the STAT LED blinks continuously for more than 60 seconds.

**Possible Cause** The card cannot boot because it failed the Power On Shelf Test (POST) diagnostics.

**Recommended Action** The blinking STAT LED indicates that POST diagnostics are being performed. If the LED continues to blink for more than 60 seconds, the card has failed the POST diagnostics test and has failed to boot. If the card has truly failed, an “EQPT” alarm is raised against the slot number with an “Equipment Failure” description. Check the alarm tab for this alarm to appear for the slot where the card was installed. To attempt recovery, remove and reinstall the card and observe the card boot process. If the card fails to boot, replace the card. Complete the “[Physically Replace a Card](#)” procedure on [page 2-172](#).



**Warning**

**High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.** Statement 201



**Caution**

Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. Refer to the procedures in the “[2.8.1 Protection Switching, Lock Initiation, and Clearing](#)” section on [page 2-167](#). For more information, refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

## 1.9 Fiber and Cabling

This section explains problems typically caused by cabling connectivity errors. It also includes instructions for crimping CAT-5 cable and lists the optical fiber connectivity levels.

### 1.9.1 Bit Errors Appear for a Traffic Card

**Symptom** A traffic card has multiple bit errors.

**Possible Cause** Faulty cabling or low optical-line levels.

**Recommended Action** Bit errors on line (traffic) cards usually originate from cabling problems or low optical-line levels. The errors can be caused by synchronization problems, especially if pointer justification (PJ) errors are reported. Moving cards into different error-free slots will isolate the cause. Use a test set whenever possible because the cause of the errors could be external cabling, fiber, or external equipment connecting to the ONS 15454. Troubleshoot low optical levels using the [“1.9.2 Faulty Fiber-Optic Connections” section on page 1-54](#).

### 1.9.2 Faulty Fiber-Optic Connections

**Symptom** A card has multiple alarms and/or signal errors.

**Possible Cause** Faulty fiber-optic connections. Fiber connection problems usually occur in conjunction with alarms.

**Recommended Action** Refer to the appropriate trouble-clearing procedure in [Chapter 2, “Alarm Troubleshooting.”](#)

**Possible Cause** Faulty CAT-5 cables.

**Recommended Action** Faulty CAT-5 cables can be the source of alarms and signal errors. Complete the [“1.9.2.1 Crimp Replacement LAN Cables” section on page 1-55](#).

**Possible Cause** Faulty Gigabit Interface Converters (GBICs).

**Recommended Action** Faulty GBICs can be the source of alarms and signal errors. See the [“1.9.2.2 Replace Faulty SFP or XFP Connectors” section on page 1-56](#).



Warning

**Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 272



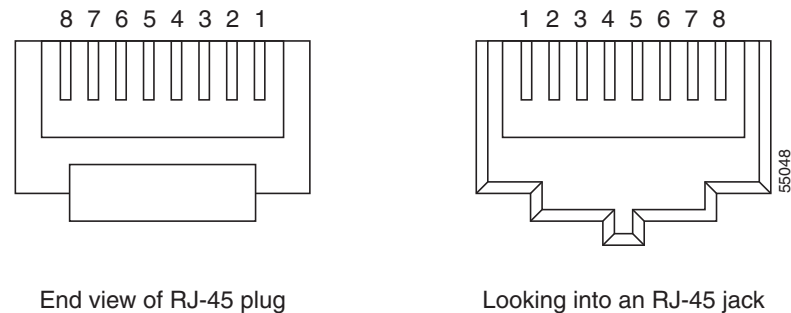
Warning

**Laser radiation presents an invisible hazard, so personnel should avoid exposure to the laser beam. Personnel must be qualified in laser safety procedures and must use proper eye protection before working on this equipment.** Statement 300

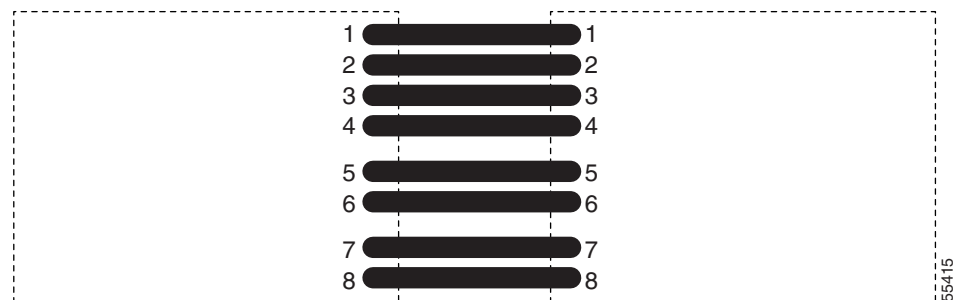
### 1.9.2.1 Crimp Replacement LAN Cables

You can crimp your own LAN cables for use with the ONS 15454. Use a cross-over cable when connecting an ONS 15454 to a hub, LAN modem, or switch, and use a LAN cable when connecting an ONS 15454 to a router or workstation. Use CAT-5 cable RJ-45 T-568B, Color Code (100 Mbps), and a crimping tool. [Figure 1-18](#) shows the wiring of an RJ-45 connector. [Figure 1-19](#) shows a LAN cable layout, and [Table 1-5](#) shows the cable pinouts. [Figure 1-20](#) shows a cross-over cable layout, and [Table 1-6](#) shows the cross-over pinouts.

**Figure 1-18 RJ-45 Pin Numbers**

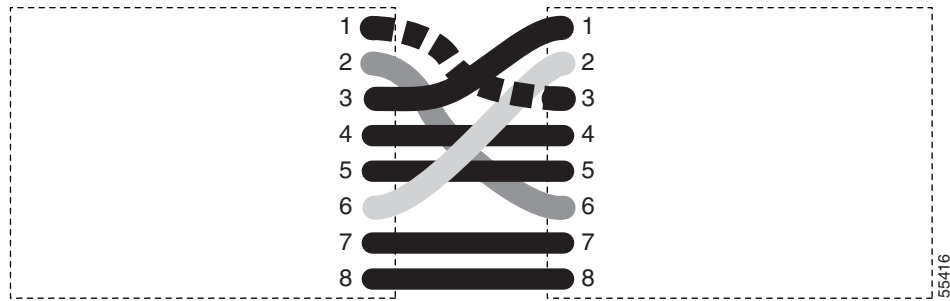


**Figure 1-19 LAN Cable Layout**



**Table 1-5 LAN Cable Pinout**

| Pin | Color        | Pair | Name            | Pin |
|-----|--------------|------|-----------------|-----|
| 1   | white/orange | 2    | Transmit Data + | 1   |
| 2   | orange       | 2    | Transmit Data – | 2   |
| 3   | white/green  | 3    | Receive Data +  | 3   |
| 4   | blue         | 1    | —               | 4   |
| 5   | white/blue   | 1    | —               | 5   |
| 6   | green        | 3    | Receive Data –  | 6   |
| 7   | white/brown  | 4    | —               | 7   |
| 8   | brown        | 4    | —               | 8   |

**Figure 1-20** Cross-Over Cable Layout**Table 1-6** Cross-Over Cable Pinout

| Pin | Color        | Pair | Name            | Pin |
|-----|--------------|------|-----------------|-----|
| 1   | white/orange | 2    | Transmit Data + | 3   |
| 2   | orange       | 2    | Transmit Data – | 6   |
| 3   | white/green  | 3    | Receive Data +  | 1   |
| 4   | blue         | 1    | —               | 4   |
| 5   | white/blue   | 1    | —               | 5   |
| 6   | green        | 3    | Receive Data –  | 2   |
| 7   | white/brown  | 4    | —               | 7   |
| 8   | brown        | 4    | —               | 8   |

**Note**

Odd-numbered pins always connect to a white wire with a colored stripe.

### 1.9.2.2 Replace Faulty SFP or XFP Connectors

Small Form-factor Pluggables (SFPs) and 10-Gbps SFPs (called XFPs) are input/output devices that plug into some transponder and muxponder cards to link the port with the fiber-optic network. The type of SFP or XFP determines the maximum distance that traffic can travel from the card to the next network device. For a description of SFPs and XFPs and their capabilities, refer to the *Cisco ONS 15454 DWDM Reference Manual*. SFPs and XFPs are hot-swappable and can be installed or removed while the card or shelf assembly is powered and running.

**Warning**

**Class 1 laser product.** Statement 1008

**Warning**

**Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 272

**Note**

SFPs and XFPs must be matched on both ends by type: SX to SX, LX to LX, or ZX to ZX.

## Remove SFP or XFP Connectors



**Warning**

**Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 272

- 
- Step 1** Disconnect the network fiber cable from the SFP or XFP LC duplex connector.
- Step 2** Release the SFP or XFP from the slot by simultaneously squeezing the two plastic tabs on each side.
- Step 3** Slide the SFP out of the card slot. A flap closes over the SFP slot to protect the connector on the card.
- 

## Install an SFP or XFP Connector



**Warning**

**Class 1 laser product.** Statement 1008



**Warning**

**Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm could pose an eye hazard.** Statement 1056

- 
- Step 1** Remove the SFP or XFP from its protective packaging.
- Step 2** Check the label to verify that you are using a compatible SFP or XFP for the card where you want to install the connector. [Table 1-7](#) shows the compatible SFPs and XFPs.



**Caution**

Only use SFPs/XFPs certified for use in Cisco ONSs. The qualified Cisco SFP/XFP pluggable module top assembly numbers (TANs) are provided in [Table 1-7](#).

**Table 1-7 SFP/XFP Card Compatibility**

| Card                               | Compatible SFP/XFP<br>(Cisco Product ID)                                                             | Cisco Top Assembly<br>Number (TAN)                   |
|------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| MXP_2.5G_10G (ONS 15454 SONET/SDH) | 15454-SFP-OC48-IR=<br>ONS-SE-2G-S1=                                                                  | 10-1975-01<br>10-2017-01                             |
| MXP_2.5G_10E (ONS 15454 SONET/SDH) | 15454-SFP-OC48-IR=<br>ONS-SE-2G-S1=<br>ONS-SE-2G-L2=                                                 | 10-1975-01<br>10-2017-01<br>10-2013-01               |
| MXP_MR_2.5G<br>MXPP_MR_2.5G        | 15454-SFP-GE+-LX=<br>15454E-SFP-GE+-LX=<br>15454-SFP-GEFC-SX=<br>15454E-SFP-GEFC-S=<br>ONS-SE-GE-ZX= | 10-1832-03<br>10-1832-03<br>10-1833-01<br>10-1833-02 |

**Table 1-7 SFP/XFP Card Compatibility (continued)**

| Card                                                                    | Compatible SFP/XFP<br>(Cisco Product ID) | Cisco Top Assembly<br>Number (TAN) |
|-------------------------------------------------------------------------|------------------------------------------|------------------------------------|
| TXP_MR_2.5G (ONS 15454 SONET/SDH)<br>TXPP_MR_2.5G (ONS 15454 SONET/SDH) | 15454-SFP3-1-IR=                         | 10-1828-01                         |
|                                                                         | 15454E-SFP-L.1.1=                        | 10-1828-01                         |
|                                                                         | 15454-SFP12-4-IR=                        | 10-1976-01                         |
|                                                                         | 15454E-SFP-L.4.1=                        | 10-1976-01                         |
|                                                                         | 15454-SFP-OC48-IR=                       | 10-1975-01                         |
|                                                                         | 15454E-SFP-L.16.1=                       | 10-1975-01                         |
|                                                                         | ONS-SE-2G-S1=                            | 10-2017-01                         |
|                                                                         | 15454-SFP-200=                           | 10-1750-01                         |
|                                                                         | 15454E-SFP-200=                          | 10-1750-01                         |
|                                                                         | 15454-SFP-GEFC-SX=                       | 10-1833-01                         |
|                                                                         | 15454E-SFP-GEFC-S=                       | 10-1833-02                         |
|                                                                         | 15454-SFP-GE+-LX=                        | 10-1832-01                         |
|                                                                         | 15454E-SFP-GE+-LX=                       | 10-1832-02                         |
|                                                                         | ONS-SE-2G-L2=                            | 10-2013-01                         |
|                                                                         | ONS-SE-GE-ZX=                            |                                    |
| TXP_MR_10E (ONS 15454 SONET/SDH)                                        | ONS-XC-10G-S1                            | 10-2012-01                         |

**Step 3** Plug the LC duplex connector of the fiber into a Cisco-supported SFP or XFP.

**Step 4** If the new SFP or XFP has a latch, close the latch over the cable to secure it.

**Step 5** Plug the cabled SFP or XFP into the card port until it clicks.

To change the payload type of an SFP or XFP (called pluggable port modules [PPMs] in CTC), refer to the “Provision Transponder and Muxponder Cards” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

## 1.10 Power Supply Problems

This section explains problems related to loss of power or power supply low voltage.

**Symptom** Loss of power or low voltage, resulting in a loss of traffic and causing the LCD clock to reset to the default date and time.

**Possible Cause** Loss of power or low voltage.

**Possible Cause** Improperly connected power supply.

**Recommended Action** The ONS 15454 requires a constant source of DC power to properly function. Input power is –48 VDC. Power requirements range from –42 VDC to –57 VDC. A newly installed ONS 15454 that is not properly connected to its power supply does not operate. Power problems can be confined to a specific ONS 15454 or affect several pieces of equipment on the site. A loss of power or low voltage can result in a loss of traffic and causes the LCD clock on the ONS 15454 to default to January 1, 1970, 00:04:15. To reset the clock, in node view (single-shelf mode) or shelf view (multishelf mode) click the **Provisioning > General > General** tab and change the Date and Time fields. Complete the [“Isolate the Cause of Power Supply Problems” procedure on page 1-59](#).

**Warning**

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**  
Statement 1030

**Warning**

**During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.** Statement 94

**Caution**

Operations that interrupt power supply or short the power connections to the ONS 15454 are service-affecting.

## Isolate the Cause of Power Supply Problems

### Step 1

If a single ONS 15454 show signs of fluctuating power or power loss:

- a. Verify that the –48 VDC #8 power terminals are properly connected to a fuse panel. These power terminals are located on the lower section of the backplane EIA under the clear plastic cover.
- b. Verify that the power cable is #10 AWG and in good condition.
- c. Verify that the power cable connections are properly crimped. Stranded #10 AWG does not always crimp properly with Staycon type connectors.
- d. Verify that 20-A fuses are used in the fuse panel.
- e. Verify that the fuses are not blown.
- f. Verify that a rack-ground cable attaches to the frame-ground terminal (FGND) on the right side of the ONS 15454 EIA. Connect this cable to the ground terminal according to local site practice.
- g. Verify that the DC power source has enough capacity to carry the power load.
- h. If the DC power source is battery-based:
  - Check that the output power is high enough. Power requirements range from –40.5 VDC to –57 VDC.
  - Check the age of the batteries. Battery performance decreases with age.
  - Check for opens and shorts in batteries, which might affect power output.
  - If brownouts occur, the power load and fuses might be too high for the battery plant.

### Step 2

If multiple pieces of site equipment show signs of fluctuating power or power loss:

- a. Check the uninterruptible power supply (UPS) or rectifiers that supply the equipment. Refer to the UPS manufacturer's documentation for specific instructions.
- b. Check for excessive power drains caused by other equipment, such as generators.
- c. Check for excessive power demand on backup power systems or batteries when alternate power sources are used.

## 1.11 Power Up Problems for Node and Cards

This section explains power up problems in a node or cards typically caused an improper power supply.

**Symptom** You are unable to power up a node or the cards in a node.

**Possible Cause** Improper power supply.

**Recommended Action** Refer to the power information in the “Hardware Specifications” appendix of the *Cisco ONS 15454 DWDM Reference Manual*.

## 1.12 Network Level (Internode) Problems

The following network-level troubleshooting is discussed in this section:

- Fiber cut detection
- System restart after a fiber cut
- OCHNC circuit creation failure

### 1.12.1 Fiber Cut Detection

A fiber cut is one of the most disruptive faults for a DWDM system because more than one channel is potentially affected. Fault isolation must, therefore, be quick and effective.

In the Multi-Service Transport Platform (MSTP), a dedicated alarm is unambiguously associated with the detection of a fiber cut. The alarm is LOS (OTS or AOTS) and can be raised only by the two cards (OPT-BST and OSC-CSM) that directly interface to the span fiber. The LOS (OTS or AOTS) alarm is associated with the physical LINE-RX port of the OPT-BST and OSC-CSM cards (in CTC, identified by Port 5 on the OPT-BST and Port 4 on the OSC-CSM). LOS (OTS or AOTS) is the combination of the two alarms LOS-P (OTS or AOTS) (applies to channel payload) and LOS-O (applies to the OC-3 overhead OSC signal).

