



CHAPTER 1

General Troubleshooting

This chapter provides procedures for troubleshooting the most common problems encountered when operating a Cisco ONS 15600 SDH. To troubleshoot specific ONS 15600 SDH alarms, see [Chapter 2, “Alarm Troubleshooting.”](#) If you cannot find what you are looking for, contact the Cisco Technical Assistance Center (1 800 553-2447).

For an update on End-of-Life and End-of-Sale notices, refer to http://www.cisco.com/en/US/products/hw/optical/ps4533/prod_eol_notices_list.html

This chapter begins with the following sections on network problems:

- [1.1 Network Troubleshooting Tests, page 1-2](#)—Describes loopbacks and hairpin circuits, which you can use to test circuit paths through the network or logically isolate faults.



Note For network acceptance tests, refer to the *Cisco ONS 15600 SDH Procedure Guide*.

- [1.2 Troubleshooting Optical Circuit Paths With Loopbacks, page 1-6](#)—Explains how to perform the tests described in the “[1.1 Network Troubleshooting Tests](#)” section on [page 1-2](#) for STM-N ports and cards.
- [1.3 Troubleshooting an Ethernet Circuit Path With Loopbacks, page 1-29](#)—Explains how to perform the tests described in the “[1.1 Network Troubleshooting Tests](#)” section on [page 1-2](#) for Gigabit Ethernet (GIGE) ASAP card ports.

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

- [1.4 Using CTC Diagnostics, page 1-48](#)—Provides procedures for testing LED operation and downloading a machine-readable diagnostic information file to be used by Technical Support.
- [1.5 Restoring the Database to a Previous or Original Configuration, page 1-51](#)—Provides troubleshooting for node operation errors that might require procedures to restore software data or restoring the node to the default setup.
- [1.6 PC Connectivity Troubleshooting, page 1-52](#)—Provides troubleshooting procedures for PC and network connectivity to the ONS 15600 SDH.
- [1.7 CTC Operation Troubleshooting, page 1-58](#)—Provides troubleshooting procedures for Cisco Transport Controller (CTC) login or operation problems.
- [1.8 Circuits and Timing, page 1-68](#)—Provides troubleshooting procedures for circuit creation, error reporting, and timing reference errors and alarms.
- [1.9 Fiber and Cabling, page 1-71](#)—Provides troubleshooting procedures for fiber and cabling connectivity errors.

- [1.10 Power Supply Problems, page 1-76](#)—Provides troubleshooting information for common power supply issues.

1.1 Network Troubleshooting Tests

Use loopbacks to test newly created circuits before running live traffic or to logically locate the source of a network failure. All ONS 15600 SDH optical (STM-N) cards allow loopbacks.



Caution

On optical cards, a loopback can be applied only if the port state is Locked, maintenance for facility, terminal, and payload loopbacks, and the circuit state is Locked, maintenance for cross-connect loopbacks.



Note

Do not use loopbacks to verify circuit switch times or traffic hits because it could exceed 60 msec. For switch times, a test set should be placed at both ends of the circuits.



Note

When an entity is put in the administrative state, the ONS 15600 SDH suppresses all standing alarms on that entity. All alarms and events appear on the Conditions tab. You can change this behavior for the LPBKFACILITY, LPBKPAYLD, and LPBKTERMINAL alarms. To display these alarms on the Alarms tab, set the NODE.general.ReportLoopbackConditionsOnPortsInLocked,maintenance to TRUE on the NE Defaults tab.

1.1.1 Facility Loopbacks

The following sections give general information about facility loopback operations and specific information about ONS 15600 SDH card loopback activity.

1.1.1.1 General Behavior

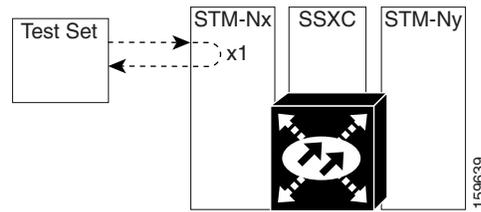
A facility loopback tests the line interface unit (LIU) of an ASAP card or STM-16 card and related cabling. After applying a facility loopback on a port, use a test set to run traffic over the loopback. A successful facility loopback isolates the LIU or the cabling plant as the potential cause of a network problem. To test an STM-N port or Ethernet port, connect an optical test set to the port and perform a facility loopback. Alternately, use a loopback or hairpin circuit on a card that is farther along the circuit path.



Note

CTC sometimes calls a facility loopback a facility (line) loopback. This is done to clarify the direction that the loopback signal travels, that is, out from the facility toward the span.

[Figure 1-1](#) shows a facility/payload loopback on an STM-N port.

Figure 1-1 Facility/Payload Loopback Process on an STM-N Port**Caution**

Before performing a facility loopback on an STM-N port, be sure the ASAP 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. Issuing a second DCC is not necessary if you are directly connected to the ONS 15600 SDH containing the loopbacked ASAP card.

1.1.1.2 Card Behavior

Loopbacks either terminate or bridge the loopback signal. 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.

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 will show AS-MT, which means that alarms are suppressed on the facility during loopback.) In Software Release 8.0, an option in node defaults allows you to specify that loopback conditions be reported as alarms, even though the port or circuit is Locked,maintenance.

In addition to the Conditions window listing, the following behaviors occur:

- If an electrical or optical port is in the **Locked-enabled, disabled** service state, it injects an alarm indication signal (AIS) upstream and downstream.
- When an electrical or optical port is placed in the **Locked-enabled,maintenance** service state before loopback testing, the port clears the AIS signal upstream and downstream unless there is a service-affecting defect that would also cause an AIS signal to be injected. For more information about placing ports into alternate states for testing, refer to the “Change Card Settings” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

**Caution**

A lockout of protection must be executed before putting a two-fiber or four-fiber MS-SP Ring span into a facility loopback state. That is, a span lockout of one side (such as the east side) of a two-fiber MS-SP Ring is required before operating a facility loopback on the same (east) side of the ring. A span lockout of one protection side (such as the east protection side) of a four-fiber MS-SP Ring is required before operating a facility loopback on the same (east) side working line of the ring. If you do not execute the lockout prior to creating the loopback, the ring can become stuck in an anomalous state after you release the loopback.

1.1.2 Payload Loopbacks

The payload loopback is similar to a facility loopback but occurs on STM-64 cards. Another difference is that a payload loopback terminates and regenerates section and line overhead, while a facility loopback passes section and line overhead through, untouched. The STM-16 card executes a facility loopback by looping the signal back just before the framer chip. The STM-64 card cannot do this because of the differences in the design. To execute a loopback on an STM-64 card, the loopback signal passes through the framer chip and then terminates and regenerates line and section overhead. Since STM-64 card line and section overhead is terminated and regenerated, this type of loopback is called a payload loopback.

1.1.3 Terminal Loopbacks

The following sections give general information about ASAP card terminal loopback operations.

1.1.3.1 General Behavior

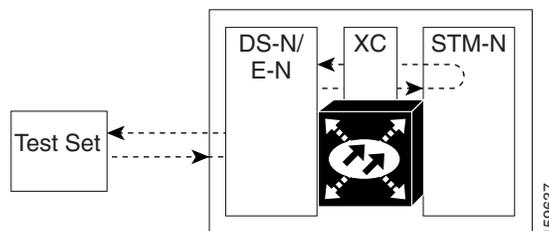
A terminal loopback tests a circuit path as it passes through the SSXC card and loops back from the card with the loopback. [Figure 1-2](#) shows a terminal loopback on an ASAP card. The test-set traffic enters the optical or Ethernet port and travels through the cross-connect card to the optical port. A terminal loopback turns the signal around before it reaches the LIU and sends it back through the SSXC card to the card. This test verifies that the SSXC card and terminal circuit paths are valid, but does not test the LIU on the optical card.



Note

CTC sometimes calls a terminal loopback a terminal (inward) loopback. This is done to clarify the direction that the loopback signal travels, that is, inward toward the facility.

Figure 1-2 Terminal Loopback Path on an ASAP Card



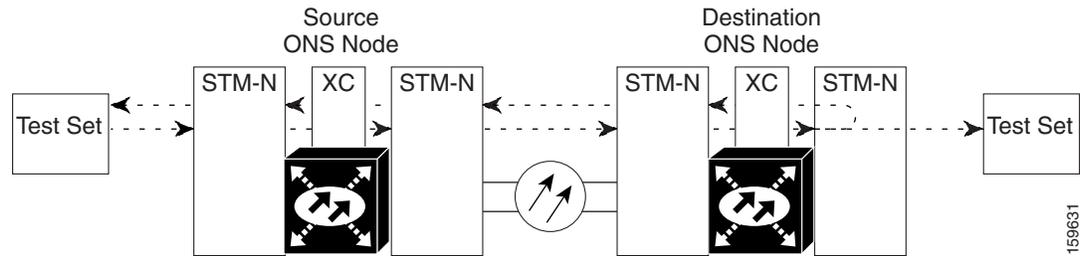
1.1.3.2 Card Behavior

ONS 15600 SDH terminal port loopbacks can either terminate or bridge the signal. (Some ONS 15600 SDH cards bridge the loopback signal, while others terminate it.)

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.

An STM-N terminal loopback example is shown in [Figure 1-3](#).

Figure 1-3 Terminal Loopback on an STM-N Card with Bridged Signal



The loopback 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 AS-MT, which indicates that all alarms are suppressed on the port during loopback testing.)

In addition to the Conditions window listing, the following behaviors occur:

- If an electrical or optical port is in the Locked-enabled, disabled service state, it injects an AIS signal upstream and downstream.
- When an optical or Ethernet port is placed in the Locked-enabled, maintenance service state before loopback testing, the port clears the AIS signal upstream and downstream unless there is a service-affecting defect that would also cause an AIS signal to be injected. For more information about placing ports into alternate states for testing, refer to the “Change Card Settings” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.



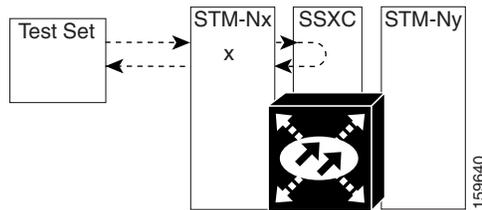
Caution

A lockout of protection must be executed before putting a two-fiber or four-fiber MS-SP Ring span into a terminal loopback state. That is, a span lockout of one side (such as the east side) of a two-fiber MS-SP Ring is required before operating a facility loopback on the same (east) side of the ring. A span lockout of one protection side (such as the east protection side) of a four-fiber MS-SP Ring is required before operating a terminal loopback on the same (east) side working line of the ring. If you do not execute the lockout prior to creating the loopback, the ring can become stuck in an anomalous state after you release the loopback.

1.1.4 Cross-Connect (XC) Loopbacks

An XC loopback tests an SDH virtual container (VC) circuit path as it passes through an SSXC card and loops back to the port being tested without affecting other traffic on the optical port. Cross-connect loopbacks are less invasive than terminal or facility loopbacks. Testing with facility or terminal loopbacks often involve taking down the whole line; however, an XC loopback allows you to create a loopback on any embedded channel at supported payloads of VC3 granularity and higher. For example, you can place a loopback on a single VC3, VC4, VC4-2c, etc. on an optical facility without interrupting the other VC circuits. [Figure 1-4](#) shows the XC loopback path.

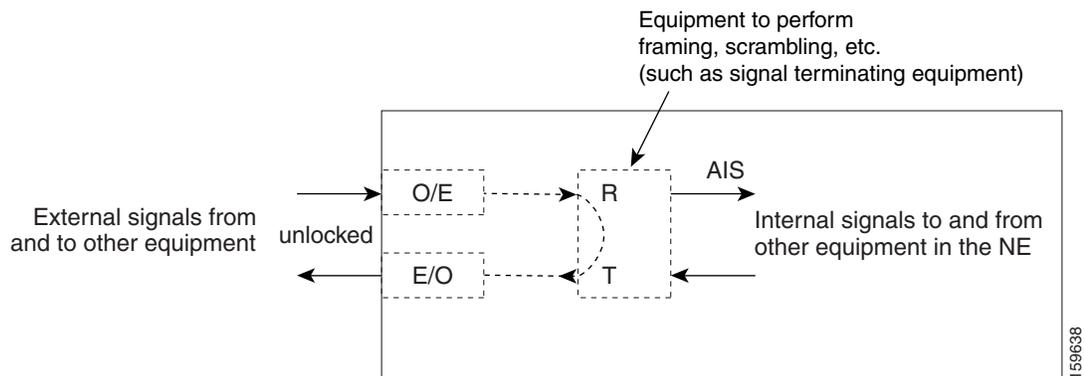
Figure 1-4 Cross-Connect Loopback Path on an STM-N Port



This test can be conducted locally or remotely through the CTC interface without on-site personnel. It takes place on an STM-16, STM-64, or ASAP port and tests the traffic path on that VC circuit through the port and SSXC. The signal path is similar to a facility loopback.

The XC loopback breaks down the existing path and creates a new cross-connect—a hairpin—while the source of the original path is set to inject a line-side AIS-P. The signal path and AIS injection are shown in [Figure 1-5](#).

Figure 1-5 Network Element with SDH Cross-Connect Loopback Function



Note

If a terminal or facility loopback exists on a port, you cannot create an XC loopback on it.