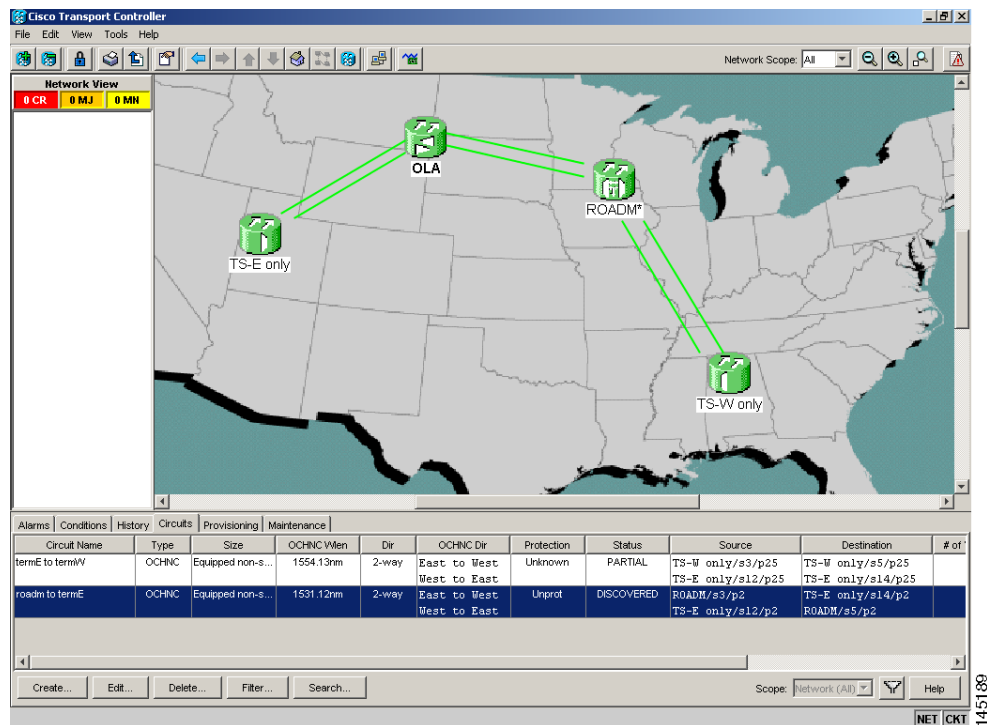
The simultaneous failure of both the active channel (C band) and the service channel (1510 nm) coming into the node is evidence of a fiber span issue, whereas either the LOS-P (OTS or AOTS) alarm alone or the LOS-O alarm alone can only be derived from different root causes.



#### Note

When a fiber cut occurs, the actual conditions on the affected span (for example, alarms raised on both line directions) are strictly dependent on the network automatic laser shutdown (ALS) setting. The network ALS setting is a function of the ALS mode configured on the appropriate cards in the system (OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OSC-CSM, and OSCM).

Different symptoms and scenarios can occur, depending on the network ALS settings. Consider the linear network (four nodes) in [Figure 1-21](#) as a reference. The scenarios are presented after the figure.

**Figure 1-21**      **Linear Network, With No Fiber Cut**

### 1.12.1.1 Scenario A

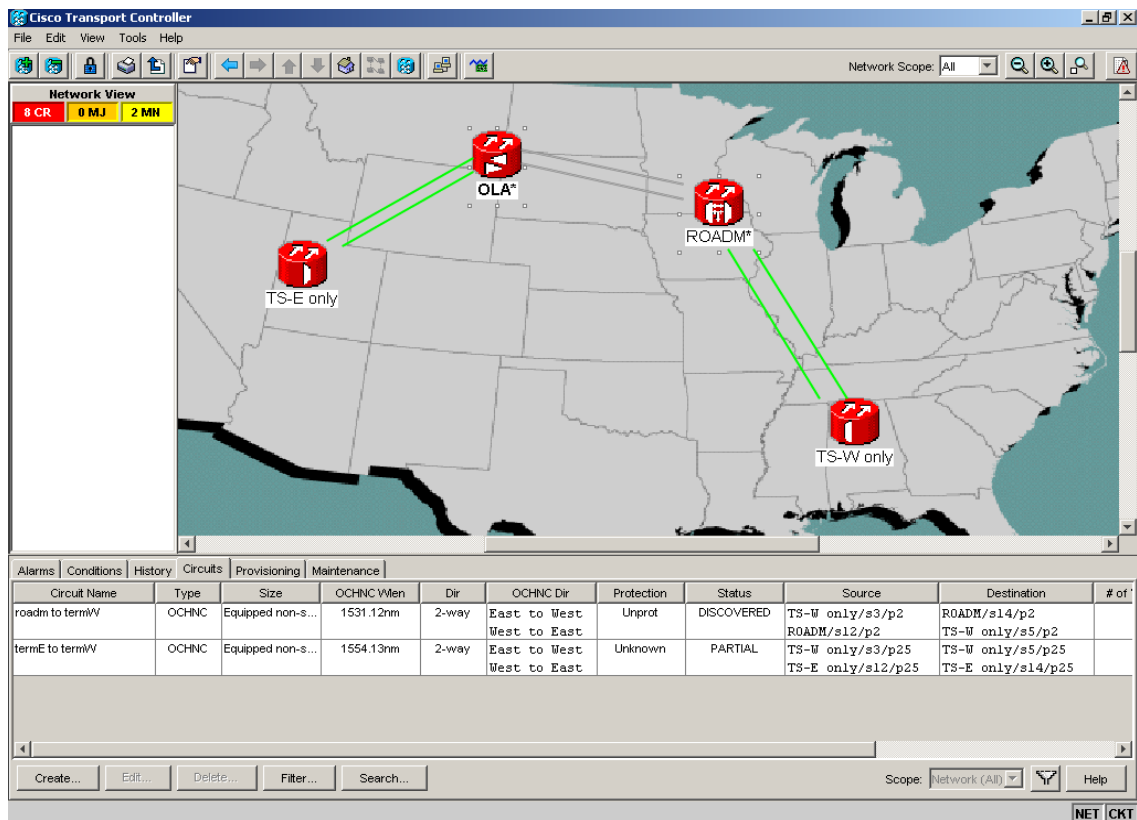
Scenario A has the following conditions:

- ALS Mode = Auto Restart on OPT-BST (+ OSCM) and OSC-CSM
- Fiber cut on the fiber between the OLA-TX node and the ROADM-RX node

The ALS protocol (refer to the “Network Optical Safety—Automatic Laser Shutdown” section in the “Network Reference” chapter of the *Cisco ONS 15454 DWDM Reference Manual*) is activated in the event of a fiber cut, resulting in the shutdown of optical power on both of the fibers belonging to the affected span, even if only one of the two fibers is cut.

The final fault condition of the network is shown in [Figure 1-22](#).

Figure 1-22 Fiber Cut with ALS MODE = Auto Restart



In network view, both of the lines representing the span were formerly green and have now changed to gray. Notice also that the status of all the OCHNC circuits on the broken span have changed from Discovered to Partial.

In node view (single-shelf mode) or shelf view (multishelf mode), the alarm panel of the two nodes (reconfigurable optical add/drop multiplexing [ROADM] and optical line amplification [OLA] in the example) show the LOS (AOTS) alarm on Port 4 of the OSC-CSM (see Figure 1-23) and the LOS (OTS) on Port 5 of the OPT-BST (see Figure 1-24).

**Figure 1-23** LOS Indication on the ROADM Node OSC-CSM

The screenshot displays the OLA - Cisco Transport Controller interface. On the left, the OLA configuration is shown with the following details:

- 1 CR, 0 MJ, 1 MN
- IP Addr : 10.58.46.96
- Booted : 6/21/05 12:09 PM
- User : CISC015
- Authority : Superuser
- SW Version: 05.02-005C-26.23
- Defaults : Factory Defaults
- APC state : Enable

The main area shows a schematic diagram of the ROADM Node OSC-CSM. The diagram includes a central section with slots 18 through 29, and a side section with slots 1 through 17. The side section shows a red alarm indicator for slot 17, labeled 'LOS'.

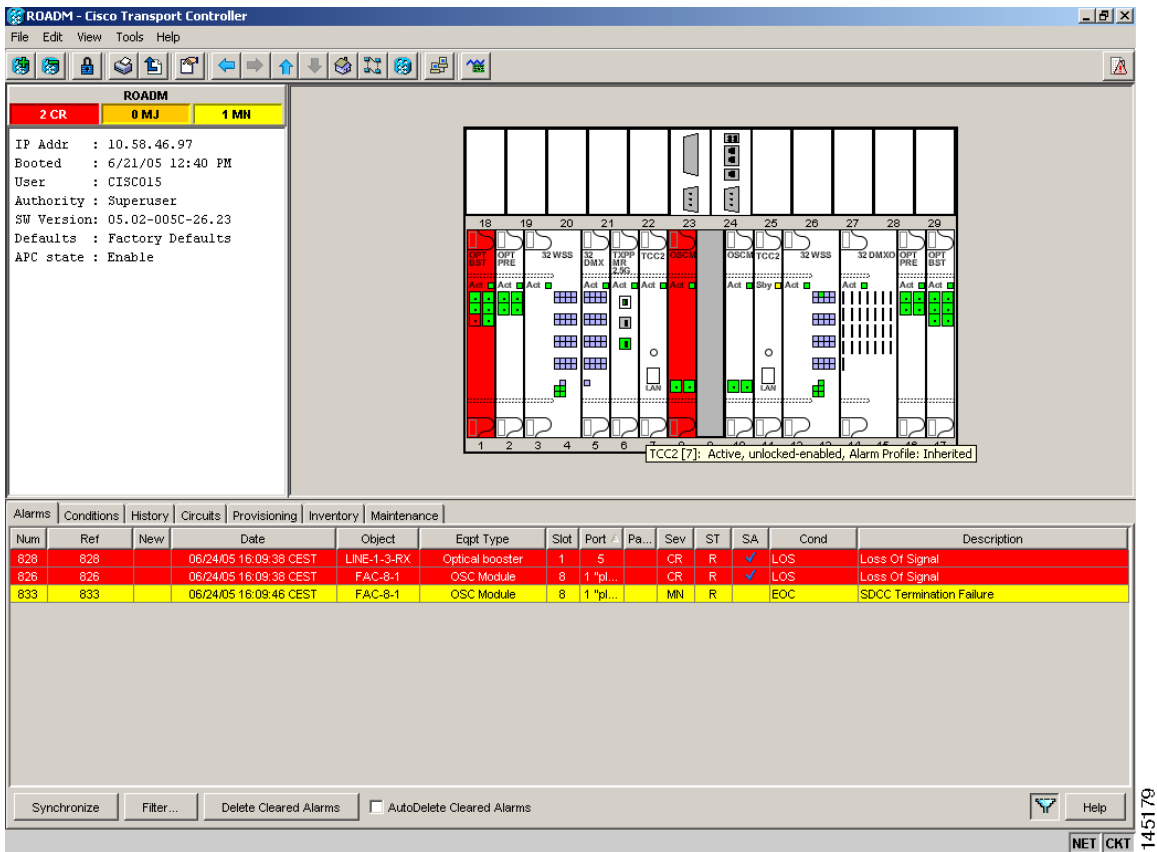
At the bottom, the Alarms tab is active, displaying a table of alarms:

| Num | Ref | New | Date                   | Object       | Eqpt Type             | Slot | Port / | Pa... | Sev | ST | SA | Cond | Description              |
|-----|-----|-----|------------------------|--------------|-----------------------|------|--------|-------|-----|----|----|------|--------------------------|
| 156 | 156 |     | 06/24/05 16:13:50 CEST | LINE-17-2-RX | OSC + Combiner/Sep... | 17   | 4      |       | CR  | R  | ✓  | LOS  | Loss Of Signal           |
| 159 | 159 |     | 06/24/05 16:13:58 CEST | FAC-17-1     | OSC + Combiner/Sep... | 17   | 1      |       | MN  | R  |    | EOC  | SDCC Termination Failure |

At the bottom of the interface, there are buttons for Synchronize, Filter..., Delete Cleared Alarms, and a checkbox for AutoDelete Cleared Alarms. The Help button is also present.

145178

Figure 1-24 LOS Indication on the OLA Node OPT-BST



**Note**

An EOC condition is always present on both nodes, because the optical service channel (OSC) link (to which the communication channel applies) is down.

**Note**

For the OSCM card, only an LOS (OC-3) alarm is present at the SONET layer (Port 1).

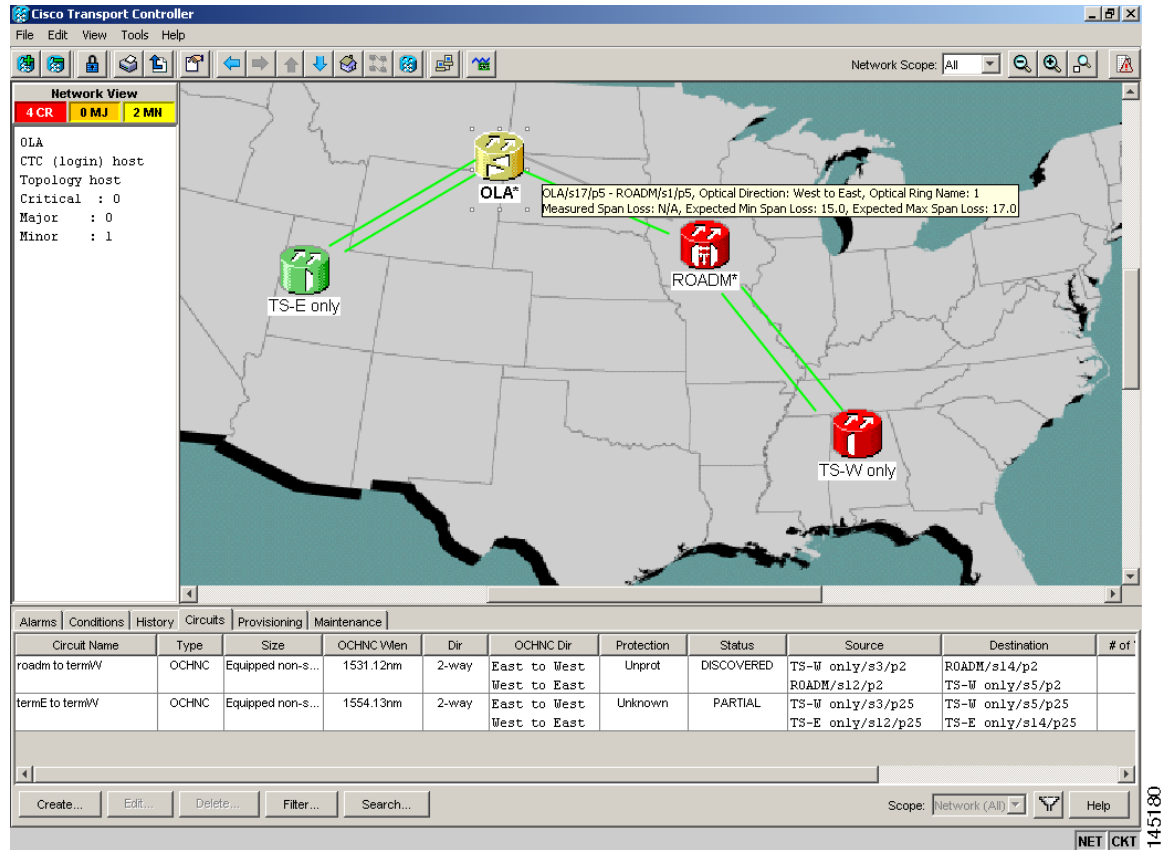
1.12.1.2 Scenario B

Scenario B has the following conditions:

- ALS Mode = DISABLE on OPT-BST (+ OSCM) and OSC-CSM
- Fiber cut on the fiber between the OLA-TX node and the ROADM-RX node

Because the ALS protocol is disabled, the signal is lost on only the affected fiber (power is not shut down on both fibers).

The LOS (OTS or AOTS) alarm is raised by the ROADM-RX node that was receiving the signal coming from the broken fiber. The final fault condition of the network is shown in Figure 1-25.

**Figure 1-25** Network View Fault Condition for Fiber Cut with ALS Mode Disabled

In network view (Figure 1-25), only the actual affected fiber becomes gray, whereas the traffic (and OSC signal as well) on the good fiber is active and fault identification is immediate.

In node view (single-shelf mode) or shelf view (multishelf mode) (Figure 1-26 and Figure 1-27), the alarm panel of the receiving node (ROADM in this example) reports the LOS (OTS), while the transmitting node (OLA) reports only an EOC alarm.