Note

When testing STM-64 signals with jitter analyzers, be sure to verify with the manufacturer that you are using the most current test equipment. Some test equipment has demonstrated false high jitter readings caused by accumulated jitter dependencies within the test equipment.

1.2 Troubleshooting Optical Circuit Paths With Loopbacks

Facility loopbacks or payload loopbacks, terminal loopbacks, and cross-connect (XC) loopback circuits 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.

The procedures in this section apply to STM-16, STM-64, and ASAP optical ports. (For instructions on ASAP Ethernet ports, go to the [“1.3 Troubleshooting an Ethernet Circuit Path With Loopbacks”](#) section on [page 1-29](#).) The example in this section tests an STM-N circuit on a three-node MS-SPRing. Using a

series of facility, cross-connect, and terminal loopbacks, the example scenario traces the circuit path, tests the possible failure points, and eliminates them. The logical progression contains seven network test procedures:

**Note**

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

1. A facility (or payload) loopback on the source-node STM-N port
2. A terminal loopback on the source-node STM-N port
3. A cross-connect loopback on the source STM-N port
4. A facility (or payload) loopback on the intermediate-node STM-N port
5. A terminal loopback on the intermediate-node STM-N port
6. A facility (or payload) loopback on the destination-node STM-N port
7. A terminal loopback on the destination-node STM-N port

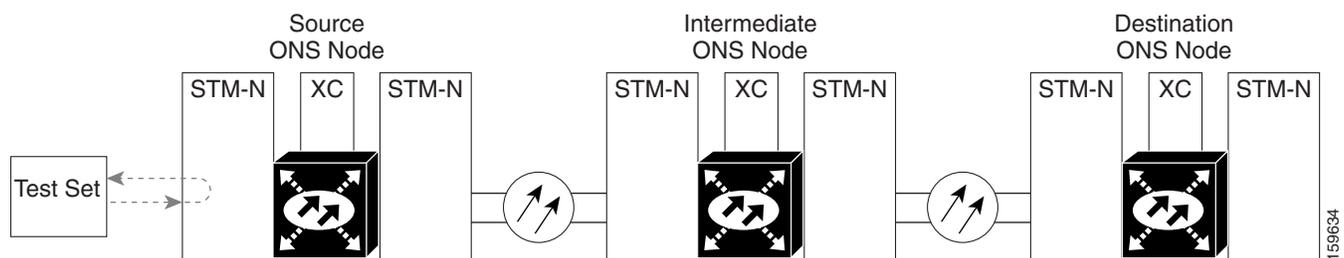
**Note**

Facility and terminal loopback tests require on-site personnel.

1.2.1 Perform a Facility Loopback or Payload Loopback on a Source-Node Optical Port

The STM-16 card or ASAP card optical port facility loopback test is performed on the node source port in the network circuit. Likewise for the STM-64 payload loopback. In the testing situation used in this example, the source optical port in the source node. Completing a successful facility loopback on this port isolates the optical port as a possible failure point. [Figure 1-6](#) shows an example of a facility loopback on a circuit source STM-N port.

Figure 1-6 Facility Loopback on a Circuit Source STM-N Port

**Caution**

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

**Note**

Facility and payload loopbacks require on-site personnel.

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

Create the Facility Loopback or Payload Loopback on the Source Optical Port

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



Note For specific procedures to 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. Adjust the test set accordingly. (Refer to manufacturer instructions for test-set use.)

Step 2 In CTC node view, double-click the card to display the card view.

Step 3 Take the port out of service:

- a. Click the **Maintenance > Line** (or **Maintenance > Optical > Line**) tabs.
- b. Choose **Locked,maintenance** from the Admin State column for the port being tested. If multiple ports are available, select the appropriate row for the desired port.
- c. Click **Apply**.

Step 4 Create the loopback. On the **Maintenance** tab, click the correct subtab:

- For an STM-16 card or STM-64 card, click the **Loopback > Port** tabs.
- For an ASAP card, click the **Optical > Loopback > Port** tabs.

Step 5 Choose the loopback type:



Note If multiple ports are available, choose the row associated with the correct port and then configure the loopback.

- For an STM-16 card, click **Facility** in the Loopback Type column.
- For an STM-64 card, click **Payload** in the Loopback Type column.
- For an ASAP card, click **Facility** in the Loopback Type column.

Step 6 Click **Apply**.

Step 7 Click **Yes** in the confirmation dialog box.



Note It is normal for the “[LPBKFACILITY \(STMN\)](#)” condition on page 2-88 or the “[LPBKTERMINAL \(GIGE\)](#)” condition on page 2-89 to appear during loopback setup. The condition clears when you remove the loopback.

Step 8 Complete the “[Test and Clear the Facility Loopback or Payload Loopback Circuit](#)” procedure on page 1-8.

Test and Clear the Facility Loopback or Payload 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 a good circuit, no further testing is necessary with the facility loopback. Clear the loopback:
- Click the **Maintenance > Loopback > Port** (or **Maintenance > Optical > Loopback > Port**) tabs.
 - Choose the appropriate state (**Unlocked**; **Locked,disabled**; **Locked,maintenance**; **Unlocked,automaticInservice**) from the Admin State column for the port being tested. If multiple ports are available, select the appropriate row for the desired port. (The new administrative state will override the loopback.)
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 4** Complete the [“Test the Optical Card” procedure on page 1-9](#).
-

Test the Optical Card

- Step 1** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad card and replace it with a known-good one.



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. See the procedures in the [“2.8.2 Protection Switching, Lock Initiation, and Clearing” section on page 2-123](#). For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

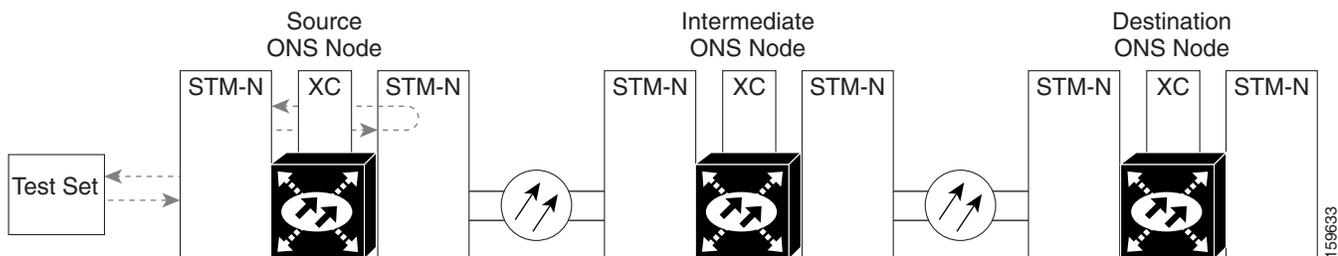
- Step 2** Resend test traffic on the loopback circuit with a known-good card installed.
- Step 3** If the test set indicates a good circuit, the problem was probably the defective card. Return the defective card to Cisco through the returned materials authorization (RMA) process. Contact Cisco Technical Support (1 800 553-2447).
- Step 4** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the faulty card.
- Step 5** Clear the facility loopback:
- Step 6** If the test set indicates a good circuit, no further testing is necessary with the facility or payload loopback. Clear the loopback:
- Click the **Maintenance > Loopback > Port** (or **Maintenance > Optical > Loopback > Port**) tabs.
 - Choose the appropriate state (**Unlocked**; **Locked,disabled**; **Locked,maintenance**; **Unlocked,automaticInservice**) from the Admin State column for the port being tested. If multiple ports are available, select the appropriate row for the desired port. (The new administrative state will override the loopback.)
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 7** Complete the [“1.2.2 Perform a Terminal Loopback on a Source-Node Optical Port” procedure on page 1-10](#).
-

1.2.2 Perform a Terminal Loopback on a Source-Node Optical Port

The terminal loopback test is only available on ASAP card optical and Ethernet ports. (This section will only address the optical ports; Ethernet ports are covered in [1.3 Troubleshooting an Ethernet Circuit Path With Loopbacks](#), page 1-29.) Terminal loopbacks are not available on STM-16 or STM-64 cards.

To create a terminal loopback, create a bidirectional circuit originating on the node source optical port and looping back on the node source optical port. You then proceed with the terminal loopback test. Completing a successful terminal loopback to a node source port verifies that the circuit is good to the source port. [Figure 1-7](#) shows an example of a terminal loopback on a source optical port.

Figure 1-7 Terminal Loopback on a Source-Node STM-N 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 Optical Port”](#) procedure on page 1-10.

Create the Terminal Loopback on a Source-Node Optical Port

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



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

- a. If you just completed the [“1.2.1 Perform a Facility Loopback or Payload Loopback on a Source-Node Optical Port”](#) procedure on page 1-7 for an optical port, leave the optical test set hooked up.
- b. If you are starting the current procedure without the optical test set hooked up to the source optical 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.
- c. Adjust the test set accordingly. (Refer to manufacturer instructions for test-set use.)

Step 2 Use CTC to set up the terminal loopback on the test port:

- a. In node view, click the **Circuits** tab and click **Create**.
- b. In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and circuit number, such as 1.

- c. Click **Next**.
 - d. In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as Opt1toOpt2.
 - e. Leave the Bidirectional check box checked.
 - f. Click **Next**.
 - g. In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
 - h. Click **Next**.
 - i. In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC used for the source dialog box.
 - j. Click **Next**.
 - k. In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.
- Step 3** Confirm that the newly created circuit appears on the Circuits tab list as a two-way circuit.



Note It is normal for the “[LPBKTERMINAL \(STMN\)](#)” condition on page 2-90 to appear during a loopback setup. The condition clears when you remove the loopback.

- Step 4** Create the terminal loopback on the destination port being tested:
- a. In node view, double-click the ASAP card.
 - b. Click the **Maintenance > Optical > Loopback > Port** tabs.
 - c. Select **Locked,maintenance** from the Admin State column. If there are multiple available circuits, select the row appropriate for the desired port.
 - d. Select **Terminal** from the Loopback Type column.
 - e. Click **Apply**.
 - f. Click **Yes** in the confirmation dialog box.
- Step 5** Complete the “[Test and Clear the Terminal Loopback Circuit](#)” procedure on page 1-11.

Test and Clear the 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 a good circuit, no further testing is necessary on the loopback circuit. Clear the terminal loopback state on the port:
- a. Double-click the ASAP in the source node.
 - a. Click the **Maintenance > Optical > Loopback > Port** tabs.
 - b. Choose the appropriate state (**Unlocked**; **Locked,disabled**; **Locked,maintenance**; **Unlocked,automaticInservice**) from the Admin State column for the port being tested. If multiple ports are available, select the appropriate row for the desired port. (The new administrative state will override the loopback.)

- c. Click **Apply**.
 - d. Click **Yes** in the confirmation dialog box.
- Step 4** Clear the terminal loopback circuit:
- a. Click the **Circuits** tab.
 - b. Choose the loopback circuit being tested.
 - c. Click **Delete**.
 - d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 5** Complete the [“Test the ASAP Card” procedure on page 1-12](#).
-

Test the ASAP Card

- Step 1** Determine whether you are experiencing trouble on a single SFP (PPM), on all PPMs within a 4PIO (PIM), or on all 4PIO used in that ASAP card. If there is only partial failure, you might be able to replace this part rather than the entire card.
- Step 2** If the errors are being observed on one port but not all ports of the ASAP, you might only need to replace that SFP (PPM). Remove the errored SFP (PPM) and replace it with a known-good SFP (PPM) by completing the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 3** If all SFPs (PPMs) on a particular 4PIO (PIM) are experiencing problems, the 4PIO (PIM) is indicated. Remove this 4PIO (PIM) and replace it with a known-good one using the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 4** If the trouble still is not located, complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad ASAP card and replace it with a known-good one.
- Step 5** Resend test traffic on the loopback circuit with a known-good card.
- Step 6** If the test set indicates a good circuit, 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 7** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the defective card.
- Step 8** Clear the terminal loopback on the port before testing the next segment of the network circuit path:
- a. Double-click the ASAP card in the source node with the terminal loopback.
 - a. Click the **Maintenance > Optical > Loopback > Port** tabs.
 - b. Choose the appropriate state (**Unlocked**; **Locked,disabled**; **Locked,maintenance**; **Unlocked,automaticInservice**) from the Admin State column for the port being tested. If multiple ports are available, select the appropriate row for the desired port. (The new administrative state will override the loopback.)
 - c. Click **Apply**.
 - d. Click **Yes** in the confirmation dialog box.
- Step 9** Clear the terminal loopback circuit before testing the next segment of the network circuit path:
- a. Click the **Circuits** tab.
 - b. Choose the loopback circuit being tested.
 - c. Click **Delete**.

d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.

Step 10 Complete the “[1.2.3 Perform an XC Loopback on the Source Optical Port](#)” procedure on page 1-13.

1.2.3 Perform an XC Loopback on the Source Optical Port



Note This procedure is performed from an STM-N card or ASAP card optical port to test the cross-connect circuit connection.



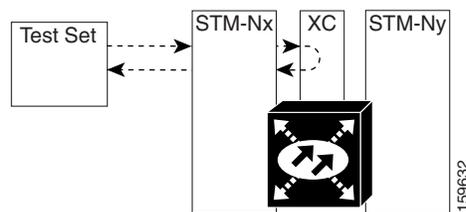
Note You can perform an XC loopback on either the circuit source working or the protect port of a 1+1 protection group.



Note XC loopbacks do not require on-site personnel.

The XC loopback test is available for STM-16, STM-64, and ASAP cards and occurs on an optical circuit transiting the SSXC card in a network circuit. Completing a successful XC loopback from an optical port through the SSXC card eliminates the SSXC card as the source of trouble for a faulty circuit. [Figure 1-8](#) shows an example of an XC loopback path on a source STM-N port.

Figure 1-8 XC Loopback on a Source STM-N Port



Complete the “[Create the XC Loopback on the Source-Node Optical Port](#)” procedure on page 1-13.

Create the XC Loopback on the Source-Node Optical Port

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



Note For specific procedures to 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 Optical 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, use appropriate cabling to attach the Tx and 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** Use CTC to put the circuit being tested out of service:
- In node view, click the **Circuits** tab.
 - Click the circuit and then click **Edit**.
 - In the Edit Circuit dialog box, click the **State** tab.
 - Choose **Locked,maintenance** from the Target Circuit Admin State drop-down list.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 4** Use CTC to set up the XC loopback on the circuit being tested:
- In node view, double-click the STM-N card to display the card view.
 - Click the **Maintenance > Loopback > VC3** or **VC4** tabs (or **Maintenance > Optical > Loopback > VC3** or **VC4** tabs).
 - Click the check box in the **XC Loopback** column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 5** Complete the [“Test and Clear the XC Loopback Circuit” procedure on page 1-14](#).
-

Test and Clear the XC 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 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 a good circuit, no further testing is necessary with the cross-connect. Clear the XC loopback:
- In card view, click the **Maintenance > Loopback > VC3** or **VC4** tabs (or **Maintenance > Optical > Loopback > VC3** or **VC4** tabs).
 - Uncheck the check box in the XC Loopback column for the circuit being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 4** Complete the [“Test the Alternate SSXC Card” procedure on page 1-14](#).
-

Test the Alternate SSXC Card

- Step 1** Do a manual data copy switch of the SSXC cards before retesting the XC loopback circuit:
- In node view, select the **Maintenance > Preferred Copy** tabs.
 - In the **Set Preferred** drop-down list, select the alternate copy. (For example, if Copy B is preferred and in use, select Copy A.)



Note CTC Copy A refers to the SSXC card in Slot 6. Copy B refers to the SSXC card in Slot 8. Either copy might be chosen as the preferred copy SSXC. The other SSXC is called the alternate SSXC in this chapter.

- c. Click **Apply**.
- d. Click **Yes** in the confirmation dialog box.



Note If you attempt a preferred copy switch and the switch is unsuccessful, a problem is present with the alternate SSXC.

- e. Click **Refresh** until the tab shows that the alternate copy you selected is now the preferred copy. The Currently Used field will show the newly-selected preferred copy.

Step 2 Resend test traffic on the XC loopback circuit.

The test traffic now travels through the alternate cross-connect card.

Step 3 If the test set indicates a faulty circuit, assume the cross-connect card is not causing the problem. Clear the XC loopback circuit:

- a. Click the **Circuits** tab.
- b. Choose the XC loopback circuit being tested.
- c. Click **Delete**.
- d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- e. Confirm that the XC loopback circuit is deleted from the Circuits tab list. If the test set indicates a good circuit, the problem might be a defective cross-connect card.

Step 4 To confirm a defective preferred cross-connect card, complete the [“Retest the Preferred SSXC Card” procedure on page 1-15](#).

Retest the Preferred SSXC Card

Step 1 Do a manual data copy switch of the SSXC cards before retesting the loopback circuit:

- a. In node view, select the **Maintenance > Preferred Copy** tabs.
- b. In the **Set Preferred** drop-down menu, select the alternate copy. (For example, if Copy B is preferred and in use, select Copy A.)
- c. Click **Apply**.
- d. Click **Yes** on the confirmation dialog box.



Note If you attempt a preferred copy switch and the switch is unsuccessful, a problem is present with the alternate SSXC.

- e. Click **Refresh** until the tab shows that the alternate copy you selected is now the preferred copy. The Currently Used field will show the newly selected preferred copy.

Step 2 Resend test traffic on the loopback circuit.

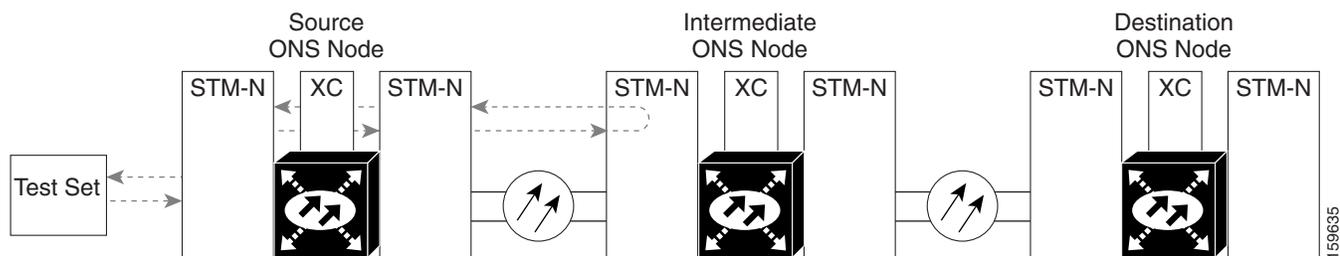
1.2.4 Perform a Facility Loopback or Payload Loopback on an Intermediate-Node Optical Port

- Step 3** If the test set indicates a faulty circuit, the problem is probably the defective card. Return the defective card to Cisco through the RMA process. Contact Cisco Technical Support (1 800 553-2447) and proceed to [Step 4](#). If the circuit is not shown to be faulty and the card is not shown to be defective, you are finished with testing.
- Step 4** Complete the [“Replace an SSXC Card” procedure on page 2-133](#) for the defective card. Perform [Step 5](#).
- Step 5** If the test set indicates a good circuit, the cross-connect card might have had a temporary problem that was cleared by the side switch. Clear the XC loopback circuit:
- Click the **Circuits** tab.
 - Choose the XC loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 6** Complete the [“1.2.4 Perform a Facility Loopback or Payload Loopback on an Intermediate-Node Optical Port” procedure on page 1-16](#).

1.2.4 Perform a Facility Loopback or Payload Loopback on an Intermediate-Node Optical Port

Performing an STM-16 or ASAP card optical facility loopback (or STM-64 payload loopback) on an intermediate port isolates whether this node is causing circuit failure. In the situation shown in [Figure 1-9](#), the test is being performed on an intermediate STM-N port.

Figure 1-9 Facility Loopback Path to an Intermediate-Node STM-N Port



Caution

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



Note

Facility and payload loopbacks require on-site personnel.

Complete the [“Create a Facility Loopback or Payload Loopback on an Intermediate-Node Optical Port” procedure on page 1-17](#).

Create a Facility Loopback or Payload Loopback on an Intermediate-Node Optical Port

- Step 1** Connect an optical test set to the port you are testing. 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. For specific procedures to use the test set equipment, consult the manufacturer.
- Step 2** Adjust the test set accordingly. (Refer to manufacturer instructions for test-set use.)
- Step 3** Use CTC to set up the facility loopback on the test port:
- In node view, click the **Circuits** tab and click **Create**.
 - In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and circuit number, such as 1.
 - Click **Next**.
 - In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as Opt1toOpt3.
 - Leave the Bidirectional check box checked.
 - Click **Next**.
 - In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
 - Click **Next**.
 - In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC used for the source dialog box.
 - Click **Next**.
 - In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.
- Step 4** Confirm that the newly created circuit appears on the Circuits tab list as a two-way circuit.
-  **Note** It is normal for the [“LPBKFACILITY \(STMN\)” condition on page 2-88](#) to appear during a loopback setup. The condition clears when you remove the loopback.
- Step 5** Create the facility loopback on the intermediate port being tested:
- Go to the node view of the intermediate node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node from the drop-down list in the Select Node dialog box and click **OK**.
 - In node view, double-click the intermediate-node card that requires the loopback.
 - Click the **Maintenance > Loopback > Port** tabs (or **Maintenance > Optical > Loopback > Port** tabs).
 - Select **locked,maintenance** from the Admin State column. If multiple ports are available, select the row appropriate for the desired port.
 - For an STM-16 card or ASAP card optical port, select **Facility** from the Loopback Type column. For an STM-64 card, select **Payload**. If multiple ports are available, select the row appropriate for the desired port.
 - Click **Apply**.

- g. Click **Yes** in the confirmation dialog box.
- Step 6** Complete the “[Test and Clear the Facility Loopback or Payload Loopback Circuit](#)” procedure on page 1-18.
-

Test and Clear the Facility Loopback or Payload 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 a good circuit, no further testing is necessary with the facility loopback. Clear the facility loopback from the port:
- a. Click the **Maintenance > Loopback > Port** tabs (or **Maintenance > Optical > Loopback > Port** tabs).
 - b. Choose **None** from the Loopback Type column for the port being tested.
 - c. Choose the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance; Unlocked,automaticInservice**) from the Admin State column for the port being tested.
 - d. Click **Apply**.
 - e. Click **Yes** in the confirmation dialog box.
- Step 4** Clear the loopback circuit:
- a. Click the **Circuits** tab.
 - b. Choose the loopback circuit being tested.
 - c. Click **Delete**.
 - d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 5** Complete the “[Test the Optical Card](#)” procedure on page 1-18.
-

Test the Optical Card

- Step 1** Complete the “[Replace an I/O Card](#)” procedure on page 2-134 for the suspected bad STM-N or ASAP card and replace it with a known-good one.



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. See the procedures in the “[2.8.2 Protection Switching, Lock Initiation, and Clearing](#)” section on page 2-123. For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

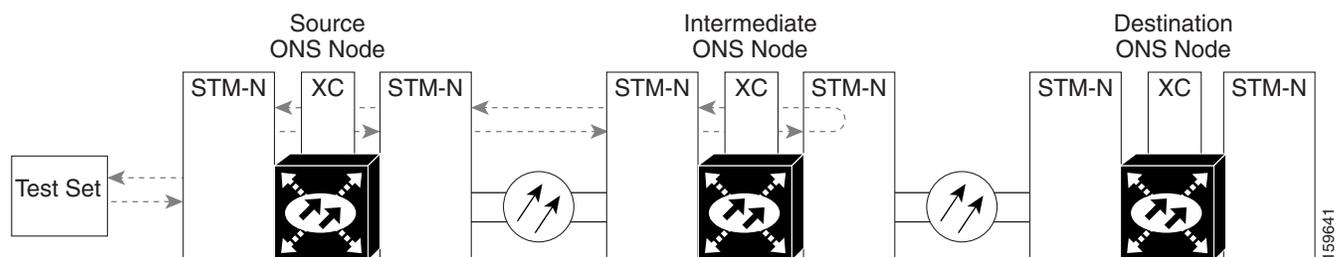
- Step 2** Resend test traffic on the loopback circuit with a known-good card installed.
- Step 3** If the test set indicates a good circuit, the problem was probably the defective card. Return the defective card to Cisco through the RMA process. Contact Cisco Technical Support (1 800 553-2447).
- Step 4** Complete the “[Replace an I/O Card](#)” procedure on page 2-134 for the faulty card.

- Step 5** Clear the facility loopback from the port:
- Click the **Maintenance > Loopback > Port** tabs (or **Maintenance > Optical > Loopback > Port** tabs).
 - Choose **None** from the Loopback Type column for the port being tested.
 - Choose the appropriate state (**Unlocked**; **Locked,disabled**; **Locked,maintenance**; **Unlocked,automaticInservice**) from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 6** Clear the loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 7** Complete the “[1.2.6 Perform a Facility Loopback or Payload Loopback on a Destination-Node Optical Port](#)” procedure on page 1-22.

1.2.5 Perform a Terminal Loopback on an Intermediate-Node Optical Port

In the next troubleshooting test, you perform a terminal loopback on the intermediate-node port to isolate whether the destination port is causing circuit trouble. In the example situation in [Figure 1-10](#), the terminal loopback is performed on an intermediate optical port in the circuit. You first create a bidirectional circuit that originates on the source-node optical port and loops back on the intermediate-node port. You then proceed with the terminal loopback test. If you successfully complete a terminal loopback on the node, this node is excluded from possible sources of circuit trouble.

Figure 1-10 Terminal Loopback on an Intermediate-Node STM-N Port



STM-N cards placed in facility loopback state display an icon, shown in [Figure 1-11](#).

Figure 1-11 Facility Loopback Indicator



**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 Optical Ports”](#) procedure on page 1-20.

Create a Terminal Loopback on Intermediate-Node Optical 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 [“1.2.4 Perform a Facility Loopback or Payload Loopback on an Intermediate-Node Optical Port”](#) section 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 Use CTC to set up the terminal loopback on the test port:

- a. In node view, click the **Circuits** tab and click **Create**.
- b. In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and circuit number, such as 1.
- c. Click **Next**.
- d. In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as STMN1toSTMN4.
- e. Leave the **Bidirectional** check box checked.
- f. Click **Next**.
- g. In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
- h. Click **Next**.
- i. In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC used for the source dialog box.
- j. Click **Next**.
- k. In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.