Figure 1-26 ONS 15454 SDH ROADM Node View with Fault Condition for ALS MODE Disabled

**ROADM - Cisco Transport Controller**

File Edit View Tools Help

**ROADM**

2 CR 8 MJ 1 MN

IP Addr : 10.50.46.97  
 Booted : 6/21/05 12:40 PM  
 User : CISC015  
 Authority : Superuser  
 SW Version: 05.02-005C-26.23  
 Defaults : Factory Defaults  
 APC state : Enable

18 19 20 21 22 23 24 25 26 27 28 29

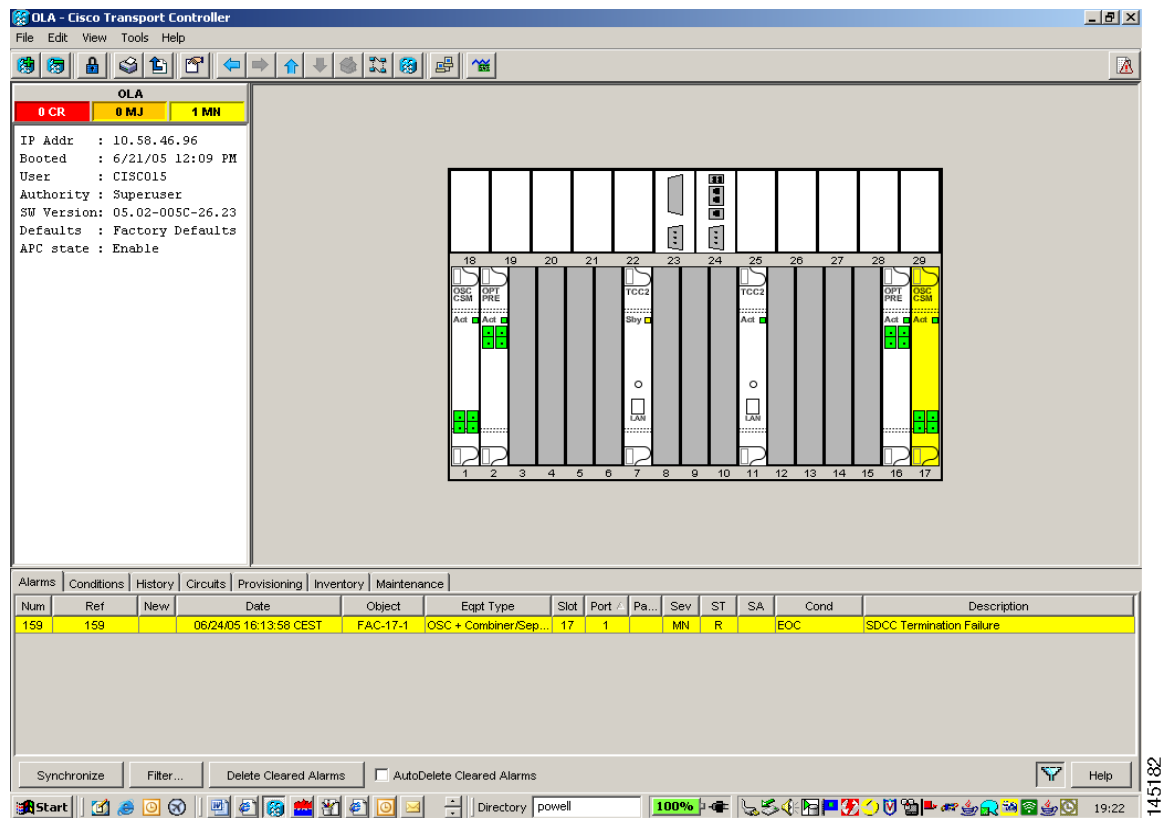
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

TCC2 (7): Active, unlocked-enabled, Alarm Profile: Inherited

| Num | Ref | New | Date                   | Object      | Egpt Type       | Slot | Port  | Pa | Sev | ST | SA | Cond | Description              |
|-----|-----|-----|------------------------|-------------|-----------------|------|-------|----|-----|----|----|------|--------------------------|
| 828 | 828 |     | 06/24/05 16:09:38 CEST | LINE-1-3-RX | Optical booster | 1    | 5     |    | CR  | R  |    | LOS  | Loss Of Signal           |
| 829 | 829 |     | 06/24/05 16:09:38 CEST | FAC-B-1     | OSC Module      | 0    | 1-1st |    | CR  | R  |    | LOS  | Loss Of Signal           |
| 833 | 833 |     | 06/24/05 16:09:46 CEST | FAC-B-1     | OSC Module      | 0    | 1-1st |    | MN  | R  |    | SDCC | SDCC Termination Failure |

Synchronize Filter Delete Cleared Alarms AutoDelete Cleared Alarms Help

NET CKT 145181

**Figure 1-27 ONS 15454 SDH OLA Node View with Fault Condition for ALS MODE Disabled**

In order to troubleshoot and eventually fix a fiber cut, follow the [“Fix a Fiber Cut” procedure on page 1-67](#). The basic assumption is that the MSTP system was already installed and working correctly before the alarm condition occurred. For first installation or restart from a fiber cut, refer to [1.12.2 System Restart after a Fiber Cut, page 1-69](#).

## Fix a Fiber Cut



### Caution

When the network ALS setting is DISABLE, optical power is still present at the damaged fiber. Before fixing the span, it is highly recommended that you shut down the amplifier and the OSC laser upstream of the fiber cut.

**Step 1** Isolate the span affected by the fiber cut.

- a. Go to CTC network view.
- b. Identify the span connection that is gray.

**Step 2** Verify the alarm is valid, then perform the following steps for both DWDM nodes connected to the span identified in [Step 1](#).

- a. Double-click the card directly connected to the span (either the OPT-BST or the OSC-CSM).

- b. Click the Alarms tab and verify that a LOS condition is present on the LINE-RX port. If the alarm is correctly reported, move to [Step 3](#). If not, close the CTC application, delete the CTC cache and reopen the CTC connection.
- c. Click the **Synchronize** button on the bottom left of the window.



**Note** If the “gray” condition of the span persists, log into the Technical Support website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1-800-553-2447) to report a service-affecting problem.

**Step 3** If the network ALS setting on the DWDM nodes that you are troubleshooting is Auto Restart, continue with [Step 4](#); if the network ALS setting is DISABLE, go to [Step 5](#).



**Note** The network ALS setting is a function of the ALS mode configured on the appropriate cards in the system (OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OSC-CSM, and OSCM).

- Step 4** Isolate the fiber affected by the fiber cut. For the two fibers belonging to the span, identify the fiber belonging to the west-to-east (W–E) line direction:
- a. Go into the upstream node and identify the OSCM or OSC-CSM card managing the OSC termination referring to the faulty span.
  - b. Double-click the card, then click the **Maintenance Panel** tab.
  - c. Force the OSC-TX laser to be active by setting the ALS Mode to **DISABLE**.
  - d. Go into the downstream node and verify if OSC power is being received.
    - If a pair of OPT-BST + OSCM cards terminate the OSC connection, click the **Provisioning > Optical Line > Parameters** tabs, then verify that there is power for OSC-TX (Port 4).
    - If an OSC-CSM terminates the OSC connection, click the **Provisioning > Optical Line > Parameters** tabs, then verify that there is power for OSC-RX (Port 6).
  - e. If no power is detected and the LOS (OC-3) alarm persists, go to [Step 5](#); otherwise, the fiber under test is good. In this case, go to [Step f](#) to check the other fiber.
  - f. Repeat Steps [a](#) to [d](#) for the other fiber to verify that it is at fault.

**Step 5** Repair the identified broken fiber to restore the internode link.



**Warning**

**Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056



**Note** Before disconnecting any optical amplifier card fiber for troubleshooting, ensure that the optical amplifier card is unplugged.

## 1.12.2 System Restart after a Fiber Cut

When the network ALS setting is Auto Restart, the system automatically restarts after a fiber cut occurs. MSTP system restart after a fiber cut is a fully automatic process regulated by a chronological sequence of steps including the OSC link built-in amplifiers restart and amplifier power control (APC) regulation.

The successful completion of system restart is strictly related to possible changes of the insertion loss value of the repaired span. A change in insertion loss is dependent on many factors, including the process of physically repairing the fiber, a change in fiber length after repair, and so on.

Four different scenarios related to span loss are presented in this section:

1. Span loss increased:
  - Span loss change > 5 dBm
  - OSC power value on the receiver < -42 dBm
2. Span loss increased:
  - Span loss change > 5 dBm
  - OSC power value on the receiver > -42 dBm
3. Span loss increased: 3 dBm < span loss change < 5 dBm
4. Span loss increased: span loss change < 3 dBm



### Note

It is also possible that span loss decreased, but this is unlikely. This condition does not prevent the MSTP system automatic restart process, but can lead (potentially) to issues downstream of the repaired span, for example, a Power Overload condition on the OSC receiver or on the Trunk-RX port of a TXP or MXP card.

These conditions are identified by specific alarms (see the “HI-RX-POWER” section of [Chapter 2, “Alarm Troubleshooting”](#) of the *DWDM Alarm and Troubleshooting Guide*).

The symptoms of the possible span loss scenarios (except for span loss decrease) are described in the following paragraphs. Refer to the linear network in [Figure 1-21 on page 1-61](#) during the discussion of the scenarios.

The basic assumption is that the network ALS feature (for feature details, refer to the “Network Optical Safety—Automatic Laser Shutdown” section in the *Cisco ONS 15454 DWDM Reference Manual*) is active (ALS Mode = Auto Restart on the OPT-BST [+ OSCM] and OSC-CSM). Given this assumption, the starting condition is as shown in [Figure 1-22 on page 1-62](#).

The system behavior when the network ALS Mode is DISABLE is a subcase that requires a manual restart after repairing a single fiber in only one line direction.



### Note

The network ALS feature is a function of the ALS Mode settings of the OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OSCM, and OSC-CSM cards. For the network ALS Mode to be disabled, each of these cards must have its ALS Mode set to DISABLE.

### 1.12.2.1 Scenario 1: Span Loss Change > 5 dBm and OSC Power Value on the Receiver < -42 dBm

In network view, both of the lines representing the span remain gray as long as the status of the OCHNC circuits relating to the repaired span remain in Partial state.

In node view (single-shelf mode) or shelf view (multishelf mode), the alarm panels of the two nodes (ROADM and OLA in this example) show the LOS (OTS or AOTS) condition on the LINE-RX port of the OPT-BST or OSC-CSM.

An EOC condition is always present on both nodes because the OSC optical link is down due to an incoming power level lower than the optical sensitivity limit (−42 dBm). The system condition remains unchanged as illustrated in Figure 1-22.

Every 100 seconds, the ALS protocol turns up the OSC TX laser in a pulse mode (pulse duration = 2 seconds), but the excessive loss on the span prevents the OSC link from synchronizing, and the MSTP system remains unoperational.

**Note**

During the attempt to restart, a valid power value is reported by the OSC transmit card (in the example, the OSC-CSM in the OLA node), but on the OSC receive card (the OSCM in the ROADM node), the alarm condition persists.

### Corrective Action for Scenario 1

- Step 1** Follow these steps to verify the alarms for both DWDM nodes that are connected to the repaired span:
- Double-click the card directly connected to the span (either the OPT-BST or the OSC-CSM).
  - Click the **Alarms** tab.
  - Verify that a LOS condition is present on the LINE-RX port.
  - Click the **Synchronize** button on the bottom left of the window.
  - If the alarm is correctly reported, move to [Step 2](#). If not, close the CTC application and delete the CTC cache. Then reopen the CTC connection, and repeat [Step 1](#).

**Note**

If the gray color persists on the span, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1-800-553-2447) in order to report a service-affecting problem.

- Step 2** Isolate the fiber affected by the excessive insertion loss. For the two fibers belonging to the span, identify the one for the W–E line direction.
- Go into the upstream node and identify the OSCM or OSC-CSM card that manages the OSC termination for the faulty span.
  - Double-click the card, then click the **Maintenance** tab.
  - Force the OSC-TX laser active by setting ALS Mode to **DISABLE**.
  - Go into the downstream node and verify the OSC Power level received.
    - If a pair of OPT-BST + OSCM cards terminate the OSC connection, click the **Provisioning > Optical Line > Parameters** tabs, then verify that there is power for OSC-TX (Port 4).
    - If an OSC-CSM terminates the OSC connection, click the **Provisioning > Optical Line > Parameters** tabs, then verify that there is power for OSC-RX (Port 6).
    - If no power is detected and the LOS (OC-3) alarm persists, the faulty fiber has been identified, so go to [Step 3](#).
  - If a power value greater than −42 dBm is detected, the fiber under test has been properly repaired. However, it is recommended that you check the new fiber Insertion Loss value.

- In node view (single-shelf mode) or shelf view (multishelf mode), click the **Maintenance > DWDM > WDM Span Check** tabs.
- Retrieve the new value of fiber Insertion Loss of the repaired span.

**Note**

The new value of the fiber Insertion Loss of this fiber after restoration must be less than 5 dB higher than the previous Insertion Loss value. If possible, try to recover the original value by making a better fiber splice. If this is not possible, use the new value (must be less than 5 dB higher than the previous value) and rerun Cisco MetroPlanner to revalidate the new condition.

- Step 3** For the two fibers belonging to the repaired span, identify one for the east to west (E–W) line direction.
- Step 4** Repeat the procedure starting at [Step 2](#) for the E–W direction.
- Step 5** Clean the LINE-RX and LINE-TX connectors for the failing fiber that was identified in the previous steps.
- Step 6** If the problem persists, continue with [Step 7](#). Otherwise, the corrective action is finished.
- Step 7** Repair the failing fiber again until the expected OSC link is reestablished.

**Warning**

**Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

**Note**

Before disconnecting any optical amplifier card fiber for troubleshooting, ensure that the optical amplifier card is unplugged.

**Note**

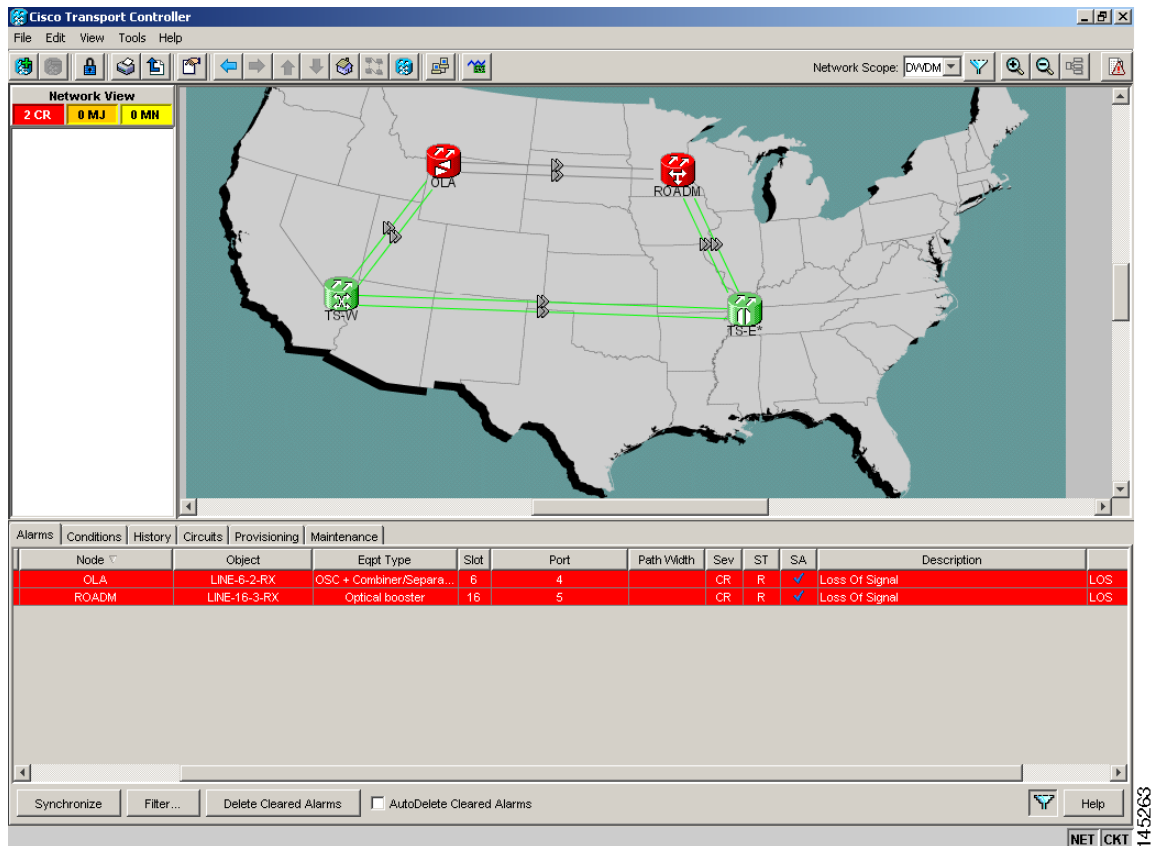
If the OSC link cannot be reestablished (either by splicing or replacing the fiber), and the new value of Span Loss cannot be modified, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

### 1.12.2.2 Scenario 2: Span Loss Change > 5 dBm and OSC Power Value on the Receiver > –42 dBm

In network view, both of the lines representing the span change to green; however, the status of the OCHNC circuits relating to the repaired span remains Partial, instead of Complete (due to the fiber cut).

This change is due to the fact the physical optical power value received by the OSC transceiver is above the sensitivity limit (–42 dBm) and consequently, the OSC optical link can be rebuilt, allowing the restoration of the Section DCC (SDCC) or multiplex section DCC (MS-DCC). The network view for this condition is shown in [Figure 1-28](#).

**Figure 1-28** Network View for Span Loss Change > 5 dBm and OSC Power Value at Receiver > -42 dBm



In node view (single-shelf mode) or shelf view (multishelf mode), the EOC condition is cleared, but the alarm panels of the two nodes (ROADM and OLA in the example) continue to show LOS (OTS or AOTS) on the LINE-RX port of the OPT-BST or OSC-CSM.

The network ALS protocol keeps the OCHNC traffic down along the span because the new losses of the restored span can potentially affect the optical validation of the network design done by Cisco MetroPlanner.

## Corrective Action for Scenario 2

- Step 1** Verify the validity of the alarm.
- Step 2** For both DWDM nodes connected to the repaired span:
  - a. Double-click the card directly connected with the span (either the OPT-BST or the OSC-CSM).
  - b. Click **Alarms**.
  - c. Click the **Synchronize** button on the bottom left of the window.
  - d. Verify that a LOS condition is present on the LINE-RX port.
  - e. If the alarm is correctly reported, move to [Step 3](#). If not, close the CTC application, delete the CTC cache, and open the CTC connection again. Then, go back to [Step 1](#).

**Note**

If the “gray condition” of the span persists, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

**Step 3**

Measure the new Span Loss value after fixing the fiber.

- a. In the node view (single-shelf mode) or shelf view (multishelf mode) of both nodes for the span, click the **Maintenance > DWDM > WDM Span Check** tabs.
- b. Click **Retrieve Span Loss Values** to retrieve the latest loss data.

**Note**

The two values retrieved at each node level (west side and east side) refer to the two fibers coming into the node from the adjacent nodes, so they apply to different spans. To complete the measurement in [Step 3](#), the appropriate values must be taken into account.

**Step 4**

Compare the span measurements of [Step 3](#) with the span losses values used during the network design with Cisco MetroPlanner.

**Step 5**

For the two fibers belonging to the repaired span, identify the fiber for the W–E line direction and calculate the insertion loss variation. If the span loss change is greater than 3 dBm, continue with [Step 6](#). If not, go to [Step 9](#).

**Step 6**

Clean the LINE-RX and LINE-TX connectors on the DWDM cards managing the fiber of the repaired span. If the problem persists, continue with [Step 7](#).

**Step 7**

If the alarm condition is still reported, it is recommended that the fiber be repaired again to reestablish the expected span loss value. If this is not possible and the new value of span loss cannot be modified, go to [Step 8](#) to fix the system faulty condition.

**Warning**

**Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

**Note**

Before disconnecting any optical amplifier card fiber for troubleshooting, ensure that the optical amplifier card is unplugged.

**Step 8**

Follow the signal flow into the network starting from the repaired fiber:

- a. In the downstream node, identify the OPT-BST or OSC-CSM card that manages OSC and CHS detection.
- b. In card view, click the **Provisioning > Optical Line > Optic Thresholds** tabs.
- c. Click the **Alarms** radio button, then click **Refresh**.
- d. Decrease the current OSC and CHS Fail Low thresholds by the same amount of the span loss change calculated in [Step 5](#).

If an OPT-BST is present:

- CHS Fail Low threshold refers to Port 2.
- OSC Fail Low threshold refers to Port 4.

If an OSC-CSM is present:

- CHS Fail Low threshold refers to Port 3.
- OSC Fail Low threshold refers to Port 6.

- Step 9** For the two fibers belonging to the repaired span, identify the fiber for the east to west (E–W) line direction.
- Step 10** Repeat the procedure from [Step 5](#) to [Step 8](#) for the E–W direction.
- Step 11** If the LOS alarm has cleared, the system has restarted properly. However, because a significantly different span loss value is now present, we highly recommend that you complete the following steps:
- Go back to the Cisco MetroPlanner tool and open the network design configuration file.
  - Select **Installation Mode** to freeze the node layout and amplifier positioning.
  - Change the span value, inserting the new insertion loss that was measured in [Step 3](#).
  - Run the Cisco MetroPlanner algorithm to validate the new design.
  - If the optical result indications (power, optical signal-to-noise ratio [OSNR], chromatic dispersion [CD], and so on) are all green, the repair procedure is complete. If not, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) and report a service-affecting problem.

If the LOS alarm is still present, continue with [Step 12](#).

- Step 12** Go back to the card where the LOS alarm is active, and set the optic thresholds (see [Step 8b](#)) to the lowest value allowed.

If an OPT-BST is present:

- CHS Fail Low threshold must to be set to –30 dBm.
- OSC Fail Low threshold must to be set to –42 dBm.

If an OSC-CSM is present:

- CHS Fail Low threshold must to be set to –30 dBm.
- OSC Fail Low threshold must to be set to –40 dBm.



**Note**

If the LOS alarm is still present, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

- Step 13** If the LOS alarm has cleared, the system has restarted properly, but because a Span Loss value significantly different from the design is now present, we highly recommend that you repeat the steps described in [Step 11](#).

### 1.12.2.3 Scenario 3: 3 dBm < Span Loss Change < 5 dBm

In network view, both of the lines representing the span change to green after the rebuild of the OSC optical link and consequent restoration of the SDCC or MS-DCC. The EOC condition and the LOS alarms are cleared.

The network ALS protocol successfully restarts the amplifiers, which enables the OCHNC traffic restoration along the span.

The reactivation of the OCHNC circuits relating to the repaired span (the status changes from Partial to Complete) can lead to several final conditions that depend on the network topology and node layout.

The rebuilding of circuits automatically triggers the APC check mechanism (for details, refer to the “Network Reference” chapter of the *Cisco ONS 15454 DWDM Reference Manual*). The APC check mechanism impacts the optical gain of the amplifiers (primarily the OPT-PRE card) and the VOA express attenuation for the optical add/drop multiplexing (OADM) cards. The APC application acts on the appropriate cards downstream of the repaired span (for each line direction), and attempts to compensate for the introduction of excess loss.

Because the loss increase exceeds the maximum variation (+/-3 dBm) for which APC is allowed to compensate, an APC-CORRECTIO N-SKIPPED condition is raised by the first node along the flow detecting the event. The condition panel of the impacted node (the ROADM, in this example) reports the APC-CORRECTION-SKIPPED condition and indicates the port or card to which it applies.

To correct Scenario 3:

---

**Step 1** Verify the alarm validity.

**Step 2** For both DWDM nodes connected to the repaired span:

- a. Double-click the card reporting the issue.
- b. Click **Conditions**.
- c. Click **Retrieve** and verify that an APC-CORRECTION-SKIPPED condition is present on an aggregate port.
- d. If the alarm is correctly reported, go to [Step 3](#). If not, close the CTC application, delete the CTC cache, and open the CTC connection again. Then, go to [Step 1](#).




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**Note** If the discrepancy persists, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

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**Step 3** Measure the new Span Loss value after the fiber has been repaired.

- a. In the node view (single-shelf mode) or shelf view (multishelf mode) of both nodes of the span, click the **Maintenance > DWDM > WDM Span Check** tabs.
- b. Click **Retrieve Span Loss Values** to retrieve the latest loss data.




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**Note** The two values retrieved at each node level (west side and east side) refer to the two fibers coming into the node from the adjacent nodes, so they apply to different spans. To complete the measurement in [Step 4](#), the appropriate values must be taken into account.

---

**Step 4** Compare the Span Measurements of the previous step with the Span Losses values used during the network design with Cisco MetroPlanner.

**Step 5** For the two fibers belonging to the repaired span, identify the one for the W–E line direction. If the Span Loss Change is greater than 3 dB, continue with [Step 6](#). If not, go to [Step 9](#).

**Step 6** Clean the LINE-RX and LINE-TX connectors of the DWDM cards that manage the fiber of the repaired span. If the problem persists, continue with [Step 7](#). Otherwise, you are finished with the corrective action.

- Step 7** If the alarm condition is still reported, we recommend that you again repair the fiber to reestablish the expected span loss value. If this is not possible and the new value of Span Loss cannot be modified, move to [Step 8](#) to fix the system faulty condition.

**Warning**

**Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

**Note**

Before disconnecting any optical amplifier card fiber for troubleshooting, ensure that the optical amplifier card is unplugged.

- Step 8** Follow the signal flow into the network starting from the repaired fiber.
- a. In the first downstream node of the restored span (W–E), check whether a DWDM card reports the APC-CORRECTION-SKIPPED condition on a port applying to the W–E direction (see [Step 2](#) for how to do this).
  - b. If the answer is yes, retrieve the following values according to the card type.
    - For OPT-PRE (or OPT-BST) cards, click the **Provisioning > Optical Ampli. Line > Gain Setpoint** tabs.
    - For AD-xC-xx.x or AD-xB-xx.x cards, click the **Provisioning > Optical Line > VOA Attenuation Reference** tabs.
    - Go to [Step 8f](#).
  - c. If the answer is no, go to [Step 8d](#).
  - d. Move along the downstream nodes until a card with the APC-CORRECTION-SKIPPED condition for a W–E port is detected.
  - e. From that card, retrieve parameters according to [Step 8b](#).
  - f. In the first downstream node of the restored span, go to the Circuits tab and identify all the OCHNC circuits passing through the repaired span.
  - g. Edit all the OCHNC circuits identified in [Step 8f](#):
    - Click the **Tools > Circuits > Set Circuit State** tabs.
    - Change the Target Circuit Admin. State to **OOS,DSBLD** (or **Locked, disabled**) and click **Apply**.
  - h. Go to the DWDM card for which the Gain or VOA Attenuation values were retrieved (the card can be either the one in substep [Step 8b](#) or [Step 8e](#)) and verify that the administrative state of the alarmed port is now OOS (locked).
  - i. If the alarmed port is not OOS (locked), go to the card view, click **Circuits**, and identify the remaining OCHNC circuits that are still active. Put the circuits in **OOS,DSBLD** (or **Locked, disabled**) state in order to reach the OOS (locked) administrative state on the alarmed port.
  - j. Wait for three minutes, then switch the administrative state of only one of the circuits selected in [Step 8f](#) and [Step 8i](#) back to **IS (Unlocked)**.
  - k. After the network completes the restart phase, go to the formerly alarmed card and verify that the APC-CORRECTION-SKIPPED condition has cleared and a new Gain Setpoint or VOA Attenuation Reference (compare with [Step 8a](#)) has been provisioned.

**Note**

The total variation of the above parameter setpoint must be within approximately +/- 1 dBm of the Span Loss Change measured in [Step 3](#).

- I. If the APC-CORRECTION-SKIPPED condition has cleared and the system has restarted properly, we highly recommend that you complete the following procedure due to the fact that a Span Loss value that is significantly different than the design is now present.
  - Go back to the Cisco MetroPlanner tool and open the network design configuration file.
  - Select **Installation Mode** to freeze the node layout and amplifier positioning.
  - Change the span value, inserting the new Insertion Loss measured in [Step 3](#).
  - Run the Cisco MetroPlanner algorithm to validate the new design.
  - If the optical result indications (power, OSNR, CD, and so on) are all green, the repair procedure is complete. If not, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

**Note**

If the APC condition persists, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

- Step 9** For the two fibers belonging to the repaired span, identify the fiber for to the east to west (E–W) line direction.
- Step 10** Repeat the procedures from [Step 6](#) to [Step 8](#) for the E–W direction.

### 1.12.2.4 Scenario 4: Span Loss Change < 3 dB

In network view, both the lines that represent the span turn green after the rebuilding of the OSC optical link and consequent restoration of the SDCC or MS-DCC. The EOC condition and LOS alarms are cleared.

The network ALS protocol successfully completes the amplifier restart to enable OCHNC traffic restoration along the span.

The rebuilding of circuits automatically triggers the APC check mechanism (for details, refer to the “Network Reference” chapter of the *Cisco ONS 15454 DWDM Reference Manual*). The APC check mechanism affects the optical gain of the amplifiers (primarily the OPT-PRE) and the VOA express attenuation for the OADM cards. The APC application acts on the “suitable” cards downstream of the repaired span (for each line direction), and attempts to compensate for the introduction of excess loss.

The APC operation is successfully completed if enough margin during the Cisco MetroPlanner network design phase has been taken into account. If not, the adjustment done by the APC application overcomes the range setting for a specific optical parameter in the first appropriate card along the flow and an APC-OUT-OF-RANGE condition is raised. The condition panel of the impacted node (the ROADM in the example) reports the APC-OUT-OF-RANGE condition and indicates the port or card to which it applies.

To correct Scenario 4:

- Step 1** Verify the alarm validity.
- Step 2** For both DWDM nodes on the repaired span:
- Double-click the card reporting the issue.
  - Click **Conditions**.
  - Click **Retrieve** and verify that an APC-OUT-OF-RANGE condition is present on an aggregate port.
  - If the alarm is correctly reported, go to [Step 3](#). If not, close the CTC application, delete the CTC cache, and open the CTC connection again. Then, go to [Step 1](#).



**Note** If the discrepancy persists, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

- Step 3** Measure the new Span Loss value after the fiber is repaired.
- In the node view (single-shelf mode) or shelf view (multishelf mode) of both nodes for to the span, click the **Maintenance > DWDM > WDM Span Check** tabs.
  - Click **Retrieve Span Loss Values** to retrieve the latest loss data.



**Note** The two values retrieved at each node level (west side and east side) refer to the two fibers coming into the node from the adjacent nodes, so they apply to different spans. To complete the measurement in [Step 4](#), the appropriate values must be taken into account.

- Step 4** Compare the Span Measurements done in [Step 3](#) with the Span Losses values used during the network design with Cisco MetroPlanner.
- Step 5** For the two fibers belonging to the repaired span, identify the one for the W–E line direction.
- If the Span Loss Change is greater than 1 dBm, continue with [Step 6](#).
  - If the Span Loss Change is 1 dBm or less, move to [Step 9](#).
- Step 6** Clean the LINE-RX and LINE-TX connectors of the DWDM cards that manage the fiber of the repaired span.
- Step 7** If the problem persists, continue with the next step. If not, you have finished the corrective action.
- Step 8** If the Span Loss Change is greater than 1 dBm and the APC-OUT-OF-RANGE condition still exists, it is mandatory to again repair the fibers to reestablish the expected span loss value.



#### Warning

**Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056



**Note** Before disconnecting any optical amplifier card fiber for troubleshooting, ensure that the optical amplifier card is unplugged.

**Note**

If this is not possible and the new value of Span Loss cannot be modified, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem

- Step 9** For the two fibers belonging to the repaired span, identify the fiber for the east to west (E–W) line direction.
- Step 10** Repeat the procedure from [Step 6](#) to [Step 8](#) for the E–W direction.

## 1.12.3 OCHNC Circuits Creation Failure

POCHNC circuit creation is managed by the Cisco Wavelength Path Provisioning (WPP) network application. The WPP application helps prevent errors during new circuit activation (if the wavelength is already allocated in the path between source and destination) and also guarantees an appropriate time interval between one circuit activation and the next to enable proper amplifier gain regulation by APC.

WPP uses the network topology information carried by the OSC link among different nodes to identify the routing path of the optical wavelength (POCHNC circuits) from the source node to the destination node. WPP also enables the card ports of the OCHNC circuits by changing the administrative state from the default (OOS or Locked) state to the final (IS or Unlocked) state.

### 1.12.3.1 Prerequisites for Successful OCHNC Circuit Creation

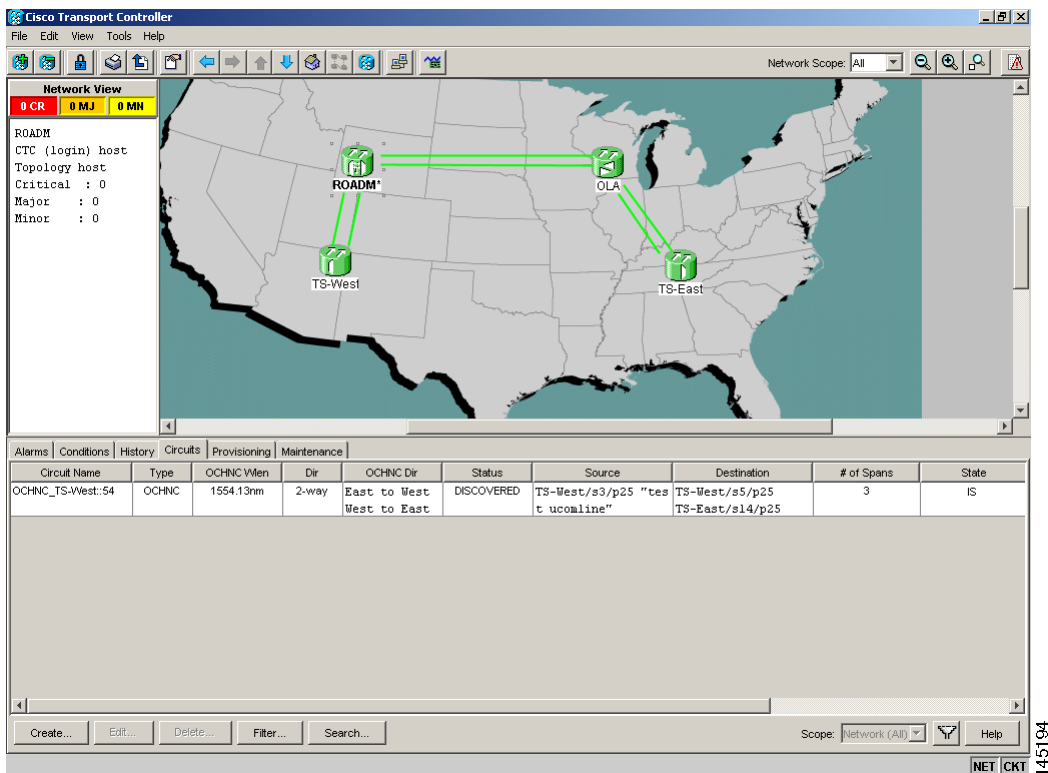
The prerequisite conditions for successfully completed circuit creation are:

1. Internode: OSC link active among all DWDM nodes involved
2. Internode: APC enabled (or alternatively manually disabled by the user)
3. Intranode: Logical connections among cards created and provisioned on every node of the network (ANS completed)

POCHNC circuit creation is successfully completed when the CTC circuit table reports the situation shown in [Figure 1-29](#).

- The Circuit Status has turned to DISCOVERED.
- The # of spans field shows the correct number of hops among different nodes that the OCHNC circuit passes through to reach the final destination.
- Circuit State reports IS (or unlocked).