Step 4 Confirm that the newly created circuit appears on the Circuits tab list and that it is described in the Dir column as a two-way circuit.



Note It is normal for the “[LPBKTERMINAL \(STMN\)](#)” condition on [page 2-90](#) to appear during a loopback setup. The condition clears when you remove the loopback.

- Step 5** Create the terminal loopback on the destination port being tested:
- Go to the node view of the intermediate node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node from the drop-down list in the Select Node dialog box and click **OK**.
 - In node view, double-click the card that requires the loopback.
 - Click the **Maintenance > Loopback > Port** tabs.
 - Select **Locked,maintenance** from the Admin State column. If this is a multiport card, select the row appropriate for the desired port.
 - Select **Terminal** from the Loopback Type column. If this is a multiport card, select the row appropriate for the desired port.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 6** Complete the “[Test and Clear the Optical Terminal Loopback Circuit](#)” procedure on [page 1-21](#).

Test and Clear the Optical 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 a good circuit, 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 to open the card view.
 - Click the **Maintenance > Loopback > Port** tabs.
 - Select **None** from the Loopback Type column for the port being tested.
 - Select the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance; Unlocked,automaticInservice**) in the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 4** Clear the terminal loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.

- Step 5** Complete the “[Test the Optical Card](#)” procedure on page 1-22.
-

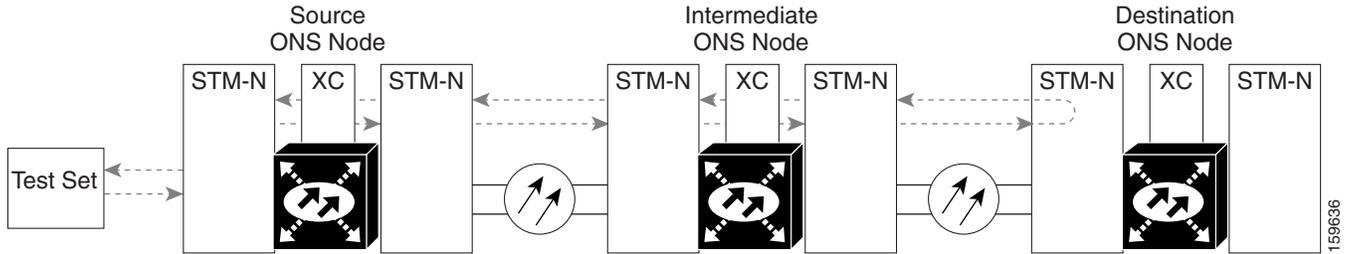
Test the Optical Card

- Step 1** Complete the “[Replace an I/O Card](#)” procedure on page 2-134 for the suspected bad card and replace it with a known-good one.
- Step 2** Resend test traffic on the loopback circuit with a known-good card.
- Step 3** If the test set indicates a good circuit, the problem was probably the defective card. Return the defective card to Cisco through the RMA process. Contact Cisco Technical Support at (1 800 553-2447).
- Step 4** Complete the “[Replace an I/O Card](#)” procedure on page 2-134 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 > Port** tabs.
 - Select **None** from the Loopback Type column for the port being tested.
 - Select the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance; Unlocked,automaticInservice**) in the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 6** Clear the terminal loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 7** Complete the “[1.2.6 Perform a Facility Loopback or Payload Loopback on a Destination-Node Optical Port](#)” procedure on page 1-22.
-

1.2.6 Perform a Facility Loopback or Payload Loopback on a Destination-Node Optical 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 1-12](#) shows a facility loopback being performed on a destination-node STM-N port.

Figure 1-12 Facility Loopback Path to a Destination-Node STM-N 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 or Payload Loopback on a Destination-Node Optical Port” procedure on page 1-23](#).

Create the Facility Loopback or Payload Loopback on a Destination-Node Optical Port

- Step 1** Connect an optical test set to the STM-N or ASAP optical port you are testing. 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.

**Note**

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

- Step 2** Adjust the test set accordingly. (Refer to manufacturer instructions for test-set use.)
- Step 3** Use CTC to set up the facility circuit on the test port:
- In node view, click the **Circuits** tab and click **Create**.
 - In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and circuit number, such as 1.
 - Click **Next**.
 - In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as Opt1toOpt5.
 - Leave the Bidirectional check box checked.
 - Click **Next**.
 - In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
 - Click **Next**.
 - In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC for the source dialog box.
 - Click **Next**.

k. In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.

Step 4 Confirm that the newly created circuit appears on the Circuits tab list as a two-way circuit.



Note It is normal for the “[LPBKFACILITY \(STMN\)](#)” [condition on page 2-88](#) to appear during a loopback setup. The condition clears when you remove the loopback.

Step 5 Create the facility loopback on the destination port being tested:

- a. Go to the node view of the destination node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node from the drop-down list in the Select Node dialog box and click **OK**.
- b. In node view, double-click the card that requires the loopback.
- c. Click the **Maintenance > Loopback > Port** tabs (or **Maintenance > Optical > Loopback > Port** tabs).
- d. Select **Locked,maintenance** from the Admin State column. If multiple ports are available, select the row appropriate for the desired port.
- e. For an ASAP card or STM-16 card, select **Facility** from the Loopback Type column. For an STM-64 card, select **Payload**. If multiple ports are available, select the row appropriate for the desired port.
- f. Click **Apply**.
- g. Click **Yes** in the confirmation dialog box.

Step 6 Complete the “[Test and Clear the Optical Facility Loopback or Payload Loopback Circuit](#)” procedure on [page 1-24](#).

Test and Clear the Optical Facility Loopback or Payload 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 a good circuit, no further testing is necessary with the facility loopback. Clear the facility loopback from the port:

- a. Click the **Maintenance > Loopback > Port** tabs (or **Maintenance > Optical > Loopback > Port** tabs).
- b. Choose **None** from the Loopback Type column for the port being tested.
- c. Choose the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance; Unlocked,automaticInservice**) from the Admin State column for the port being tested.
- d. Click **Apply**.
- e. Click **Yes** in the confirmation dialog box.

Step 4 Clear the loopback circuit:

- a. Click the **Circuits** tab.
- b. Choose the loopback circuit being tested.
- c. Click **Delete**.

- d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 5** Complete the [“Test the Optical Card” procedure on page 1-25](#).
-

Test the Optical Card

- Step 1** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad STM-N or ASAP card and replace it with a known-good one.



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. See the procedures in the [“2.8.2 Protection Switching, Lock Initiation, and Clearing” section on page 2-123](#). For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

- Step 2** Resend test traffic on the loopback circuit with a known-good card installed.
- Step 3** If the test set indicates a good circuit, 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 [“Replace an I/O Card” procedure on page 2-134](#) for the faulty card.
- Step 5** Clear the loopback on the port:
- Click the **Maintenance > Loopback > Port** tabs (or **Maintenance > Optical > Loopback > Port** tabs).
 - Choose **None** from the Loopback Type column for the port being tested.
 - Choose the appropriate state (**Unlocked**; **Locked,disabled**; **Locked,maintenance**; **Unlocked,automaticInservice**) from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 6** Clear the loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 7** Complete the [“1.2.7 Perform a Terminal Loopback on a Destination-Node Optical Port” procedure on page 1-25](#).
-

1.2.7 Perform a Terminal Loopback on a Destination-Node Optical Port

The terminal loopback at the destination-node ASAP card optical 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.

**Caution**

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

**Note**

STM-16 and STM-64 cards are not capable of terminal loopbacks.

**Note**

Terminal loopbacks require on-site personnel.

Complete the [“Create the Terminal Loopback on a Destination-Node Optical Port” procedure on page 1-26](#).

Create the Terminal Loopback on a Destination-Node Optical Port

-
- Step 1** Connect an optical test set to the ASAP card optical port you are testing: 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.

**Note**

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

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

- Step 3** Use CTC to set up the terminal loopback on the test port:

- a. In node view, click the **Circuits** tab and click **Create**.
- b. In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and circuit number, such as 1.
- c. Click **Next**.
- d. In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as Opt1toOpt6.
- e. Leave the Bidirectional check box checked.
- f. Click **Next**.
- g. In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
- h. Click **Next**.
- i. In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC used for the source dialog box.
- j. Click **Next**.
- k. In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.

- Step 4** Confirm that the newly created circuit appears on the Circuits tab list as a two-way circuit.

**Note**

It is normal for the [“LPBKTERMINAL \(STMN\)” condition on page 2-90](#) to appear during a loopback setup. The condition clears when you remove the loopback.

- Step 5** Create the terminal loopback on the destination port being tested:
- Go to the node view of the destination node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node from the drop-down list in the Select Node dialog box and click **OK**.
 - In node view, double-click the card that requires the loopback.
 - Click the **Maintenance > Optical > Loopback > Port** tab.
 - Select **Locked,maintenance** from the Admin State column. If multiple ports are available, select the row appropriate for the desired port.
 - Select **Terminal** from the Loopback Type column. If multiple ports are available, select the row appropriate for the desired port.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 6** Complete the [“Test and Clear the Optical Terminal Loopback Circuit” procedure on page 1-27](#).
-

Test and Clear the Optical 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 a good circuit, no further testing is necessary on the loopback circuit. Clear the terminal loopback from the port:
- Double-click the destination-node ASAP card with the terminal loopback.
 - Click the **Maintenance > Optical > Loopback > Port** tab.
 - Select **None** from the Loopback Type column for the port being tested.
 - Select the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance; Unlocked,automaticInservice**) in the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 4** Clear the terminal loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- The entire circuit path has now passed its comprehensive series of loopback tests. This circuit qualifies to carry live traffic.
- Step 5** If the test set indicates a faulty circuit, the problem might be a faulty card.
- Step 6** Complete the [“Test the ASAP Card” procedure on page 1-28](#).
-

Test the ASAP Card

-
- Step 1** Determine whether you are experiencing trouble on a single SFP (PPM), on all PPMs within a 4PIO (PIM), or on all 4PIO used in that ASAP card. If there is only partial failure, you might be able to replace this part rather than the entire card.
- Step 2** If the errors are being observed on one port but not all ports of the ASAP, you might only need to replace that SFP (PPM). Remove the errored SFP (PPM) and replace it with a known-good SFP (PPM) by completing the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 3** If all SFPs (PPMs) on a particular 4PIO (PIM) are experiencing problems, the 4PIO (PIM) is indicated. Remove this 4PIO (PIM) and replace it with a known-good one using the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 4** If the trouble still is not located, complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad ASAP card and replace it with a known-good one.



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. See the procedures in the [“2.8.2 Protection Switching, Lock Initiation, and Clearing” section on page 2-123](#). For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

-
- Step 5** Resend test traffic on the loopback circuit with a known-good card.
- Step 6** If the test set indicates a good circuit, 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 7** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the defective card.
- Step 8** Clear the terminal loopback on the port:
- Double-click the source-node card with the terminal loopback.
 - Click the **Maintenance > Optical > Loopback > Port** tabs.
 - Select **None** from the Loopback Type column for the port being tested.
 - Select the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance; Unlocked,automaticInservice**) in the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 9** Clear the terminal loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.

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

1.3 Troubleshooting an Ethernet Circuit Path 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.

You can use these procedures only on the ASAP card Ethernet ports in the ONS 15600 SDH system. The example in this section tests an Ethernet circuit on a three-node MS-SP Ring. 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

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 Ethernet port
2. A terminal loopback on the source-node Ethernet port
3. A facility loopback on the intermediate-node Ethernet port
4. A terminal loopback on the intermediate-node Ethernet port
5. A facility loopback on the destination-node Ethernet port
6. A terminal loopback on the destination-node Ethernet port


Note

Facility and terminal loopback tests require on-site personnel.

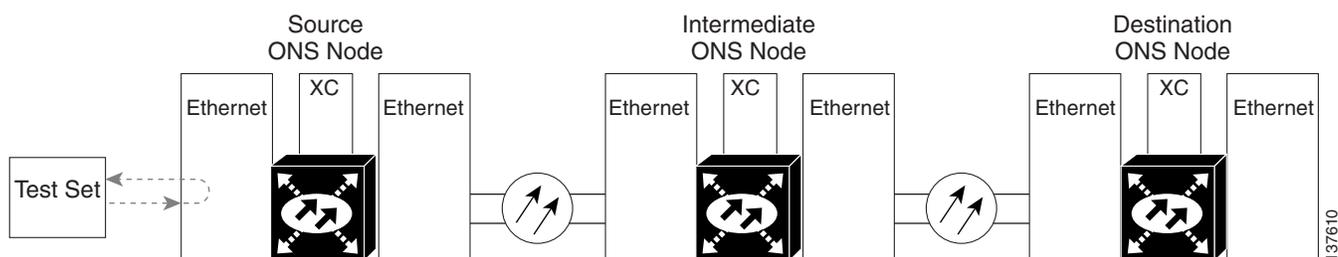
1.3.1 Perform a Facility Loopback on a Source-Node Ethernet Port

The facility loopback test is performed on the node source port in the network circuit. In the testing situation used in this example, the source is an ASAP Ethernet port in the source node. Completing a successful facility loopback on this port isolates the port as a possible failure point. [Figure 1-13](#) shows an example of a facility loopback on a circuit source Ethernet port.