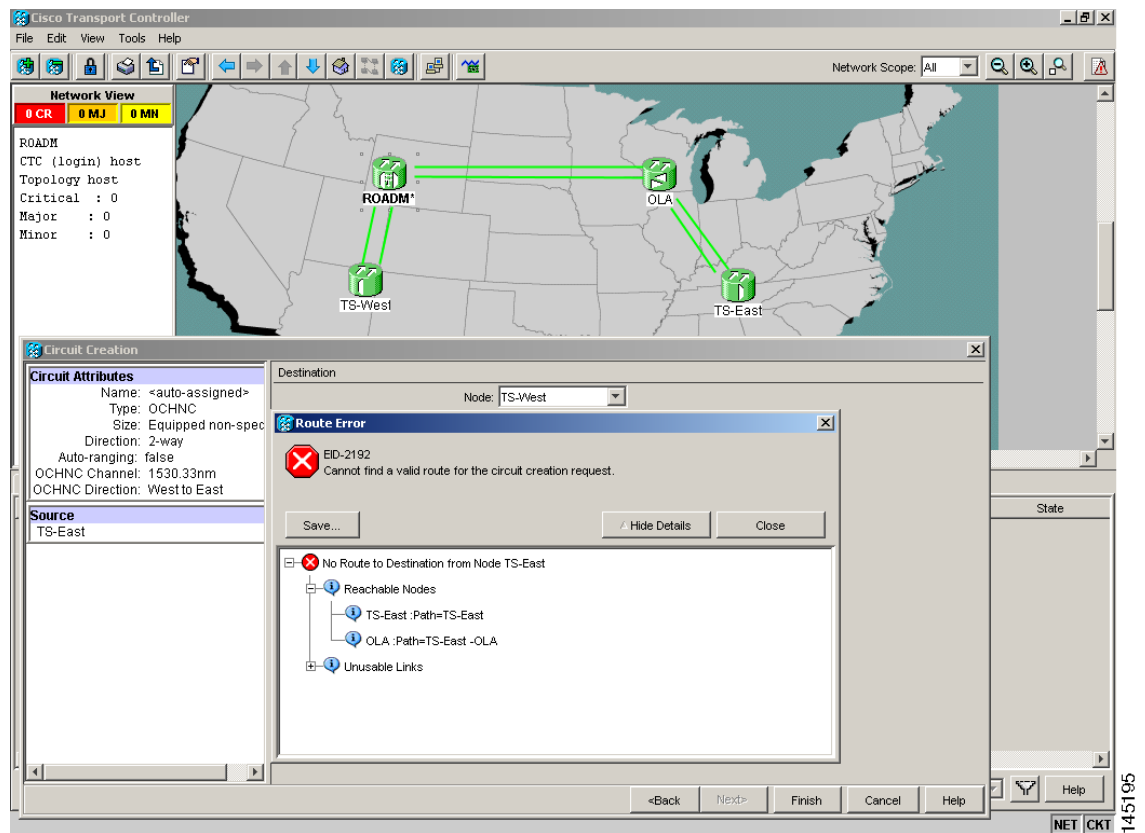
Figure 1-29 OCHNC Circuit Successfully Completed



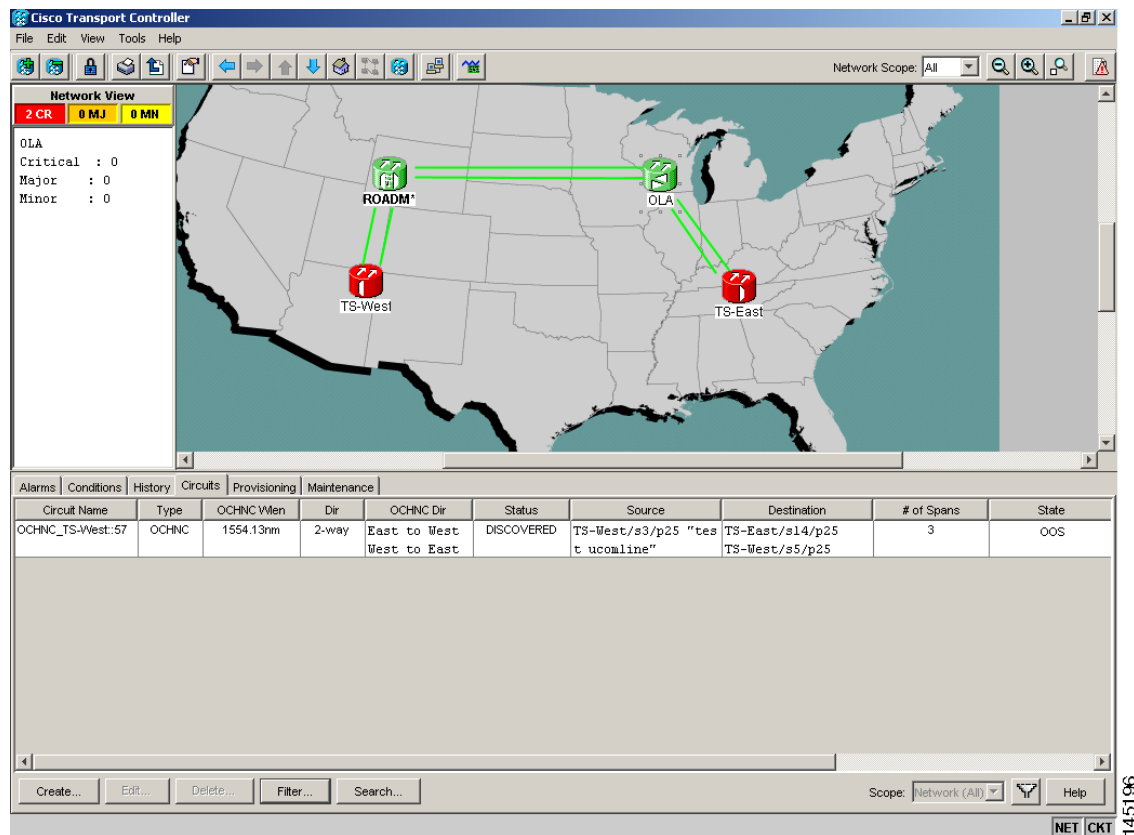
### 1.12.3.2 Conditions for OCHNC Circuit Creation Failure

If the OCHNC circuit creation fails, you will see one of the following conditions:

- If the WPP wizard cannot complete the circuit creation procedure, CTC displays the error message shown in Figure 1-30. In the message, click **Details** to see the partial connections that WPP can set up. Start troubleshooting the problem in the first node that is unreachable along the path.

**Figure 1-30** Partial Circuit

- The circuit is successfully created and reported under the Circuits tab, the Status field turns to DISCOVERED, but the Circuit State is OOS (locked). The condition is shown in [Figure 1-31](#).

**Figure 1-31** Circuit Discovered, State OSS

- The OCHNC circuit is shown under the Circuits tab, but the Status field reports PARTIAL. This applies to a circuit successfully built-up when the network falls into scenarios a. or b (OSC link fail or APC disabled), described below.

The root cause identification for the preceding conditions are found in the prerequisite conditions described in [1.12.3.1 Prerequisites for Successful OCHNC Circuit Creation](#).

### 1.12.3.3 Scenarios for OCHNC Circuit Creation Failure

The most common scenarios for failure to create an OCHNC circuit are:

- One (or more) of the Span OSC links involving the OCHNC circuit has not been properly established. The WPP application prevents the creation of any circuit passing through the failing span. Prerequisite condition 1. of [1.12.3.1 Prerequisites for Successful OCHNC Circuit Creation](#) has not been met.
  - The APC application is internally disabled due to the presence of a Critical alarm somewhere in the network. As a consequence, no reliable information about the number of active channels can be shared among the nodes and the creation of any further OCHNC circuit is prevented until the faulty condition is fixed. Prerequisite condition 2. of [1.12.3.1 Prerequisites for Successful OCHNC Circuit Creation](#) has not been met.
  - One (or more) of the intranode connections between two DWDM cards associated with the circuit have not been properly created. Prerequisite condition 3. of [1.12.3.1 Prerequisites for Successful OCHNC Circuit Creation](#) has not been met.

- c. One (or more) of the intranode connections between two DWDM cards associated with the circuit have not been properly provisioned. This happens when ANS application has not run in one of the involved nodes or at least one port status after the ANS run has not been successfully configured (Fail-Out of Range alarm on the ANS panel). Prerequisite condition 3. of [1.12.3.1 Prerequisites for Successful OCHNC Circuit Creation](#) has not been met.

To troubleshoot and eventually fix issues related to the faulty OCHNC circuit creation shown in [Figure 1-30 on page 1-81](#), the following procedure must be performed.

**Step 1** Verify OSC connectivity:

- a. Go to network view and identify the MSTP nodes to which the OCHNC circuit applies.
- b. Verify that all the OSC links connecting the MSTP nodes along the circuit path, from the source node to the destination node, are active (green line).



**Note** Bidirectional circuits have two possible nodes, depending on the line direction being considered.

Complete one of the following actions depending on OSC connectivity:

- If the OSC link is down, focus on the affected span and troubleshoot the issue (see [1.12.2 System Restart after a Fiber Cut, page 1-69](#)).



**Note** If necessary, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

- If the OSC link is not down, continue with [Step 2](#).

**Step 2** Verify APC status:

- a. Go to node view (single-shelf mode) or shelf view (multishelf mode) on the MSTP node that is the source node for the circuit.
- b. In the General Info box on the left, check the APC state (last row).
  - If the APC state is DISABLE - INTERNAL, complete the appropriate troubleshooting procedure from [Chapter 2, “Alarm Troubleshooting”](#).



**Note** If necessary, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

- If the APC state is not DISABLE - INTERNAL, continue with [Step 3](#).

**Step 3** Verify that the intranode connections have been built in:

- a. Go to the node view (single-shelf mode) or multishelf view (multishelf mode) on the MSTP node that is the source node for the circuit.
- b. Click the **Provisioning > WDM-ANS > Connections** tabs.

**Step 4** Verify that all node connections have been created and that their state is Connected.

**Tip**

To quickly verify the connections, click the **Calculate Connection** button and check to see if any new connections come up.

If some connections are missing, perform the proper procedure according to “Turn Up a Node” in the *Cisco ONS 15454 DWDM Procedure Guide*.

**Step 5**

If necessary, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

## 1.13 Node Level (Intranode) Problems

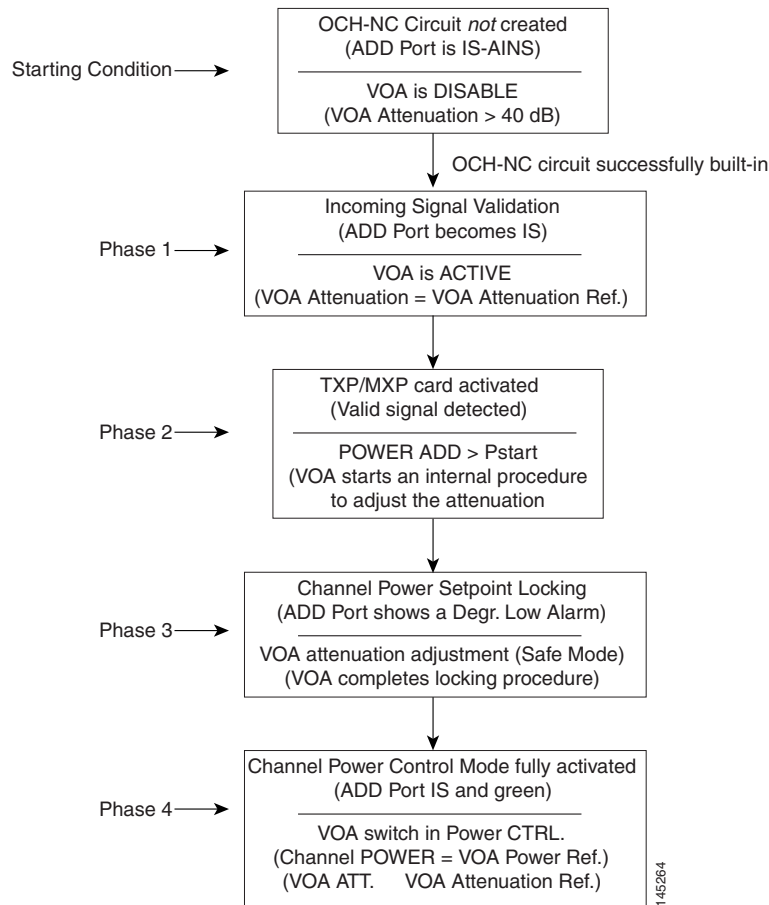
Troubleshooting for node-level optical channel (OCH) VOA start-up failure as well as internal VOA control loop problems in the 32DMX-C and 32DMX-L cards that occur due to counter-propagating light are discussed in this section.

A dedicated VOA regulates the optical power for every single channel (single wavelength) inserted in the MSTP system through a WSS, 32MUX-O, or AD-xC-xx.x card.

The final state for the VOAs is the power control working mode. In this mode, the attenuation that the VOA introduces is automatically set based on the feedback provided from a dedicated photodiode, so that a specific power setpoint value is reached and maintained.

### 1.13.1 VOA Startup Phases

The final VOA condition is achieved through a startup procedure divided into the four sequential phases shown in [Figure 1-32](#).

**Figure 1-32 VOA Startup Procedure**

Until the VOA has completed all the phases shown in [Figure 1-32](#), the power control mode is not fully activated.

### 1.13.1.1 Phase 1: Incoming Signal Validation

The Incoming Signal Validation phase checks to see that the optical interface connection is valid and that the optical power level is appropriate.

Cisco MetroPlanner calculates the VOA Attenuation Reference value to allow only supported MSTP interfaces to overcome the power start-up (Pstart-up) acceptance level. (Refer to the “Network Reference” chapter of the *Cisco ONS 15454 DWDM Reference Manual*.)

If the interface that is connected has a power value outside the allowed range, the Phase 1 check prevents OCHNC turn-up.

### 1.13.1.2 Phase 2: Valid Signal Detected

If Phase 1 indicates that the signal is valid, an automatic iterative attenuation adjustment on the VOA takes place to reach a power target on the photodiode downstream of the VOA.

**Note**

The power setpoint is generated by Cisco MetroPlanner on a case-by-case basis. During the ANS run, the power target is provisioned on the VOA.

### 1.13.1.3 Phase 3: Channel Power Setpoint Locking

In Phase 3, the VOA is kept in a transient standby condition when a steady power value close enough to the final power setpoint has been reached (nominally 3 dBm lower).

The duration of the transient standby condition is three seconds (by default) and allows safe management of optical interfaces that have different signal rise time values or are undergoing a pulse startup procedure compliant with the ITU-T G664 recommendation.

### 1.13.1.4 Phase 4: Channel Power Control Mode Fully Activated

The VOA reaches the final attenuation condition that leads the power value that is read on the photodiode to the expected target value (VOA Power Reference). Simultaneously, the VOA operating mode switches to power control mode.

From this point on, any further adjustment of the VOA attenuation is triggered by a variation of the value read on the photodiode. The aim of these adjustments is to always keep the power value equal to the power setpoint, with  $\pm 0.5$  dBm as the minimum adjustment increment.

## 1.13.2 VOA Failure Scenarios

Several conditions can stop the startup procedure at an intermediate step, blocking the VOA (and the circuit activation, as a consequence) from completing activation of the power control mode. The scenarios in this section portray those conditions.

Root-cause identification can be performed based on the alarm raised and the power reading on the photodiode associated with the VOA.

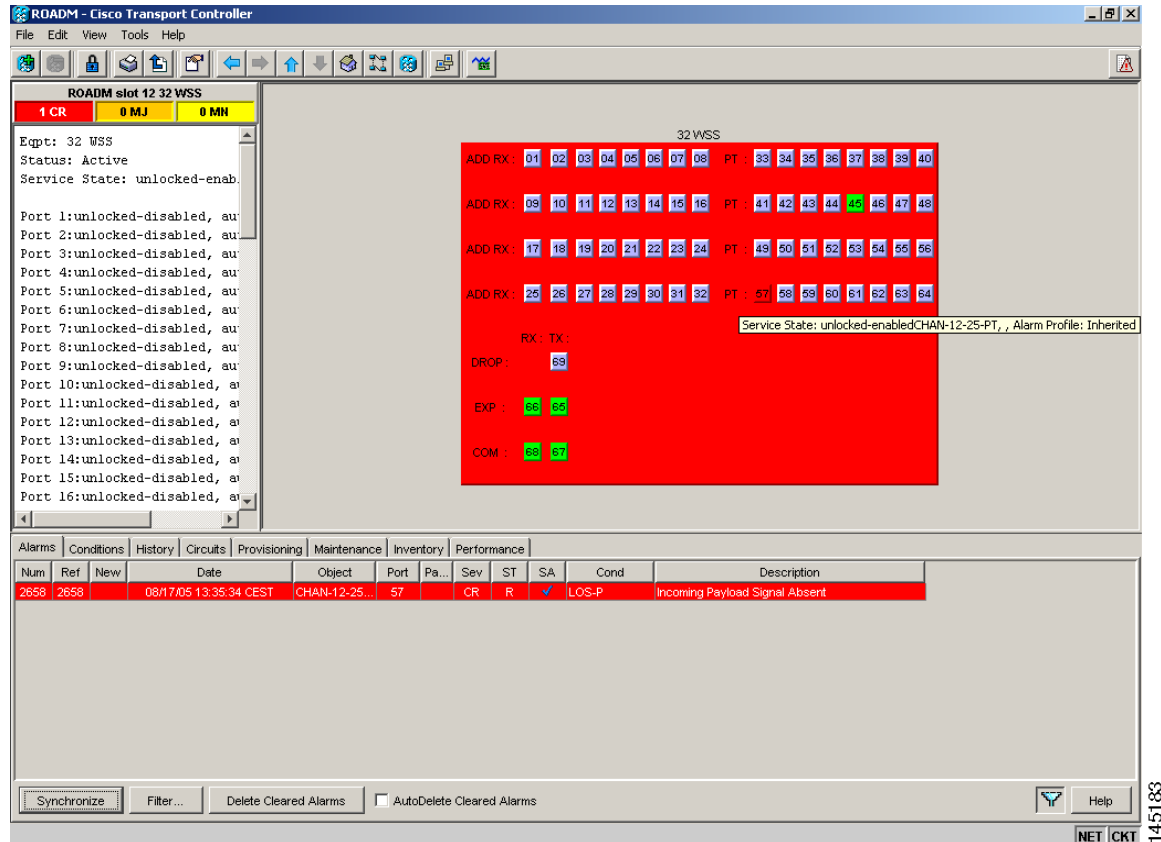
### 1.13.2.1 Scenario A: Optical Power Level of the Incoming Signal Lower Than Minimum Allowed by MSTP Supported Optical Interfaces

This scenario is for a condition where a TXP or MXP card is directly connected to a 32MUX-O or 32WSS card where power in is expressed as  $P_{in} < -4.5$  dBm.

If the incoming power level is lower than the minimum allowed, the startup procedure always stops at Phase 1 (see [Figure 1-33](#)). This is the case even if the final VOA Power Reference reported in CTC is reachable.

The final conditions that CTC reports are:

- A LOS-P (OCH layer) alarm on the port associated with the VOA (see [Figure 1-33](#))
- A valid optical power value (different from the end of scale value of  $-50$  dBm) in the Power field, but the value for Power is less than  $-33$  dBm. (To view the Power field, in card view, click the **Provisioning > Parameters** tabs.)

**Figure 1-33** LOS-P Indication on the VOA Port

Use the following procedure to troubleshoot and eventually fix issues related to the VOA start-up when the optical power level of the incoming signal is lower than the minimum allowed by the MSTP supported optical interfaces (32MUX-O and 32WSS cards).

**Step 1**

Verify the alarm validity:

- Identify the DWDM nodes where the alarmed card is seated.
- Double-click the card (either the 32MUX-O or the 32WSS card).
- Click **Alarms**.
- Verify that a LOS-P alarm is present on the ADD-RX port.
- Click the **Synchronize** button in the bottom left of the window.
- If the alarm is correctly reported, move to [Step 2](#). If not, close the CTC application, delete the CTC cache, and open the CTC connection again.

**Note**

If the alarm inconsistency persists, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

**Step 2** If the alarmed card is a 32WSS, verify the incoming power level from the connected TXP, MXP, or line card. If the alarmed card is a 32MUX-O, go to [Step 5](#).

- a. Double-click the 32WSS card.
- b. Click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs to display the optical power physically coming into the 32WSS ADD-RX port.



**Note** X is the number (1 to 4) of the appropriate multifiber MPO connector that manages the alarmed channel (wavelength).

- c. Identify the proper channel (wavelength) and read the Power ADD field.
- d. If the Power ADD value is less than  $-4.5$  dBm, go to [Step 3](#). If not, click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs.



**Note** X is the number (1 to 4) of the appropriate multifiber MPO connector that manages the alarmed channel (wavelength).

- e. Identify the correct row based on the **Type** field (the row must indicate Add in the type field).
- f. Decrease the attenuation on the VOA to the minimum (0 dB) to enable channel startup. To perform this adjustment:
  - Read the VOA Attenuation Ref value for the channel (wavelength).
  - Enter into the VOA Attenuation Calib field the same value as that of the VOA Attenuation Ref field, but with the opposite sign (the algebraic sum of the two contributions must be equal to zero).
  - Click **Apply**. If the LOS-P alarm persists, continue with this procedure. Otherwise, the problem has been corrected.
- g. In card view, click **Circuits**.
- h. Delete the OCHNC circuit that relates to the faulty channel.
- i. Ensure that the corresponding ADD-RX service state port changes to IS-AINS (or Unlocked,automaticInService) and that the color changes to grey (the LOS-P alarm should clear).
- j. Recreate the OCHNC circuit and verify that the Status field reports DISCOVERED and that the state is IS (Unlocked).
- k. If the LOS-P alarm has not cleared, replace the 32WSS card (refer to the “Add and Remove Cards and Nodes” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*). Before you replace the card, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.



#### Warning

**High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.** Statement 201

**Step 3** Because the actual power received by the 32WSS card is lower than expected, verify the correct behavior of the TXP, MXP, or line card connected to the 32WSS:

- The TX laser must be active (trunk port is in IS [or Unlocked] state).
- The wavelength provisioned must be the proper one.

- The output power value must be within the expected range (refer to the “Hardware Specifications” appendix in the *Cisco ONS 15454 DWDM Reference Manual*). If the trunk port PM is not available through CTC, perform a manual measurement using a standard power meter.

If the TX laser is active, the wavelength is provisioned properly, and the output power value is in the correct range, go to [Step 4](#). Otherwise, take the appropriate corrective action, including card replacement if the output power value is outside of the expected range (refer to the “Add and Remove Cards and Nodes” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*. Replacing the card should correct the problem.)

**Warning**

**High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.** Statement 201

**Step 4** If the TXP or MXP card behaves as expected, the only remaining root cause is the fiber connection between the two cards:

- Verify that the ADD\_RX port of the alarmed 32WSS is connected to the TRUNK\_TX port of the TXP or MXP card using an MPO-LC multifiber cable.

**Note**

A patch-panel tray is normally used to manage fiber connections (for patch-panel cabling details, refer to the “Turn Up a Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*).

- Check and clean the LC fiber fan-out according to site practice. The fiber numbers (1 to 8) must correspond to the wavelength managed.
- If a patch panel is used, check and, if necessary, clean the LC-LC adapter. If necessary, replace any bad devices (maximum tolerance is 1 dB).
- Pull out the LC connector from the TRUNK\_TX port of the TXP or MXP card and clean the fiber according to site practice.

**Note**

If no site practice exists for cleaning fibers, complete the procedure in the “Maintain the Node” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

**Note**

If the alarm condition has not cleared, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

**Step 5** When the alarmed card is a 32MUX-O, the troubleshooting procedure should start from the TXP, MXP, or line card. Verify the correct behavior of the TXP, MXP, or line card connected to the 32MUX-O:

- The TX laser must be active (trunk port is in IS [or Unlocked] state).
- The wavelength provisioned must be the proper one.
- The output power value must be within the expected range (refer to the “Hardware Specifications” appendix in the *Cisco ONS 15454 DWDM Reference Manual*). If the trunk port PM is not available through CTC, perform a manual measurement using a standard power meter.

If the TX laser is active, the wavelength is provisioned properly, and the output power value is in the correct range, go to [Step 6](#). Otherwise, take the appropriate corrective action, including card replacement if the output power value is outside of the expected range (refer to the “Add and Remove Cards and Nodes” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*. Replacing the card should correct the problem.)

**Warning**

**High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.** Statement 201

**Step 6** If the TXP or MXP card behaves as expected, check the fiber connection between the two cards:

- a. The ADD\_RX port of the alarmed 32MUX-O must be connected to the TRUNK\_TX port of a TXP or MXP card using an MPO-LC multifiber cable.

**Note**

A patch-panel tray is normally used to manage fiber connections (for patch-panel cabling details, refer to the “Turn Up a Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*).

- b. Check and clean the LC fiber fan-out according to site practice. The fiber numbers (1 to 8) must correspond to the wavelength managed.
- c. If a patch panel is used, check and, if necessary, clean the LC-LC adapter.
- d. If necessary, replace any bad devices (maximum tolerance is 1 dB).
- e. Pull out the LC connector from the TRUNK\_TX port of the TXP or MXP card and clean the fiber according to site practice.

**Note**

If no site practice exists for cleaning fibers, complete the procedure in the “Maintain the Node” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

- f. If the alarm condition persists, move to [Step 7](#). Otherwise, the problem has been corrected.

**Step 7** Verify the correct behavior of the VOA inside the 32MUX-O card:

- a. Double-click the 32MUX-O card.
- b. Click **Circuits**.
  - Delete the OCHNC circuit relating to the faulty channel.
  - Ensure that the service state of the corresponding ADD-RX port changes to IS-AINS (or Unlocked,automaticInService), and that the color turns grey (the LOS-P alarm should clear).
- c. In card view, click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs and identify the proper channel (wavelength).
- d. Decrease the attenuation on the VOA to the minimum (0 dB) to enable channel startup. To perform this in field adjustment:
  - Read the VOA Attenuation Ref value for the channel (wavelength).
  - Enter the same value into the VOA Attenuation Calib field as that of the VOA Attenuation Ref field, but with the opposite sign (the algebraic sum of the two contributions must be equal to zero).

- Click **Apply**. If the LOS-P alarm persists, continue with this procedure. Otherwise, the problem has been corrected.
- e. Click **Circuits**.
- f. Recreate the OCHNC circuit and verify that Circuit Status field reports DISCOVERED and the state is IS (Unlocked).
- g. If the LOS-P alarm has not cleared, replace the 32MUX-O card (refer to the “Add and Remove Cards and Nodes” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*). Before you replace the card, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem).

**Warning**

**High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.** Statement 201

### 1.13.2.2 Scenario B: Optical Power Level of the Incoming Signal Lower Than Expected

In some cases, the pass-through channels on the 32WSS card or the optical bypass channels on the 32MUX-O card are at a power level that is lower than expected. The incoming power level can be lower than expected for several reasons. A few examples are:

- Dirty connections
- Excessive span loss
- Wrong amplifier gain setting

When the power is lower than expected, the start-up procedure can stop at Phase 1, Phase 2, or Phase 3 (see [Figure 1-32](#)). The point at which the start-up procedure stops depends on the amount of power missing.

Given that Delta Power is the amount of optical power missing compared to the expected value, two final conditions for Scenario B can be identified, Conditions B1 and B2.

#### 1.13.2.2.1 Condition B1—Delta Power > 6 dB (LOS-P Alarm)

When the optical power is more than 6 dB lower than the expected value, the final VOA Power Reference setpoint value is definitively not reachable and even Phase 1 of the start-up procedure cannot be properly completed. As a consequence, the final condition reported in CTC is the same as that of Scenario A:

- A LOS-P (OCH layer) alarm is present on the port associated with the VOA.
- A valid optical power value (different from the end of scale value of – 50 dBm) can be read in the Power field, but the value for Power is less than –33 dBm (see [Figure 1-34](#)). (To access this value, in card view, click the **Provisioning** > **Parameters** tabs.)

Figure 1-34 Power Level of Incoming Signal Less than -33 dBm

ROADM - Cisco Transport Controller

ROADM slot 12 32 WSS

1 CR 0 MJ 0 MN

Port 55:unlocked-disabled, a  
 Port 56:unlocked-disabled, a  
 Port 57:unlocked-enabled  
 Port 58:unlocked-disabled, a  
 Port 59:unlocked-disabled, a  
 Port 60:unlocked-disabled, a  
 Port 61:unlocked-disabled, a  
 Port 62:unlocked-disabled, a  
 Port 63:unlocked-disabled, a  
 Port 64:unlocked-disabled, a  
 Port 65:unlocked-enabled  
 Port 66:unlocked-enabled  
 Port 67:unlocked-enabled  
 Port 68:unlocked-enabled  
 Port 69:unlocked-disabled, a

ADD RX: 01 02 03 04 05 06 07 08 PT 33 34 35 36 37 38 39 40  
 ADD RX: 09 10 11 12 13 14 15 16 PT 41 42 43 44 45 46 47 48  
 ADD RX: 17 18 19 20 21 22 23 24 PT 49 50 51 52 53 54 55 56  
 ADD RX: 25 26 27 28 29 30 31 32 PT 57 58 59 60 61 62 63 64

RX : TX :  
 DROP : 69  
 EXP : 68 65  
 COM : 68 67

Service State: unlocked-enabledCHAN-12-25-PT, Alarm Profile: Inherited

Alarms Conditions History Circuits Provisioning Maintenance Inventory Performance

Optical Chn:  
 Optical Connector 1  
 Optical Chn:  
 Optical Connector 2  
 Optical Chn:  
 Optical Connector 3  
 Optical Chn:  
 Optical Connector 4  
 Optical Line  
 Alarm Profiles

Parameters Optics Thresholds

| Port             | Admin St. | Service State | Line Direction | Power | Actual Wav... | Type        | VOA Mode       | VOA Power Ref. |
|------------------|-----------|---------------|----------------|-------|---------------|-------------|----------------|----------------|
| 25 CHAN-12-25-RX | unlocked  | unlocked-dis  | West to East   | N/A   | 1554.1 nm     | Add         | Constant Power | -14.0 0.0      |
| 57 CHAN-12-25-PT | unlocked  | unlocked-en   | West to East   | -35.3 | 1554.1 nm     | Passthrough | Constant Power | -14.0 0.0      |
| 26 CHAN-12-26-RX | unlocked  | unlocked-dis  | West to East   | N/A   | 1554.9 nm     | Add         | Constant Power | -14.0 0.0      |
| 58 CHAN-12-26-PT | unlocked  | unlocked-dis  | West to East   | N/A   | 1554.9 nm     | Passthrough | Constant Power | -14.0 0.0      |
| 27 CHAN-12-27-RX | unlocked  | unlocked-dis  | West to East   | N/A   | 1555.7 nm     | Add         | Constant Power | -14.0 0.0      |
| 59 CHAN-12-27-PT | unlocked  | unlocked-dis  | West to East   | N/A   | 1555.7 nm     | Passthrough | Constant Power | -14.0 0.0      |
| 28 CHAN-12-28-RX | unlocked  | unlocked-dis  | West to East   | N/A   | 1556.5 nm     | Add         | Constant Power | -14.0 0.0      |
| 60 CHAN-12-28-PT | unlocked  | unlocked-dis  | West to East   | N/A   | 1556.5 nm     | Passthrough | Constant Power | -14.0 0.0      |
| 29 CHAN-12-29-RX | unlocked  | unlocked-dis  | West to East   | N/A   | 1558.1 nm     | Add         | Constant Power | -14.0 0.0      |
| 61 CHAN-12-29-PT | unlocked  | unlocked-dis  | West to East   | N/A   | 1558.1 nm     | Passthrough | Constant Power | -14.0 0.0      |
| 30 CHAN-12-30-RX | unlocked  | unlocked-dis  | West to East   | N/A   | 1558.9 nm     | Add         | Constant Power | -14.0 0.0      |
| 62 CHAN-12-30-PT | unlocked  | unlocked-dis  | West to East   | N/A   | 1558.9 nm     | Passthrough | Constant Power | -14.0 0.0      |
| 31 CHAN-12-31-RX | unlocked  | unlocked-dis  | West to East   | N/A   | 1559.7 nm     | Add         | Constant Power | -14.0 0.0      |

NET CKT 145184

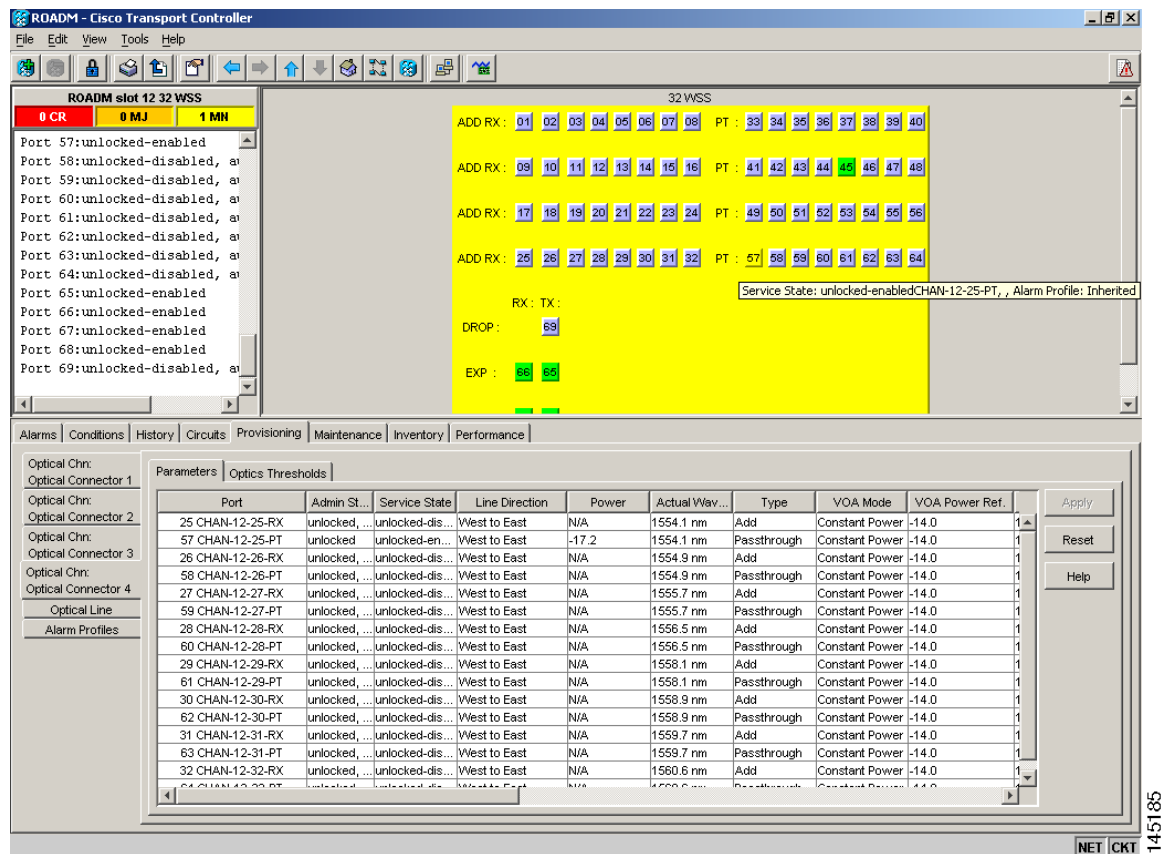
#### 1.13.2.2.2 Condition B2—Delta Power < 6 dB (OPWR-LowDEGrade Alarm)

When the optical power is less than 6 dB lower than the expected value, even if a valid incoming signal is present, the final VOA Power Reference setpoint value that is reported in the CTC is not reachable and the VOA startup procedure is stopped at Phase 3.