Note

Facility loopbacks require on-site personnel.

Figure 1-13 Facility Loopback on a Circuit Source Ethernet Port


Caution

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

Complete the [“Create the Facility Loopback on the Source-Node Ethernet Port” procedure on page 1-30](#).

Create the Facility Loopback on the Source-Node Ethernet Port

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



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

Use appropriate cabling to attach the Tx and 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 CTC node view, double-click the card to display the card view.

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

Step 5 Choose **Locked,maintenance** from the Admin State column for the port being tested. If multiple ports are available, select the appropriate row for the desired port.

Step 6 Choose **Facility** from the Loopback Type column for the port being tested. If multiple ports are available, 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 \(GIGE\)” condition on page 2-87](#) to appear during loopback setup. The condition clears when you remove the loopback.

Step 9 Complete the [“Test and Clear the Facility Loopback Circuit” procedure on page 1-30](#).

Test and Clear the 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 a good circuit, no further testing is necessary with the facility loopback. Clear the facility loopback:

- a. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
- b. Choose **None** from the Loopback Type column for the port being tested.
- c. Choose the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) 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 ASAP Card” procedure on page 1-31](#).
-

Test the ASAP Card

- Step 1** Determine whether you are experiencing trouble on a single SFP (PPM), on all PPMs within a 4PIO (PIM), or on all 4PIO used in that ASAP card. If there is only partial failure, you might be able to replace this part rather than the entire card.
- Step 2** If the errors are being observed on one port but not all ports of the ASAP, you might only need to replace that SFP (PPM). Remove the errored SFP (PPM) and replace it with a known-good SFP (PPM) by completing the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 3** If all SFPs (PPMs) on a particular 4PIO (PIM) are experiencing problems, the 4PIO (PIM) is indicated. Remove this 4PIO (PIM) and replace it with a known-good one using the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 4** If the trouble still is not located, complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad ASAP card and replace it with a known-good one.



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. See the procedures in the [“2.8.2 Protection Switching, Lock Initiation, and Clearing” section on page 2-123](#). For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

- Step 5** Resend test traffic on the loopback circuit with a known-good card installed.
- Step 6** If the test set indicates a good circuit, 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 7** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the faulty card.
- Step 8** Clear the facility loopback:
- Click the **Maintenance > Ethernet > Loopback > Port** tabs.
 - Choose **None** from the Loopback Type column for the port being tested.
 - Choose the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 9** Complete the [“1.3.2 Perform a Terminal Loopback on a Source-Node Ethernet Port” procedure on page 1-32](#).
-

1.3.2 Perform a Terminal Loopback on a Source-Node Ethernet Port

The terminal loopback test is performed on the node source Ethernet port. For the circuit in this example, it is the source Ethernet port in the source node. You first create a bidirectional circuit that starts on the node destination Ethernet port and loops back on the node source Ethernet port. You then proceed with the terminal loopback test. Completing a successful terminal loopback to a node source port verifies that the circuit is good to the source 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 Ethernet Port”](#) procedure on page 1-32.

Create the Terminal Loopback on a Source-Node Ethernet Port

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



Note

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

- a. If you just completed the [“1.3.1 Perform a Facility Loopback on a Source-Node Ethernet Port”](#) procedure on page 1-29, leave the optical test set hooked up to the Ethernet port in the source node.
- b. If you are starting the current procedure without the optical test set hooked up to the source Ethernet 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 Use CTC to set up the terminal loopback on the test port:

- a. In node view, click the **Circuits** tab and click **Create**.
- b. In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and number of circuits, such as 1.
- c. Click **Next**.
- d. In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as Eth1toEth2.
- e. Leave the Bidirectional check box checked.
- f. Click **Next**.
- g. In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
- h. Click **Next**.
- i. In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC used for the source dialog box.
- j. Click **Next**.
- k. In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.

Step 4 Confirm that the newly created circuit appears on the Circuits tab list as a two-way circuit.



Note It is normal for the “[LPBKTERMINAL \(GIGE\)](#)” condition on page 2-89 to appear during a loopback setup. The condition clears when you remove the loopback.

Step 5 Create the terminal loopback on the destination port being tested:

- a. In node view, double-click the card that requires the loopback, such as the ASAP card in the source node.
- b. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
- c. Select **Locked,maintenance** from the Admin State column. If multiple ports are available, select the row appropriate for the desired port.
- d. Select **Terminal** from the Loopback Type column. If multiple ports are available, select the row appropriate for the desired port.
- e. Click **Apply**.
- f. Click **Yes** in the confirmation dialog box.

Step 6 Complete the “[Test and Clear the Ethernet Terminal Loopback Circuit](#)” procedure on page 1-33.

Test and Clear the Ethernet 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 a good circuit, no further testing is necessary on the loopback circuit. Clear the terminal loopback state on the port:

- a. Double-click the ASAP card in the source node with the terminal loopback.
- b. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
- c. Select **None** from the Loopback Type column for the port being tested.
- d. Select the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) in the Admin State column for the port being tested.
- e. Click **Apply**.
- f. Click **Yes** in the confirmation dialog box.

Step 4 Clear the terminal loopback circuit:

- a. Click the **Circuits** tab.
- b. Choose the loopback circuit being tested.
- c. Click **Delete**.
- d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.

Step 5 Complete the “[Test the ASAP Card](#)” procedure on page 1-34.

Test the ASAP Card

-
- Step 1** Determine whether you are experiencing trouble on a single SFP (PPM), on all PPMs within a 4PIO (PIM), or on all 4PIO used in that ASAP card. If there is only partial failure, you might be able to replace this part rather than the entire card.
- Step 2** If the errors are being observed on one port but not all ports of the ASAP, you might only need to replace that SFP (PPM). Remove the errored SFP (PPM) and replace it with a known-good SFP (PPM) by completing the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 3** If all SFPs (PPMs) on a particular 4PIO (PIM) are experiencing problems, the 4PIO (PIM) is indicated. Remove this 4PIO (PIM) and replace it with a known-good one using the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 4** If the trouble still is not located, complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad ASAP card and replace it with a known-good one.



Caution

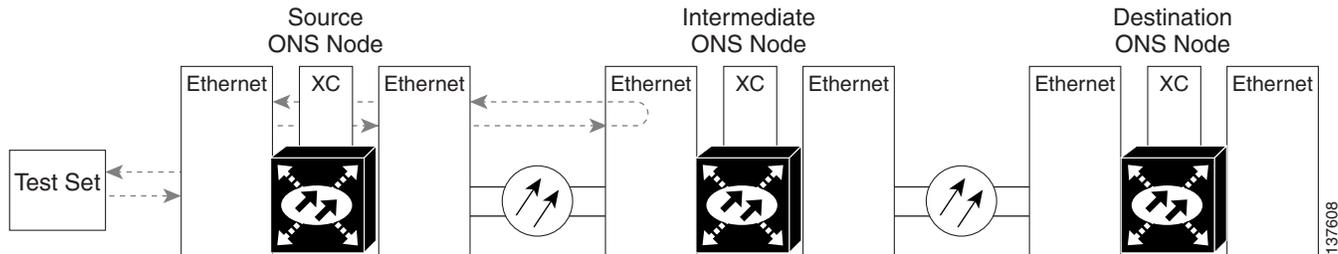
Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. See the procedures in the [“2.8.2 Protection Switching, Lock Initiation, and Clearing” section on page 2-123](#). For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

-
- Step 5** Resend test traffic on the loopback circuit with a known-good card.
- Step 6** If the test set indicates a good circuit, 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 7** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the defective card.
- Step 8** 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 > Ethernet > Loopback > Port** tabs.
 - Select **None** from the Loopback Type column for the port being tested.
 - Select the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) in the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 9** Clear the terminal loopback circuit before testing the next segment of the network circuit path:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 10** Complete the [“1.3.3 Create a Facility Loopback on an Intermediate-Node Ethernet Port” procedure on page 1-35](#).
-

1.3.3 Create a Facility Loopback on an Intermediate-Node Ethernet Port

Performing the facility loopback test on an intermediate port isolates whether this node is causing circuit failure. It is shown in [Figure 1-14](#).

Figure 1-14 Facility Loopback on an Intermediate-Node Ethernet 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 Ethernet Port”](#) procedure on page 1-35.

Create a Facility Loopback on an Intermediate-Node Ethernet Port

- Step 1** Connect an optical test set to the ASAP card Ethernet port you are testing: If you are starting the current procedure without the optical test set hooked up to the source ASAP card Ethernet 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.



Note

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

- Step 2** Adjust the test set accordingly. (Refer to manufacturer instructions for test-set use.)
- Step 3** Use CTC to set up the facility loopback on the test port:
- In node view, click the **Circuits** tab and click **Create**.
 - In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and circuit number, such as 1.
 - Click **Next**.
 - In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as Eth1toEth3.
 - Leave the Bidirectional check box checked.
 - Click **Next**.

1.3.3 Create a Facility Loopback on an Intermediate-Node Ethernet Port

- g. In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
- h. Click **Next**.
- i. In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC used for the source dialog box.
- j. Click **Next**.
- k. In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.

Step 4 Confirm that the newly created circuit appears on the Circuits tab list as a two-way circuit.



Note It is normal for the “[LPBKFACILITY \(GIGE\)](#)” condition on page 2-87 to appear during a loopback setup. The condition clears when you remove the loopback.

Step 5 Create the facility loopback on the destination port being tested:

- a. Go to the node view of the intermediate node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node from the drop-down list in the Select Node dialog box and click **OK**.
- b. In node view, double-click the intermediate-node card that requires the loopback.
- c. Click the or **Maintenance > Ethernet > Loopback > Port** tabs.
- d. Select **Locked,maintenance** from the Admin State column. If multiple ports are available, select the row appropriate for the desired port.
- e. Select **Facility** from the Loopback Type column. If multiple ports are available, select the row appropriate for the desired port.
- f. Click **Apply**.
- g. Click **Yes** in the confirmation dialog box.

Step 6 Complete the “[Test and Clear the Ethernet Facility Loopback Circuit](#)” procedure on page 1-36.

Test and Clear the Ethernet 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 a good circuit, no further testing is necessary with the facility loopback. Clear the facility loopback from the port:
 - a. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
 - b. Choose **None** from the Loopback Type column for the port being tested.
 - c. Choose the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) from the Admin State column for the port being tested.
 - d. Click **Apply**.
 - e. Click **Yes** in the confirmation dialog box.

- Step 4** Clear the loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 5** Complete the [“Test the ASAP Card” procedure on page 1-37](#).
-

Test the ASAP Card

- Step 1** Determine whether you are experiencing trouble on a single SFP (PPM), on all PPMs within a 4PIO (PIM), or on all 4PIO used in that ASAP card. If there is only partial failure, you might be able to replace this part rather than the entire card.
- Step 2** If the errors are being observed on one port but not all ports of the ASAP, you might only need to replace that SFP (PPM). Remove the errored SFP (PPM) and replace it with a known-good SFP (PPM) by completing the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 3** If all SFPs (PPMs) on a particular 4PIO (PIM) are experiencing problems, the 4PIO (PIM) is indicated. Remove this 4PIO (PIM) and replace it with a known-good one using the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 4** If the trouble still is not located, complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad ASAP card and replace it with a known-good one.



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. See the procedures in the [“2.8.2 Protection Switching, Lock Initiation, and Clearing” section on page 2-123](#). For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

- Step 5** Resend test traffic on the loopback circuit with a known-good ASAP card installed.
- Step 6** If the test set indicates a good circuit, 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 7** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the faulty card.
- Step 8** Clear the facility loopback from the port:
- Click the **Maintenance > Ethernet > Loopback > Port** tabs.
 - Choose **None** from the Loopback Type column for the ASAP port being tested.
 - Choose the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) from the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 9** Clear the loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.

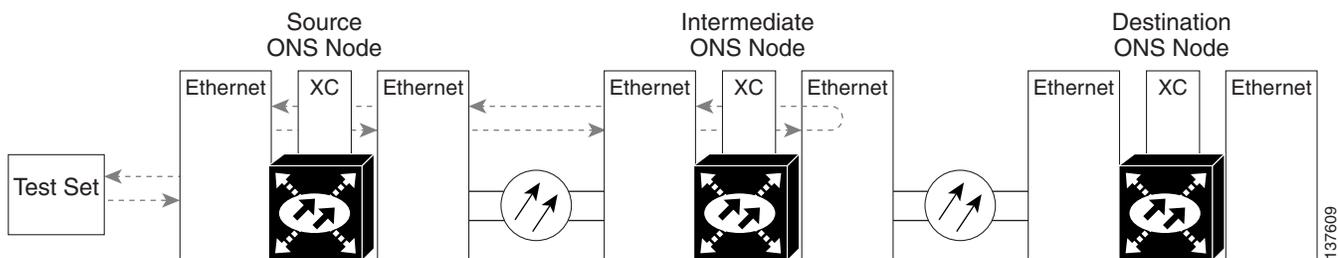
- c. Click **Delete**.
- d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.

Step 10 Complete the “1.3.4 Create a Terminal Loopback on an Intermediate-Node Ethernet Port” procedure on page 1-38.