The final conditions that CTC reports are:

- An OPWR-LowDEGrade (OCH layer) alarm is present on the port associated with the VOA.
- A valid optical power value (different from the end of scale value of -50 dBm) can be read in the Power field, but the value is (VOA Power Ref - 6 dBm) < Power < VOA Power Ref (see Figure 1-35). To access this value, in card view, click the **Provisioning > Parameters** tabs.

Figure 1-35 Optical Power Less than 6 dB Lower than Expected



## Corrective Actions for Scenario B (Optical Power Level of Incoming Signal Lower than Expected)

When the optical power level of the incoming signal is lower than expected for the pass-through channels on the 32WSS or the optical bypass channels on the 32MUX-O card, use the following procedures to troubleshoot and eventually fix issues related to VOA start-up. According to the final conditions reported by the card (either LOS-P alarm for condition B1 or OPWR-LowDEGrade for condition B2), two troubleshooting procedures are suggested. These procedures are given in the following sections.

### Condition B1—LOS-P Alarm

#### Step 1 Verify the alarm validity:

- Identify the DWDM nodes where the alarmed card is located.
- Double-click the card (either the 32MUX-O or the 32WSS card).
- Click **Alarms**.
- Verify that a LOS-P alarm is present on the ADD-RX port.
- Click the **Synchronize** button at the bottom left of the window.
- If the alarm is correctly reported, move to [Step 2](#). If not, close the CTC application, delete the CTC cache, and open the CTC connection again.

**Note**

If the alarm inconsistency persists, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

- Step 2** In card view, click **Circuits** and retrieve the node, card, and port information for the alarmed channel from the Source field of the OCHNC circuit. Then follow the procedures of [Step 3](#) (32MUX-O, 32WSS, or AD-xC-xx.x card) or [Step 4](#) (TXP, MXP, or line card) as appropriate.
- Step 3** Verify the correct behavior of the far-end DWDM card (32MUX-O, 32WSS, or AD-xC-xx.x) that manages the channel (wavelength):
- Verify that the power value coming in on the ADD\_RX port is correct.
    - In card view, click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs.

**Note**

X is number (1 to 4) of the proper multifiber MPO connector that manages the alarmed channel (wavelength).

- The Power field value must be the same as that in the VOA Power Ref field. If not, take the appropriate corrective actions according to the alarm raised at the RX-ADD port.
- Step 4** Verify the correct behavior of the TXP, MXP, or line card that is the signal source of the channel (wavelength) that is alarmed:
- The TX laser must be active (trunk port is in IS [Unlocked] state).
  - The wavelength provisioned must be the proper one.
  - The output power value must be within the expected range (refer to the “Hardware Specifications” appendix in the *Cisco ONS 15454 DWDM Reference Manual*). If the trunk port PM is not available through CTC (for example, TXP\_MR\_2.5G), perform a manual measurement using a standard power meter.
- Step 5** If the cards referenced in [Step 3](#) and [Step 4](#) are operating properly, go to [Step 6](#). If not, take the appropriate corrective actions according to the alarm raised on the card.
- Step 6** If the alarmed card is a 32MUX-O, go to [Step 9](#).
- Step 7** If the alarmed card is a 32WSS, continue with the following steps:
- Double-click the card.
  - Click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs.

**Note**

X is number (1 to 4) of the proper multifiber MPO connector that manages the alarmed channel (wavelength).

- Identify the correct row based in the Type field (the row must indicate Passthrough in the type field).
- Decrease the attenuation on the VOA to the minimum (0 dB) to enable channel startup. To perform this in field adjustment:
  - Read the VOA Attenuation Ref value for the channel (wavelength).
  - Enter the same value into the VOA Attenuation Calib field as that of the VOA Attenuation Ref field, but with the opposite sign (the algebraic sum of the two contributions must be equal to zero).

- Click **Apply**. If the LOS-P alarm persists, continue with this procedure. Otherwise, the problem has been corrected.
- e. Click **Circuits**.
- f. Delete the OCHNC circuit for the faulty channel.
- g. Ensure that the service state of the corresponding ADD-RX port changes to IS-AINS (or Unlocked,automaticInService) and that the color changes to grey (LOS-P alarm should clear).
- h. Recreate the OCHNC circuit and verify that Circuit Status field reports DISCOVERED and the state is IS (Unlocked).
- i. If the LOS-P alarm has not cleared, continue with [Step 8](#). Otherwise, the problem has been corrected.

**Step 8** To unambiguously pinpoint the root cause of the alarm, verify the proper cabling of the EXP\_RX port (which is the common input port for all the pass-through channels) on the 32WSS card:

- a. The EXP\_RX port of the alarmed 32WSS card must be connected to the EXP\_TX port of the coupled 32WSS card on the opposite side of the node.
- b. Pull out the LC connector from the EXP\_RX port of the 32WSS card and clean the fiber according to site practice.
- c. Pull out the LC connector from the EXP\_TX port of the coupled 32WSS card and clean that connector also.
- d. Verify that the fiber attenuation is within the specifications (maximum tolerance is 1 dB).
- e. If necessary, replace any bad fibers.

**Note**

Before disconnecting any optical amplifier card fiber for troubleshooting, ensure that the optical amplifier card is unplugged.

**Note**

If no site practice exists for cleaning fibers, complete the procedure in the “Maintain the Node” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

- f. If the alarm condition persists even after the checking and fixing the fibers, replace the 32WSS card (refer to the “Add and Remove Cards and Nodes” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*). Before replacing the card, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem).

**Warning**

**High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.** Statement 201

**Step 9** Verify the correct behavior of the VOA inside the 32MUX-O card:

- a. Double-click the 32MUX-O card.
- b. Click **Circuits**.
- c. Delete the OCHNC circuit for the faulty channel.
- d. Ensure that the service state of the corresponding ADD-RX port changes to IS-AINS (or Unlocked,automaticInService) and that the color changes to grey (LOS-P alarm should clear).

- e. Click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs and identify the proper channel (wavelength).



**Note** X is number (1 to 4) of the proper multifiber MPO connector that manages the alarmed channel (wavelength).

- f. Decrease the attenuation on the VOA to the minimum (0 dB) to enable channel startup. To perform this in field adjustment:
- Read the VOA Attenuation Ref value for the channel (wavelength).
  - Enter the same value into the VOA Attenuation Calib field as that of the VOA Attenuation Ref field, but with the opposite sign (the algebraic sum of the two contributions must be equal to zero).
  - Click the **Apply** button. If the LOS-P alarm persists, continue with this procedure. Otherwise, the problem has been corrected.
- g. Click **Circuits**.
- h. Recreate the OCHNC circuit and verify that Circuit Status field reports DISCOVERED and the state is IS (Unlocked).
- i. If the LOS-P alarm has not cleared, continue with [Step 10](#). Otherwise, the problem has been corrected.

**Step 10** To unambiguously pinpoint the root cause of the alarm, verify the proper cabling of the alarmed ADD\_RX port on the 32MUX-O card:

- a. The ADD\_RX port of the alarmed 32MUX-O must be connected to the DROP\_TX port of the coupled 32DMX-O card on the opposite side of the node using two MPO-LC multifiber cables.



**Note** A patch-panel tray is normally used to manage fiber connections (for patch-panel cabling details, refer to the “Turn Up a Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*).

- b. Verify that the power value coming out of DROP\_TX port of the coupled 32DMX-O card is correct:
- In card view, click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs.



**Note** X is number (1 to 4) of the proper multi-fibers MPO connector that manages the alarmed channel (wavelength).

- The Power field value must be the same as that in the VOA Power Ref field. If it is not, take the appropriate corrective action for the alarm according to [Chapter 2, “Alarm Troubleshooting.”](#)
- c. Check and clean the LC fiber fan-out according to site practice. The fiber numbers (1 to 8) must correspond to the wavelength managed.
- d. Repeat [Step c](#) for the MPO-LC multifiber cable coming out of the DROP\_TX port of the coupled 32DMX-O card.
- e. Check and, if necessary, clean the LC-LC adapter.
- f. If necessary, replace and bad devices (maximum tolerance is 1 dB).

**Note**

If no site practice exists for cleaning fibers, complete the procedure in the “Maintain the Node” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

- g. If the alarm condition persists even after the cabling is checked or fixed, replace the 32MUX-O card (refer to the “Add and Remove Cards and Nodes” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*. Before replacing the card, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem).

**Warning**

**High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.** Statement 201

**Condition B2—OPWR-LowDEGrade Alarm****Step 1** Verify the alarm validity:

- a. Identify the DWDM node where the alarmed card is located.
- b. Double-click the card (either the 32MUX-O or the 32WSS card).
- c. Click **Alarms**.
- d. Verify that an Optical Power Degrade Low (OPWR-LDEG) alarm is present on the ADD-RX port.
- e. Click the **Synchronize** button at the bottom left of the window.
- f. If the alarm is correctly reported, go to [Step 2](#). If not, close the CTC application, delete the CTC cache, and open the CTC connection again.

**Note**

If the alarm inconsistency persists, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

**Step 2** In card view, click **Circuits** and retrieve the node, card, and port information for the alarmed channel from the Source field of the OCHNC circuit. Then, follow the procedures in [Step 3](#) (for 32MUX-O, 32WSS, or AD-xC-xx.x cards) or [Step 4](#) (for TXP, MXP, or line cards) as appropriate.

**Step 3** Verify the correct behavior of the far-end DWDM card (32MUX-O, 32WSS, or AD-xC-xx.x) that manages the channel (wavelength). To do this, verify that the power value coming in on the ADD\_RX port is correct:

- a. In card view, click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs.

**Note**

X is number (1 to 4) of the proper multi-fibers MPO connector that manages the alarmed channel (wavelength).

- b. The Power field value must be the same as the VOA Power Ref field. If it is not, take the appropriate corrective action for the alarm according to [Chapter 2, “Alarm Troubleshooting.”](#)

- Step 4** Verify the correct behavior of the TXP, MXP, or line card that is the signal source of the channel (wavelength) that is alarmed:
- The TX laser must be active (trunk port is in IS [unlocked] state).
  - The wavelength provisioned must be the proper one.
  - The output power value must be within the expected range (refer to the “Hardware Specifications” appendix in the *Cisco ONS 15454 DWDM Reference Manual*). If the trunk port PM is not available through CTC, perform a manual measurement using a standard power meter.
- Step 5** If the cards referenced in [Step 3](#) and [Step 4](#) are operating properly, go to [Step 6](#). If not, take the appropriate corrective actions according to the alarm raised on the card (see [Chapter 2, “Alarm Troubleshooting”](#)).
- Step 6** If the alarmed card is a 32MUX-O card, go to [Step 8](#).
- Step 7** If the alarmed card is a 32WSS card, verify the proper cabling of the EXP\_RX port (common input port for all pass-through channels) on the 32WSS card:
- Verify that the EXP\_RX port of the alarmed 32WSS card is connected to the EXP\_TX port of the coupled 32WSS card on the opposite side of the node.
  - Pull out the LC connector from the EXP\_RX port of the 32WSS card and clean the fiber according to site practice.
  - Pull out the LC connector from the EXP\_TX port of the coupled 32WSS card and clean its connector also.
  - Verify that the fiber attenuation is within the specifications (maximum tolerance is 1 dB).
  - If necessary, replace any bad fibers.

**Note**

Before disconnecting any optical amplifier card fiber for troubleshooting, ensure that the optical amplifier card is unplugged.

**Note**

If no site practice exists for cleaning fibers, complete the procedure in the “Maintain the Node” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

**Note**

If the alarm condition persists even after the cabling check/fixing, the root cause could be related to a network issue and a more accurate analysis of the signal flow is needed according to the actual system topology. If necessary, call Cisco TAC (1 800 553-2447) for help.

- Step 8** Verify the proper cabling of the alarmed ADD\_RX port on the 32MUX-O card:
- Verify that the ADD\_RX port of the alarmed 32MUX-O is connected to the DROP\_TX port of the coupled 32DMX-O card on the opposite side of the node, using two MPO-LC multifiber cables.

**Note**

A patch-panel tray is normally used to manage fiber connections (for patch-panel cabling details, refer to the “Turn Up a Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*).

- Verify that the power value coming out of the DROP\_TX port of the coupled 32DMX-O card is correct:
  - In card view, click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs.

**Note**

X is number (1 to 4) of the proper multifiber MPO connector that manages the alarmed channel (wavelength).

- The Power field value must be the same as that in the VOA Power Ref field. If it is not, take the appropriate corrective action for the alarm according to [Chapter 2, “Alarm Troubleshooting.”](#)
- c. Check (the number [1 to 8] must correspond with the wavelength managed) and clean the LC fan-out according to site practice.
- d. Repeat Step c for the MPO-LC multifiber cable coming out of the DROP\_TX port of the coupled 32DMX-O card.
- e. Check and, if necessary, clean the LC-LC adapter used.
- f. If necessary, replace any bad devices (maximum tolerance is 1 dB).

**Note**

If no site practice exists for cleaning fibers, complete the procedure in the “Maintain the Node.” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

**Note**

If the alarm condition persists even after the cable check and repair procedures, the root cause could be related to a network issue and a more accurate analysis of the signal flow is needed according with the actual system topology. If necessary, call Cisco TAC (1 800 553-2447) for help.

### 1.13.2.3 Scenario C: Optical Drop Power Level Lower Than Expected

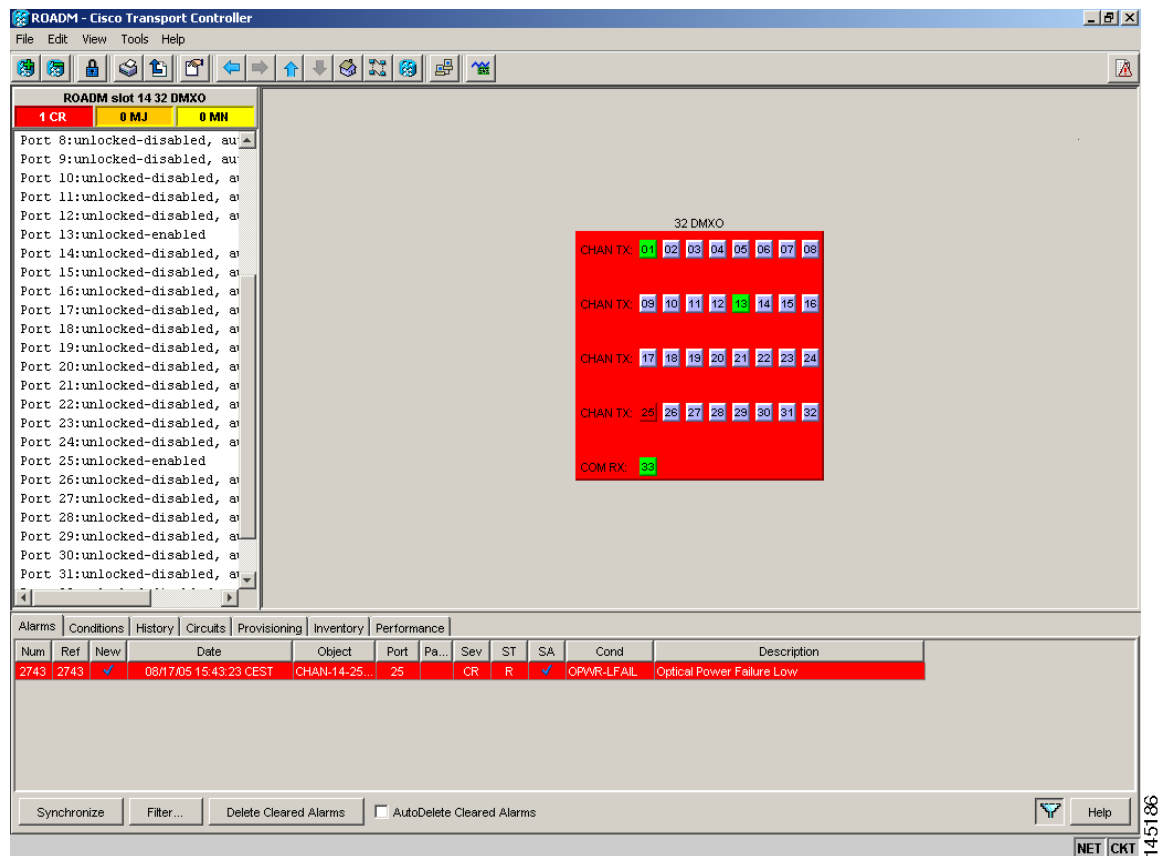
This scenario describes the condition in which the optical power at the 32DMX-O drop channels is lower than expected. The 32DMX-O card is equipped with a VOA for each wavelength, and each VOA manages the power for one dropped wavelength.