1.3.4 Create a Terminal Loopback on an Intermediate-Node Ethernet Port

In the next troubleshooting test, you perform a terminal loopback on the intermediate-node ASAP Ethernet port to isolate whether the destination port is causing circuit trouble. In the example situation in [Figure 1-15](#), the terminal loopback is performed on an intermediate Ethernet port in the circuit. You first create a bidirectional circuit that originates on the source-node Ethernet port and loops back on the intermediate-node port. You then proceed with the terminal loopback test. If you successfully complete a terminal loopback on the node, this node is excluded from possible sources of circuit trouble.

Figure 1-15 Terminal Loopback on an Intermediate-Node Ethernet 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 an Intermediate-Node Ethernet Port](#)” procedure on page 1-38.

Create a Terminal Loopback on an Intermediate-Node Ethernet Port

Step 1 Connect an optical test set to the intermediate node ASAP card Ethernet port you are testing:



Note

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

- a. If you just completed the “[1.3.3 Create a Facility Loopback on an Intermediate-Node Ethernet Port](#)” procedure on page 1-35 for an ASAP card Ethernet port, leave the optical test set hooked up to the intermediate-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 Use CTC to set up the terminal loopback on the test port:

- a. In node view, click the **Circuits** tab and click **Create**.
- b. In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and circuit number, such as 1.
- c. Click **Next**.
- d. In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as Eth1toEth4.
- e. Leave the Bidirectional check box checked.
- f. Click **Next**.
- g. In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
- h. Click **Next**.
- i. In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC used for the source dialog box.
- j. Click **Next**.
- k. In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.

Step 4 Confirm that the newly created circuit appears on the Circuits tab list and that it is described in the Dir column as a two-way circuit.



Note It is normal for the [“LPBKTERMINAL \(GIGE\)” condition on page 2-89](#) to appear during a loopback setup. The condition clears when you remove the loopback.

Step 5 Create the terminal loopback on the intermediate port being tested:

- a. Go to the node view of the intermediate node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node from the drop-down list in the Select Node dialog box and click **OK**.
- b. In node view, double-click the card that requires the loopback.
- c. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
- d. Select **Locked,maintenance** from the Admin State column. If multiple ports are available, select the row appropriate for the desired port.
- e. Select **Terminal** from the Loopback Type column. If multiple ports are available, select the row appropriate for the desired port.
- f. Click **Apply**.
- g. Click **Yes** in the confirmation dialog box.

Step 6 Complete the [“Test and Clear the Ethernet Terminal Loopback Circuit” procedure on page 1-40](#).

Test and Clear the Ethernet 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 a good circuit, 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 to display the card view.
 - Click the **Maintenance > Ethernet > Loopback > Port** tabs.
 - Select **None** from the Loopback Type column for the port being tested.
 - Select the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) in the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 4** Clear the terminal loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 5** Complete the [“Test the ASAP Card” procedure on page 1-40](#).
-

Test the ASAP Card

-
- Step 1** Determine whether you are experiencing trouble on a single SFP (PPM), on all PPMs within a 4PIO (PIM), or on all 4PIO used in that ASAP card. If there is only partial failure, you might be able to replace this part rather than the entire card.
- Step 2** If the errors are being observed on one port but not all ports of the ASAP, you might only need to replace that SFP (PPM). Remove the errored SFP (PPM) and replace it with a known-good SFP (PPM) by completing the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 3** If all SFPs (PPMs) on a particular 4PIO (PIM) are experiencing problems, the 4PIO (PIM) is indicated. Remove this 4PIO (PIM) and replace it with a known-good one using the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 4** If the trouble still is not located, complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad ASAP card and replace it with a known-good one.



Caution

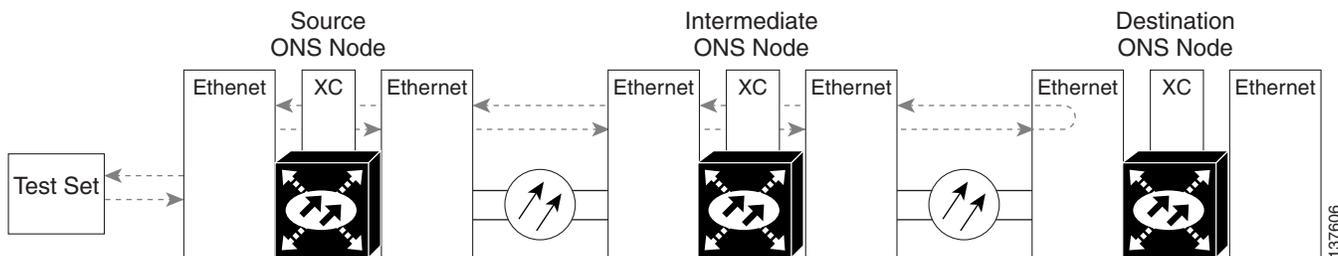
Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. See the procedures in the [“2.8.2 Protection Switching, Lock Initiation, and Clearing” section on page 2-123](#). For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

- Step 5** Resend test traffic on the loopback circuit with a known-good card.
- Step 6** If the test set indicates a good circuit, 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 7** Complete the “[Replace an I/O Card](#)” procedure on page 2-134 for the defective card.
- Step 8** Clear the terminal loopback on the port:
- Double-click the intermediate-node ASAP card with the terminal loopback.
 - Click the **Maintenance > Ethernet > Loopback > Port** tabs.
 - Select **None** from the Loopback Type column for the port being tested.
 - Select the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) in the Admin State column for the port being tested.
 - Click **Apply**.
 - Click **Yes** in the confirmation dialog box.
- Step 9** Clear the terminal loopback circuit:
- Click the **Circuits** tab.
 - Choose the loopback circuit being tested.
 - Click **Delete**.
 - Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 10** Complete the “[1.3.5 Perform a Facility Loopback on a Destination-Node Ethernet Port](#)” procedure on page 1-41.

1.3.5 Perform a Facility Loopback on a Destination-Node Ethernet Port

You perform a facility loopback test for ASAP card Ethernet port at the destination port to determine whether this local port is the source of circuit trouble. The example in [Figure 1-16](#) shows a facility loopback being performed on an Ethernet port.

Figure 1-16 Facility Loopback on a Destination-Node Ethernet 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 Ethernet Port” procedure on page 1-42](#).

Create the Facility Loopback on a Destination-Node Ethernet Port

- Step 1** Connect an optical test set to the destination ASAP card optical port you are testing. If you are starting the current procedure without the optical test set hooked up to the source optical 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.



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

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

- Step 3** Use CTC to set up the hairpin circuit on the test port:

- a. In node view, click the **Circuits** tab and click **Create**.
- b. In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and circuit number, such as 1.
- c. Click **Next**.
- d. In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as Eth1toEth5.
- e. Leave the Bidirectional check box checked.
- f. Click **Next**.
- g. In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
- h. Click **Next**.
- i. In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC used for the source dialog box.
- j. Click **Next**.
- k. In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.

- Step 4** Confirm that the newly created circuit appears on the Circuits tab list as a two-way circuit.



Note It is normal for the [“LPBKFACILITY \(GIGE\)” condition on page 2-87](#) to appear during a loopback setup. The condition clears when you remove the loopback.

- Step 5** Create the facility loopback on the destination port being tested:

- a. Go to the node view of the destination node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node from the drop-down list in the Select Node dialog box and click **OK**.
- b. In node view, double-click the card that requires the loopback.
- c. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
- d. Select **Locked,maintenance** from the Admin State column. If multiple ports are available, select the row appropriate for the desired port.

- e. Select **Facility** from the Loopback Type column. If multiple ports are available, select the row appropriate for the desired port.
 - f. Click **Apply**.
 - g. Click **Yes** in the confirmation dialog box.
- Step 6** Complete the “[Test and Clear the Ethernet Facility Loopback Circuit](#)” procedure on page 1-43.
-

Test and Clear the Ethernet 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 a good circuit, no further testing is necessary with the facility loopback. Clear the facility loopback from the port:
- a. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
 - b. Choose **None** from the Loopback Type column for the port being tested.
 - c. Choose the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) from the Admin State column for the port being tested.
 - d. Click **Apply**.
 - e. Click **Yes** in the confirmation dialog box.
- Step 4** Clear the loopback circuit:
- a. Click the **Circuits** tab.
 - b. Choose the loopback circuit being tested.
 - c. Click **Delete**.
 - d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 5** Complete the “[Test the ASAP Card](#)” procedure on page 1-43.
-

Test the ASAP Card

- Step 1** Determine whether you are experiencing trouble on a single SFP (PPM), on all PPMs within a 4PIO (PIM), or on all 4PIO used in that ASAP card. If there is only partial failure, you might be able to replace this part rather than the entire card.
- Step 2** If the errors are being observed on one port but not all ports of the ASAP, you might only need to replace that SFP (PPM). Remove the errored SFP (PPM) and replace it with a known-good SFP (PPM) by completing the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 3** If all SFPs (PPMs) on a particular 4PIO (PIM) are experiencing problems, the 4PIO (PIM) is indicated. Remove this 4PIO (PIM) and replace it with a known-good one using the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

- Step 4** If the trouble still is not located, complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad ASAP card and replace it with a known-good one.

**Caution**

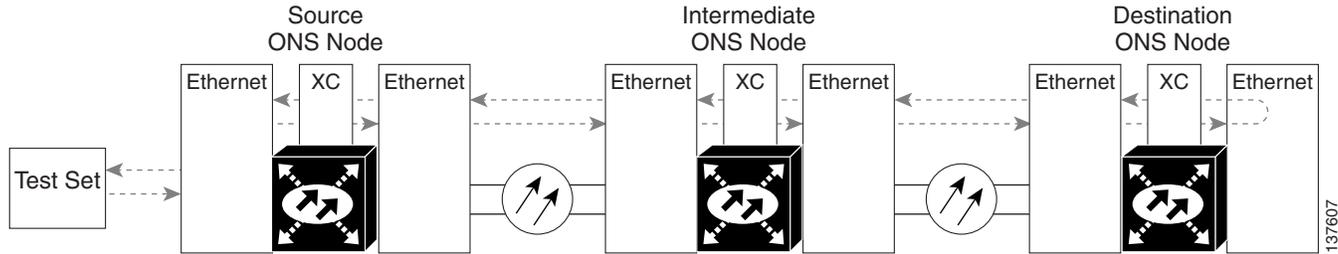
Removing a card that currently carries traffic on one or more ports can cause a traffic hit. To avoid this, perform an external switch if a switch has not already occurred. See the procedures in the [“2.8.2 Protection Switching, Lock Initiation, and Clearing” section on page 2-123](#). For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

- Step 5** Resend test traffic on the loopback circuit with a known-good card installed.
- Step 6** If the test set indicates a good circuit, 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 7** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the faulty card.
- Step 8** Clear the facility loopback on the port:
- a. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
 - b. Choose **None** from the Loopback Type column for the port being tested.
 - c. Choose the appropriate state (**Unlocked; Locked,disabled; Locked,maintenance**) from the Admin State column for the port being tested.
 - d. Click **Apply**.
 - e. Click **Yes** in the confirmation dialog box.
- Step 9** Clear the loopback circuit:
- a. Click the **Circuits** tab.
 - b. Choose the loopback circuit being tested.
 - c. Click **Delete**.
 - d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.
- Step 10** Complete the [“1.3.6 Perform a Terminal Loopback on a Destination-Node Ethernet Port” procedure on page 1-44](#).

1.3.6 Perform a Terminal Loopback on a Destination-Node Ethernet Port

The terminal loopback at the destination-node ASAP card Ethernet port is the final local hardware error elimination in the circuit troubleshooting process, and is performed on the destination-node ASAP card Ethernet port. If this test is completed successfully, you have verified that the circuit is good up to the destination port. The example in [Figure 1-17](#) shows a terminal loopback on a destination-node Ethernet port.

Figure 1-17 Terminal Loopback on a Destination-Node Ethernet 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 Ethernet Port” procedure on page 1-45](#).

Create the Terminal Loopback on a Destination-Node Ethernet Port

Step 1 Connect an optical test set to the destination node ASAP card Ethernet port you are testing:

**Note**

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

- a. If you just completed the [“1.3.5 Perform a Facility Loopback on a Destination-Node Ethernet Port” procedure on page 1-41](#) for an ASAP card Ethernet port, 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.)

Step 3 Use CTC to set up the terminal loopback on the test port:

- a. In node view, click the **Circuits** tab and click **Create**.
- b. In the Circuit Creation dialog box, choose the type, such as VC_HO_PATH_CIRCUIT, and circuit number, such as 1.
- c. Click **Next**.
- d. In the next Circuit Creation dialog box, give the circuit an easily identifiable name such as Eth1toEth6.
- e. Leave the Bidirectional check box checked.
- f. Click **Next**.
- g. In the Circuit Creation source dialog box, select the same Node, card Slot, Port, and VC where the test set is connected.
- h. Click **Next**.

- i. In the Circuit Creation destination dialog box, use the same Node, card Slot, Port, and VC used for the source dialog box.
- j. Click **Next**.
- k. In the Circuit Creation circuit routing preferences dialog box, leave all defaults. Click **Finish**.

Step 4 Confirm that the newly created circuit appears on the Circuits tab list as a two-way circuit.



Note It is normal for the “[LPBKTERMINAL \(GIGE\)](#)” condition on page 2-89 to appear during a loopback setup. The condition clears when you remove the loopback.

Step 5 Create the terminal loopback on the destination port being tested:

- a. Go to the node view of the destination node:
 - Choose **View > Go To Other Node** from the menu bar.
 - Choose the node from the drop-down list in the Select Node dialog box and click **OK**.
- b. In node view, double-click the card that requires the loopback.
- c. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
- d. Select **Locked,maintenance** from the Admin State column. If multiple ports are available, select the row appropriate for the desired port.
- e. Select **Terminal** from the Loopback Type column. If multiple ports are available, select the row appropriate for the desired port.
- f. Click **Apply**.
- g. Click **Yes** in the confirmation dialog box.

Step 6 Complete the “[Test and Clear the Ethernet Terminal Loopback Circuit](#)” procedure on page 1-46.

Test and Clear the Ethernet 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 a good circuit, no further testing is necessary on the loopback circuit. Clear the terminal loopback from the port:

- a. Double-click the destination-node ASAP card.
- b. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
- c. Select **None** from the Loopback Type column for the port being tested.
- d. Select the appropriate state (**Unlocked**; **Locked,disabled**; **Locked,maintenance**) in the Admin State column for the port being tested.
- e. Click **Apply**.
- f. Click **Yes** in the confirmation dialog box.

Step 4 Clear the terminal loopback circuit:

- a. Click the **Circuits** tab.

- b. Choose the loopback circuit being tested.
- c. Click **Delete**.
- d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.

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

- Step 5** If the test set indicates a faulty circuit, the problem might be a faulty card.
- Step 6** Complete the [“Test the ASAP Card” procedure on page 1-47](#).

Test the ASAP Card

- Step 1** Determine whether you are experiencing trouble on a single SFP (PPM), on all PPMs within a 4PIO (PIM), or on all 4PIO used in that ASAP card. If there is only partial failure, you might be able to replace this part rather than the entire card.
- Step 2** If the errors are being observed on one port but not all ports of the ASAP, you might only need to replace that SFP (PPM). Remove the errored SFP (PPM) and replace it with a known-good SFP (PPM) by completing the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 3** If all SFPs (PPMs) on a particular 4PIO (PIM) are experiencing problems, the 4PIO (PIM) is indicated. Remove this 4PIO (PIM) and replace it with a known-good one using the procedures for this in the “Install Cards and Fiber-Optic Cable” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.
- Step 4** If the trouble still is not located, complete the [“Replace an I/O Card” procedure on page 2-134](#) for the suspected bad ASAP card and replace it with a known-good one.



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. See the procedures in the [“2.8.2 Protection Switching, Lock Initiation, and Clearing” section on page 2-123](#). For more information, refer to the “Maintain the Node” chapter of the *Cisco ONS 15600 SDH Procedure Guide*.

- Step 5** Resend test traffic on the loopback circuit with a known-good card.
- Step 6** If the test set indicates a good circuit, 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 7** Complete the [“Replace an I/O Card” procedure on page 2-134](#) for the defective card.
- Step 8** Clear the terminal loopback on the port:
- a. Double-click the destination-node ASAP card.
 - b. Click the **Maintenance > Ethernet > Loopback > Port** tabs.
 - c. Select **None** from the Loopback Type column for the port being tested.
 - d. Select the appropriate state (**Unlocked**; **Locked,disabled**; **Locked,maintenance**) in the Admin State column for the port being tested.
 - e. Click **Apply**.
 - f. Click **Yes** in the confirmation dialog box.

- Step 9** Clear the terminal loopback circuit:
- a. Click the **Circuits** tab.
 - b. Choose the loopback circuit being tested.
 - c. Click **Delete**.
 - d. Click **Yes** in the Delete Circuits dialog box. Do not check any check boxes.

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

1.4 Using CTC Diagnostics

CTC provides diagnostics for the following functions:

- Verification of proper card application-specific integrated circuit (ASIC) function
- Verification of standby card operation
- Verification of proper card LED operation
- Notification of problems detected through alarms
- Provision of a downloaded, machine-readable diagnostic log 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 window. Other diagnostic functions—verifying card LED function or downloading diagnostic files for technical support—are available to the user in the node view 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 15600 SDH 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



Note

The LED test must be performed on the physical card. This test is not available in the CTC interface. For typical STM-N, SSXC, and TSC card LED behavior, see the [“2.7 LED Behavior” section on page 2-120](#).

- Step 1** Determine the active TSC card using the green ACT /STBY LED on the face of the card.
- Step 2** Press the LAMP button on the face of the active TSC card.
- Step 3** Ensure that all the LEDs on the cards in the shelf illuminate for several seconds.
- Step 4** If an LED does not illuminate, the LED might be faulty.

Return the defective card to Cisco through the returned materials authorization (RMA) process. See the [“Obtaining Documentation and Submitting a Service Request”](#) section on page xxxi to contact Cisco Technical Assistance Center (TAC).

1.4.2 Retrieve Tech Support Logs Button

When you click the Retrieve Tech Support Logs button in the Diagnostics tab of the Maintenance window, CTC retrieves system data that a Retrieve or higher level user can off-load 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 procedure to off-load the diagnostics file.



Note

In addition to the machine-readable diagnostics file, the ONS 15600 SDH stores an audit trail of all system events such as user log-ins, remote log-ins, 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 15600 SDH Procedure Guide*.

Off-Load the Diagnostics File



Note

The diagnostics operation is performed at a shelf level. Only single-node-related diagnostic information can be downloaded at a time.

The diagnostic files retrieved by CTC depends on the user privilege levels. [Table 1-1](#) lists the user privilege levels and the diagnostic retrieval operations they can perform.

Table 1-1 Diagnostic Files Retrieved Based on User Privilege

User Privilege Level	Diagnostic File Retrieval Operation
Retrieve	<ul style="list-style-type: none"> Export the unfiltered alarm table contents Export the unfiltered conditions table contents Export the unfiltered history table contents Export the inventory table contents CTC Dump Diagnostics log
Maintenance	<ul style="list-style-type: none"> All Retrieve level access operations Save the node database
Provisioning	<ul style="list-style-type: none"> All Maintenance level access operations Retrieve and save the node-level diagnostics report¹ Export the audit table contents²
Superuser	<ul style="list-style-type: none"> All Provisioning level access operations Retrieve and save the node-level diagnostics report Export the audit table contents

1.4.2 Retrieve Tech Support Logs Button

1. If secure mode is not set on the node.
2. If the NODE.security.grantPermission.RetrieveAuditLog NE Default is set to "Provisioning."

-
- Step 1** In the node view, click the **Maintenance > Diagnostic** tabs (Table 1-1).
- Step 2** Click **Retrieve Tech Support Logs** in the Controller area.
- Step 3** In the Select a Filename for the Tech Support Logs Zip Archive dialog box, add the diagnostics file name in the format **TechSupportLogs_<node_name>.zip** by default. Substitute the last 20 alphanumeric characters of the node name for <node_name>. Navigate to the directory (local or network) where you want to save the file.

A message appears asking you if you want to overwrite any existing diagnostics file in the selected directory.

- Step 4** Click **Save**.

CTC performs the diagnostic tasks and writes the diagnostic files in a folder named TechSupportLogs_<node_name> under the location selected in Step 3. After all the diagnostic files are written to the TechSupportLogs_<node_name> folder, CTC archives the retrieved diagnostic files as TechSupportLogs_<node_name>.zip. CTC deletes the TechSupportLogs_<node_name> folder after the archiving process is successfully completed. CTC retains this folder if the archiving process fails. The retrieved diagnostic files can be accessed in the TechSupportLogs_<node_name> folder.

A progress bar indicates the percentage of the file that is being saved. The Save Tech Support Logs Completed dialog box appears when the file is saved. CTC logs any error during the retrieval and archiving of diagnostics file to the CTC Alerts Log.

Table 1-2 lists the diagnostic files retrieved by CTC.

Table 1-2 List of Diagnostic Files

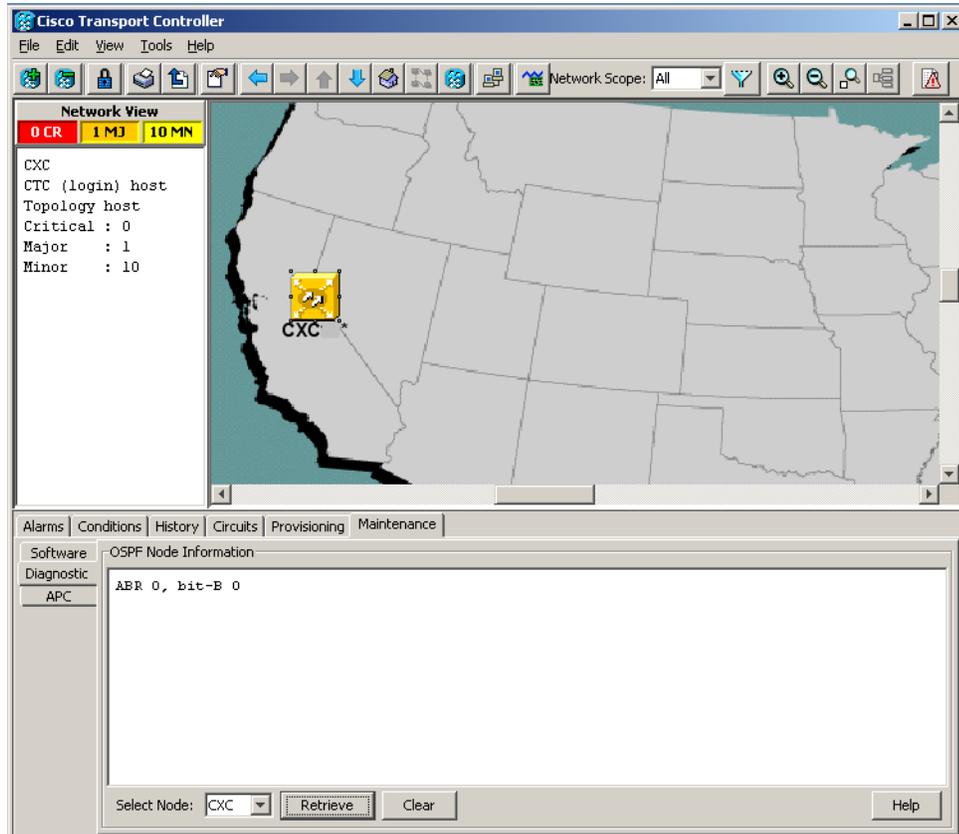
Diagnostic File	Diagnostic File Content
AlarmTableLog.html	Alarm Table export
HistoryTableLog.html	Alarm Table export
ConditionsTableLog.html	Conditions Table export
InventoryTableLog.html	Inventory Table export
AuditTableLog.html	Audit Table export
CTCDumpDiagLog.txt	Audit Table export
NodeDiagnostics.bin	NodeDiagnostics.gz
OBFLDiagnostics.bin	OBFLDiagnostics.bin
NodeDatabaseBackup.bin	Database backup
TechSupportLogs_<node_name>.zip	Zip archive of all the diagnostics file

- Step 5** Click **OK**.
-

1.4.3 Data Communications Network (DCN) Tool

In Software R8.0, CTC contains a DCN tool that assists with network troubleshooting for Open Shortest Path First (OSPF) networks. This tool, located in network view, is shown in Figure 1-18. It executes an internal dump command to retrieve information about all nodes accessible from the entry point.

Figure 1-18 DCN Tools OSPF Dump



The dump, which provides the same information as a dump executed by special networking commands, is available in the network view 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 this file can be saved or printed and furnished to Cisco Technical Support for use in OSPF network support.

1.5 Restoring the Database to a Previous or Original Configuration

This section contains troubleshooting for node operation errors that might require restoring software data or restoring the node to the default setup.

1.5.1 Node is Functioning Improperly or Has Incorrect Data

Symptom One or more nodes are not functioning properly or have incorrect data.

Table 1-3 describes the potential cause of the symptom and the solution.

Table 1-3 Node is Functioning Improperly or Has Incorrect Data

Possible Problem	Solution
The node has an incorrect or corrupted database.	Complete the procedures in the “Maintain the Node” chapter of the <i>Cisco ONS 15600 SDH Procedure Guide</i> .

1.6 PC Connectivity Troubleshooting

This section contains information about system minimum requirements, supported platforms, browsers, and Java Runtime Environments (JREs) for Software R8.0, and troubleshooting procedures for PC and network connectivity to the ONS 15600 SDH.

1.6.1 PC System Minimum Requirements

Workstations running CTC R8.0 for the ONS products on Windows platforms need to meet 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 CTC R8.0 for the ONS products on Sun workstations need to meet 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

In Software R8.0, CTC supports the following platforms:

- Windows NT
- Windows 98

- Windows XP
- Windows 2000
- Solaris 8
- Solaris 9

In Software R8.0, CTC supports the following browsers and JREs:

- PC platforms with Java plug-in 5.0
- Internet Explorer 6.0 browser (on PC platforms with Java plug-in 5.0)
- Mozilla application suite for browsers

**Note**

You can obtain browsers at the following URLs:

Netscape: <http://isp.netscape.com/>

Internet Explorer: <http://www.microsoft.com>

Mozilla: <http://mozilla.org>

**Note**

JRE 5.0 is required to run Software R8.0. JRE 5.0 is provided on the software CD.