The failing scenarios during the OCHNC turn-up and consequent VOA startup are the same as those described in the [“1.13.2.2 Scenario B: Optical Power Level of the Incoming Signal Lower Than Expected”](#) section on page 1-91. The only difference is the type of alarm that is raised when the condition exists in which Delta Power is greater than 6 dB.

#### 1.13.2.3.1 Condition C1—Delta Power > 6 dB Lower than Expected

When the optical power on the dropped channel is more than 6 dB lower than the value expected, the final VOA Power Reference setpoint value is definitively not reachable. As a consequence, the final conditions reported in CTC are as follows:

- An OPWR-LFAIL (OCH layer) alarm is present on the port associated with the VOA (see [Figure 1-36](#)).
- A valid optical power value (different from the end of scale value of –50 dBm) can be read in the CTC Power field, but the Power value is less than –33 dBm. (To view this value in card view, click the **Provisioning > Parameters** tabs.)

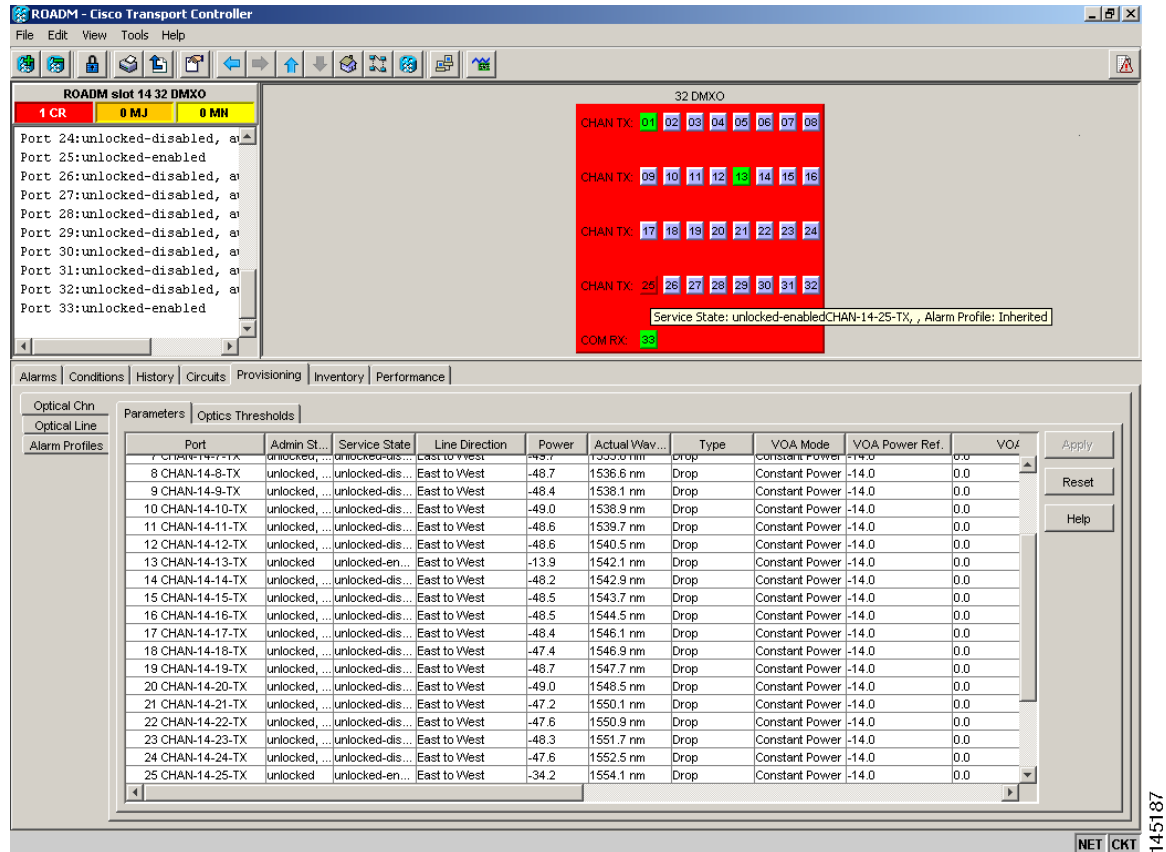
**Figure 1-36** Optical Drop Power More than 6 dB Lower than Expected

### 1.13.2.3.2 Condition C2—Delta Power < 6 dB Lower than Expected

If the delta power is less than 6 dB lower than expected, the final conditions reported in CTC are the same as those reported for Condition B2 (see the “[1.13.2.2.2 Condition B2—Delta Power < 6 dB \(OPWR-LowDEGrade Alarm\)](#)” section on page 1-92):

- An OPWR-LowDEGrade (OCH layer) alarm is present on the port associated with the VOA.
- A valid optical power value (different from the end of scale value of –50 dBm) can be read in the CTC Power field, but the value is  $(\text{VOA Power Ref} - 6 \text{ dBm}) < \text{Power} < \text{VOA Power Ref}$  (Figure 1-35). To view this value in card view, click the **Provisioning > Parameters** tabs.

A dirty connection or excessive loss of the incoming span are among the possible reasons that can lead to a fault condition. They are the most common and affect all wavelengths, whereas an excessive amplifier gain tilt or a wavelength misconfiguration on the far-end TXP or MXP card can lead to condition where only a single wavelength fails, such as the one (Channel 25) shown in Figure 1-37.

**Figure 1-37** Optical Drop Power Less than 6 dB Lower than Expected

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## Corrective Action for Scenario C (Optical Power Level of Incoming Signal Lower than Expected)

### Scenario C1 - LOS-P Alarm

- Step 1** Verify the alarm validity:
- Identify the DWDM nodes where the alarmed card is located.
  - Double-click the 32DMX-O card.
  - Click **Alarms**.
  - Verify that a LOS-P alarm is present on the CHAN-TX port.
  - Click the **Synchronize** button at the bottom left of the window.
  - If the alarm is correctly reported, move to [Step 2](#). If not, close the CTC application, delete the CTC cache, and open the CTC connection again.



#### Note

If the alarm inconsistency persists, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

**Step 2** Verify the correct behavior of the far-end DWDM card (32MUX-O, 32WSS, AD-xC-xx.x) that manages the channel (wavelength), and the TXP, MXP, or line card that is the signal source of the channel (wavelength) alarmed:

- a. Click **Circuits** and retrieve the node, card, and port information for the alarmed channel from the Source field of the OCHNC circuit.
- b. For the far-end DWDM card, verify that the power value coming in the ADD\_RX port is correct:
  - In card view, click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs.




---

**Note** X is number (1 to 4) of the proper multifiber MPO connector that manages the alarmed channel (wavelength).

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- The Power field value must be the same of VOA Power Ref field. If not, take the appropriate corrective actions according to [Chapter 2, “Alarm Troubleshooting.”](#)
- c. For the corresponding TXP, MXP, or line card connected, verify the following:
  - The TX laser is active (the trunk port is in IS [Unlocked] state).
  - The wavelength provisioned is the proper one.
- d. The output power value must be within the expected range (refer to the “Hardware Specifications” appendix in the *Cisco ONS 15454 DWDM Reference Manual*). If the trunk port PM is not available through CTC (for example, TXP\_MR\_2.5G), perform a manual measurement using a standard power meter.
- e. If everything in [Step 2](#) is correct, go to [Step 3](#). If not, take the appropriate corrective actions according to [Chapter 2, “Alarm Troubleshooting.”](#)

**Step 3** Verify the correct behavior of the VOA inside the 32DMX-O card:

- a. Double-click the 32DMX-O card.
- b. Click **Circuits**.
- c. Delete the OCHNC circuit for the faulty channel.
- d. Ensure that the service state of the corresponding CHAN-TX port changes to IS-AINS (or Unlocked,automaticInService) and the color changes to grey (LOS-P alarm should clear).
- e. Click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs and identify the proper channel (wavelength).




---

**Note** X is number (1 to 4) of the proper multifiber MPO connector that manages the alarmed channel (wavelength).

---

- f. Decrease the attenuation on the VOA to the minimum (0 dB) to enable channel startup. To perform this in field adjustment:
  - Read the **VOA Attenuation Ref** value for the channel (wavelength).
  - Enter the same value into the VOA Attenuation Calib field as that in the VOA Attenuation Ref field, but with the opposite sign (the algebraic sum of the two contributions must be equal to zero).
  - Click **Apply**.
- g. Click **Circuits**.

- h. Recreate the OCHNC circuit and verify that Circuit Status field reports DISCOVERED and the state is IS (Unlocked).
- i. If the LOS-P alarm has not cleared, continue with [Step 4](#). If it has cleared, you are finished.

**Step 4** To unambiguously pinpoint the root cause of the alarm, verify the proper cabling of the COM-RX port (common input port for all the drop channels) of the alarmed 32DMX-O card:

- a. Verify that the COM\_RX port of the alarmed 32DMX-O is connected either to the DROP\_TX port of a 32WSS card or to the COM\_TX port of an OPT-PRE, OPT-BST, or OSC-CSM card, depending on the actual node layout.
- b. Pull out the LC connector from the COM\_RX port of the 32DMX-O card and clean the fiber according to site practice.
- c. Pull out the LC connector from the COM\_TX or DROP\_TX port of the connected DWDM card and clean the fiber according to site practice.
- d. Verify that the fiber attenuation is within the specifications (maximum tolerance is 1 dB).
- e. If necessary, replace any bad fibers.



**Warning**

**Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056



**Note** Before disconnecting any optical amplifier card fiber for troubleshooting, ensure that the optical amplifier card is unplugged.



**Note** If no site practice exists for cleaning fibers, complete the procedure in the “Maintain the Node” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

- f. If the alarm condition persists even after the cabling has been checked and fixed, replace the 32DMX-O card (refer to the “Add and Remove Cards and Nodes” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*. Before replacing the card, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem).



**Warning**

**High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.** Statement 201

## Scenario C2 - OPWR-LowDEGrade Alarm

**Step 1** Verify the alarm validity:

- a. Identify the DWDM nodes where the alarmed card is seated.
- b. Double-click the 32DMX-O card.

- c. Click **Alarms**.
- d. Verify that an Optical Power Degrade Low Loss of incoming Payload (OPWR-LDEG) alarm is present on the CHAN-TX port.
- e. Click the **Synchronize** button at the bottom left of the window.
- f. If the alarm is correctly reported, move to [Step 2](#). If not, close the CTC application, delete the CTC cache, and open the CTC connection again.



**Note** If the alarm inconsistency persists, log into the Technical Support Website at <http://www.cisco.com/techsupport> for more information or call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

**Step 2** Verify the correct behavior of the far-end DWDM card (32MUX-O, 32WSS, or AD-xC-xx.x) that manages the channel (wavelength) and the TXP, MXP, or line card that is the signal source of the channel (wavelength) alarmed.

- a. Click **Circuits** and retrieve the node, card, and port information for to the alarmed channel from the Source field of the OCHNC circuit.
- b. For the far-end DWDM card, verify that the power value coming in on the ADD\_RX port is correct:
  - In card view, click the **Provisioning > Optical Chn: Optical Connector X > Parameters** tabs.



**Note** X is number (1 to 4) of the proper multifiber MPO connector that manages the alarmed channel (wavelength).

- The Power field value must be the same of VOA Power Ref field. If not, take the appropriate corrective actions according to [Chapter 2, “Alarm Troubleshooting.”](#)
- c. For the corresponding TXP, MXP, or line card connected, verify the following:
  - The TX laser is active (the trunk port is in IS [Unlocked] state).
  - The wavelength provisioned is the proper one.
- d. The output power value must be within the expected range (refer to the “Hardware Specifications” appendix in the *Cisco ONS 15454 DWDM Reference Manual*). If the trunk port PM is not available through CTC, perform a manual measurement using a standard power meter.
- e. If everything in [Step 2](#) is correct, move to [Step 3](#). If not, take the appropriate corrective actions according to [Chapter 2, “Alarm Troubleshooting.”](#)

**Step 3** Verify the proper cabling of the COM-RX port (the common input port for all of the drop channels) of the alarmed 32DMX-O:

- a. Verify that the COM\_RX port of the alarmed 32DMX-O is connected either to the DROP\_TX port of a 32WSS card or to the COM\_TX port of an OPT-PRE, OPT-BST, or OSC-CSM, depending on the actual node layout.
- b. Pull out the LC connector from the COM\_RX port of the 32DMX-O card and clean the fiber according to site practice.
- c. Pull out the LC connector from the COM\_TX or DROP\_TX port of the connected DWDM card and clean the fiber according to site practice.
- d. Verify that the fiber attenuation is within the specifications (maximum tolerance is 1 dB).
- e. If necessary, replace any bad fibers.

**Warning**

**Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

**Note**

Before disconnecting any optical amplifier card fiber for troubleshooting, ensure that the optical amplifier card is unplugged.

**Note**

If no site practice exists for cleaning fibers, complete the procedure in the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

- f. If the alarm condition persists even after the cabling has been checked and fixed, the root cause could be related to a network issue and a more accurate analysis of the signal flow is needed according to the actual system topology. If necessary, call Cisco TAC (1 800 553-2447) in order to report a service-affecting problem.

## 1.13.3 Counter-Propagating Light Affecting Operation of 32DMX-C and 32DMX-L Cards

**Symptom** The in-service operation of the 32DMX-C and 32DMX-L cards (with vendor ID 2049 and 2050) can be seriously affected by the counter-propagating light travelling from the drop ports of the card towards the COM RX port. This counter-propagating light affects the internal VOA control loop of the vendor-specific optical module of the 32DMX-C and 32DMX-L cards, leading to an increased optical path attenuation. This is traffic affecting for all in-service channels.

**Possible Cause** The counter-propagating light can be inserted into the 32DMX-C or 32DMX-L card as a result of incorrect cabling of transponder or line cards to the fiber patch-panel (in particular, swapping RX with TX patchcords).

**Recommended Action** For software releases higher than or equal to 8.5.1, the vendor-specific optical module on all the cards is automatically upgraded to a newer version. The vendor ID of the new version of the card is 2051 and can be viewed at **CTC > Card View > Inventory** tab. This new version of the optical module makes the VOA control robust to counter-propagating light, thus, minimizing the effects of incorrect cabling during installation and/or maintenance.

For software releases lower than 8.5.1, for new 32DMX-C and 32DMX-L cards that are not already installed, the vendor-specific optical module on all these new cards is automatically upgraded to a newer version at the Cisco Spare depots. Once the new card is installed in field, a downgrade of the optical module will be prevented and the latest optical module version is preserved on the software package. If the 32DMX-C or 32DMX-L card is already installed, complete the [“Corrective Action—Software Releases Lower than 8.5.1” procedure on page 1-106](#) to manually fix the problem.

## Corrective Action—Software Releases Lower than 8.5.1

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- Step 1** If the TXP card is preprovisioned in CTC, but not installed:
- Log into CTC.
  - Display card view for the TXP card.
  - Click the **Provisioning > Line** tab and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list for the Trunk-TX port.
  - Continue with [Step 2](#)
- Step 2** Install the TXP card into the receptacle at the back of the designated slot.
- Step 3** Wait for the TXP card to boot completely.
- Step 4** Verify that the Trunk-TX port of the TXP card is in OOS,DSBLD (ANSI) or Locked,disabled (ETSI) state.
- Step 5** Wire the Trunk-TX/RX port of the TXP card to the fiber patch-panel.
- Step 6** Turn up the TXP card and display card view for the TXP card in CTC.
- Step 7** Click the **Provisioning > Line** tab and choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the Admin State drop-down list for the Trunk-TX port.
- Step 8** Display card view for the 32WSS card.
- Step 9** Click the Performance > Optical Chn tab and verify the Power ADD field on the CHAN-RX port of the 32WSS card connected to the TXP card.
- If a valid power level exists, the cabling of the TXP card is correct. Change the admin state of the Trunk-TX port of the TXP card back to the original state.
  - If no power level exists, the cabling of the TXP card is incorrect. Change the admin state of the Trunk-TX port of the TXP card to OOS,DSBLD (ANSI) or Locked,disabled (ETSI) state and reverse the cabling.



**Note** It is important that you perform Steps [7](#) to [9](#) in the shortest time possible. That is, you must check the presence of a valid RX power on WSS card ([Step 9](#)) immediately after you turn up the TXP Trunk-TX port ([Step 7](#)), and in case of a bad connection, you must shut off the TXP Trunk-TX port ([Step 9b](#)) as soon as possible. This is to minimize possible impairments on other channels that are already in service.

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