1.6.4 Unsupported Platforms and Browsers

Software R8.0 does not support the following platforms:

- Windows 95
- Solaris 2.5
- Solaris 2.6

Software R8.0 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 later.

1.6.5 Retrieve the Node Information

If you do not know the IP address of your ONS 15600 SDH network element (NE), you can obtain and view the NE information using a TL1 session.

-
- Step 1** Connect a 3-pair swapping null modem adapter to the EIA/TIA-232 (RS-232) port on the customer access panel (CAP).
- Step 2** Connect a serial cable to the null modem adapter and to the serial port on your PC.
- Step 3** Configure the terminal emulation software (HyperTerminal):
- a. Terminal emulation = vt100
 - b. Bits per second = 9600
 - c. Parity = None

- d. Stop BITS = 1
- e. Flow control = None

Step 4 Press **Enter**. A > prompt appears.

Step 5 At the prompt, type the Activate User command to open a TL1 session:

```
ACT-USER::CISCO15:<CTAG>::<PID>;
```



Note When the semicolon is typed, the TL1 command is executed immediately.

Step 6 At the prompt, type the Retrieve Network Element General command to retrieve the NE information:

```
RTRV-NE-GEN:::<CTAG>;
```

Step 7 The response message will provide the following NE information.

- <IPADDR> indicates the node IP address; <IPADDR> is a string.
- <IPMASK> indicates the node IP mask; <IPMASK> is a string.
- <DEFRTR> indicates the node default router; <DEFRTR> is a string.
- <NAME> is the node name. The maximum name size is 20 characters; <name> is a string.
- <SWVER> is the software version; <SWVER> is a string.
- <LOAD> is the load version; <LOAD> is a string.
- <SELCLK> is the system-wide selected clock/sync copy; <SELCLK> is of type DATA_CLK_COPY.
- <PREFCLK> is the preferred clock/sync copy; <PREFCLK> is of type DATA_CLK_COPY.
- <SELDATA> is the system-wide selected data copy; <SELDATA> is of type DATA_CLK_COPY.
- <PREFDATA> is the preferred data copy; <SELDATA> is of type DATA_CLK_COPY.

Step 8 At the prompt, type the Cancel User command to close the TL1 session:

```
CANC-USER::CISCO15:<CTAG>;
```

Step 9 Remove the serial cable from the null modem adapter on the CAP and the serial port on your PC.

Step 10 Remove the null modem adapter from the EIA/TIA-232 port on the CAP.

1.6.6 Unable to Ping Your PC

Symptom When connecting your PC to the ONS 15600 SDH, you are unable to ping the IP address of your PC to verify the IP configuration.

[Table 1-4](#) describes the potential causes of the symptom and the solutions.

Table 1-4 **Unable to Ping Your PC**

Possible Problem	Solution
The IP address was typed incorrectly.	Verify that the IP address used to ping the PC matches the IP address displayed in the Windows IP Configuration information retrieved from the system. See the “Verify the IP Configuration of Your PC” procedure on page 1-55 .
The IP configuration of your PC is not properly set.	To verify the IP configuration of your PC, see the “Verify the IP Configuration of Your PC” procedure on page 1-55 . 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 on your PC.
- Step 2** In the Run window open field, type **command** and then click **OK**. The DOS command window appears.
- Step 3** At the prompt in the DOS window for Windows 98, Windows NT, Windows 2000, or Windows XP, type **ipconfig** and press the **Enter** key.
- The Windows IP configuration information appears, including the IP address, Subnet Mask, and the Default Gateway.
- Step 4** At the prompt in the DOS window, type **ping** followed by the IP address you verified in [Step 3](#).
- Step 5** Press the **Enter** key to execute the command.
- If the DOS window displays 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.
-

1.6.7 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.

[Table 1-5](#) describes the potential cause of the symptom and the solutions.

Table 1-5 **Browser Login Does Not Launch Java**

Possible Problem	Solution
The PC operating system and browser are not properly configured.	Reconfigure the PC operating system and the browser. See the “Reconfigure the PC Operating System and the Browser” procedure on page 1-56 .

Reconfigure the PC Operating System and the Browser

-
- Step 1** From the Windows start menu, click **Settings > Control Panel**.
- Step 2** If the Java Plug-in Control Panel does not appear, the JRE might not be installed on your PC.
- Run the Cisco ONS 15600 SDH software CD.
 - Open the *CD drive:\Windows\JRE* folder.
 - Double-click the **jre-5_0-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** Double-click the **Java Plug-in 5.0** icon.
- Step 5** Click **Advanced** in the Java Plug-in Control Panel.
- Step 6** From the Java Run Time Environment drop-down list, choose **JRE 5.0 in C:\ProgramFiles\JavaSoft\JRE\5.0**.
- Step 7** Click **Apply**.
- Step 8** In Communicator, click **Edit > Preferences**.
- Step 9** Click **Advanced > Proxies > Direct connection to the Internet > OK**.
- Step 10** Again in Communicator, click **Edit > Preferences**.
- Step 11** Click **Advanced > Cache**.
- Step 12** Confirm that the Disk Cache Folder field shows the following:
C:\ProgramFiles\Netscape\\Communicator\cache for *platform/platform*.
- Step 13** If the Disk Cache Folder field is not correct, click **Choose Folder**.
- Step 14** Navigate to the file listed in [Step 12](#) and click **OK**.
- Step 15** Click **OK** in the Preferences window and exit the browser.
- Step 16** Temporarily disable any virus-scanning software on the computer. See the [“1.7.2 Browser Stalls When Downloading JAR Files From TSC Card” procedure on page 1-59](#).
- Step 17** Verify that the computer does not have two network interface cards (NICs) installed. If the computer does have two NICs, remove one.
- Step 18** Restart the browser and log into the ONS 15600 SDH.
-

1.6.8 Unable to Verify the NIC Connection on your PC

Symptom When connecting your PC to the ONS 15600 SDH, you are unable to verify that the NIC connection is working properly because the link LED is not illuminated or flashing.

[Table 1-6](#) describes the potential causes of the symptom and the solutions.

Table 1-6 *Unable to Verify the NIC Connection on Your PC*

Possible Problem	Solution
The CAT-5 cable is not plugged in properly.	Confirm that both ends of the cable are properly inserted. If the cable is not fully inserted because of a broken locking clip, replace the cable.
The CAT-5 cable is damaged.	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.
Incorrect type of CAT-5 cable is being used.	<ul style="list-style-type: none"> • CAP connection: To connect an ONS 15600 SDH directly to your laptop/PC or a router, use a cross-over CAT-5 cable. To connect the ONS 15600 SDH to a hub or a LAN switch, use a straight-through CAT-5 cable. • TSC card connection: To connect an ONS 15600 SDH active TSC card directly to your laptop/PC, you might use either a straight-through or cross-over CAT-5 cable because the RJ-45 port on the faceplate is auto sensing. <p>For details on the types of CAT-5 cables, see the “Crimp Replacement CAT-5 Cables” procedure on page 1-73.</p>
The NIC is improperly inserted or installed.	<ul style="list-style-type: none"> • If you are using a PCMCIA-based NIC, remove and reinsert the NIC to make sure the NIC is fully inserted. • If the NIC is built into the laptop/PC, verify that the NIC is not faulty.
The NIC is faulty.	<p>Confirm that the NIC is working properly. If you have no issues connecting to the network (or any other node), the NIC should be working correctly.</p> <p>If you have difficulty connecting to the network (or any other node), the NIC might be faulty and needs to be replaced.</p>

1.6.9 TCP/IP Connection is Lost

Symptom The TCP/IP connection was established and then lost, and a DISCONNECTED alarm appears on CTC.

[Table 1-7](#) describes the potential cause of the symptom and the solution.

Table 1-7 *TCP/IP Connection is Lost*

Possible Problem	Solution
Your PC lost TCP/IP connection with the ONS 15600 SDH.	<p>Use a standard ping command to verify the TCP/IP connection between the PC and the ONS 15600 SDH TSC card. A ping command will work if the PC connects directly to the TSC card or uses a LAN to access the TSC card. A ping command will also work if the CTC is connected through a gateway network element (GNE) and DCC if the node and CTC are in the same subnet or the required static routes are configured.</p> <p>See the “Ping the ONS 15600” procedure on page 1-58.</p>

Ping the ONS 15600

-
- Step 1** Display the command prompt:
- a. If you are using a Microsoft Windows operating system, from the Start Menu choose **Run**, type 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 Microsoft and Sun operating systems, type the following at the prompt:
- ping** *ONS 15600 SDH IP address*
- For example
- ping 192.1.0.2**
- If the workstation has connectivity to the ONS 15600 SDH, 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 3** If the ping is successful, it demonstrates that an active TCP/IP connection exists. Restart CTC.
- Step 4** If the ping is not successful, and the workstation connects to the ONS 15600 SDH through a LAN, verify that the workstation’s IP address is on the same subnet as the ONS node.
- If the ping is not successful and the workstation connects directly to the ONS 15600 SDH, verify that the link light on the workstation NIC is illuminated.
-

1.7 CTC Operation Troubleshooting

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

1.7.1 Cisco Transport Controller Installation Wizard Hangs

Symptom The CTC Installation Wizard hangs or stalls during Netscape Communicator installation when installing the RealPlayer G2 plug-in application from the Cisco ONS 15600 SDH software or documentation CD-ROM.

[Table 1-8](#) describes the potential cause of the symptom and the solutions.

Table 1-8 Cisco Transport Controller Installation Wizard Hangs

Possible Problem	Solution
RealPlayer G2 is incompatible with the CTC Installation Wizard when it is installed with the Netscape Communicator software.	<p>Abort the installation. See the “Abort the Stalled Installation Wizard” procedure on page 1-59.</p> <p>Restart the CTC Installation Wizard and perform a custom Netscape Communicator installation that excludes RealPlayer G2 from the items being installed. Refer to the <i>Cisco ONS 15600 SDH Procedure Guide</i> to perform a custom installation that excludes RealPlayer G2.</p> <p>Note The RealPlayer G2 software can be installed separately at a later time without affecting the other Cisco Transport Controller software.</p>

Abort the Stalled Installation Wizard

-
- Step 1** Abort the stalled CTC Installation Wizard by pressing **Ctrl+Alt+Del**. The Windows Security dialog box appears.
- Step 2** In the Windows Security dialog, click **Task Manager**.
- Step 3** In the Windows Task Manager dialog box, highlight the Cisco Transport Controller Installation Wizard and click the **End Task** button.
- Step 4** Click **Yes** in the confirmation dialog box.
- Step 5** Navigate to the drive containing the CTC CD-ROM and double-click **setup.exe** to restart the CTC Installation Wizard.
- Step 6** Refer to the *Cisco ONS 15600 SDH Procedure Guide* to perform a custom Netscape Communicator installation that excludes RealPlayer G2 from the items to be installed.
-

1.7.2 Browser Stalls When Downloading JAR Files From TSC Card

Symptom The browser stalls or hangs when downloading Cisco Transport Controller JAR files from the TSC card.

[Table 1-9](#) describes the potential cause of the symptom and the solution.

Table 1-9 Browser Stalls When Downloading JAR Files From TSC Card

Possible Problem	Solution
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.	<p>Run the CTC installation wizard to preinstall the CTC JAR files.</p> <p>Disable the VirusScan Download Scan feature. See the “Disable the VirusScan Download Scanning” procedure on page 1-60.</p>

Disable the VirusScan Download Scanning

-
- 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 the **Configure** button on the lower part of the Task Properties window.
 - Step 4** Click the **Download Scan** icon next to 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.
-

1.7.3 Cisco Transport Controller Does Not Launch

Symptom CTC does not launch and usually an error message appears before the login screen appears.

[Table 1-10](#) describes the potential causes of the symptom and the solutions.

Table 1-10 Cisco Transport Controller Does Not Launch

Possible Problem	Solution
The Communicator browser cache points to an invalid directory.	Redirect the Communicator cache to a valid directory. See the “Redirect the Communicator Cache to a Valid Directory” procedure on page 1-60 .
The user is connected to the standby TSC card.	Connect the login PC to the port on the front of the active TSC card; the active TSC card has a green ACT/STBY LED illuminated. Note For typical TSC card LED behavior, see the “2.7 LED Behavior” section on page 2-120 .

Redirect the Communicator Cache to a Valid Directory

-
- Step 1** Launch Netscape Communicator.
 - Step 2** Display the **Edit** menu.
 - Step 3** Choose **Preferences**.
 - Step 4** In the Category column on the left-hand side, go to **Advanced** and choose the **Cache** tab.
 - Step 5** 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.
-

1.7.4 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 15600 SDH 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 15600 SDH software CD and on the Cisco ONS 15600 SDH documentation CD. 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 1-11](#) shows JRE compatibility with ONS 15600 SDH software releases.

Table 1-11 JRE Compatibility

ONS Software Release	JRE 1.3 Compatible	JRE 1.4.2 Compatible ¹	JRE 5.0 Compatible
ONS 15600 SDH R1.4	Yes	No	No
ONS 15600 SDH R8.0	No	No	Yes

1. JRE 5.0 is the recommended version and is provided on the software CD.

1.7.5 Sluggish Cisco Transport Controller Operation or Login Problems

Symptom You experience sluggish CTC operation or have problems logging into CTC.

[Table 1-12](#) describes the potential cause of the symptom and the solution.

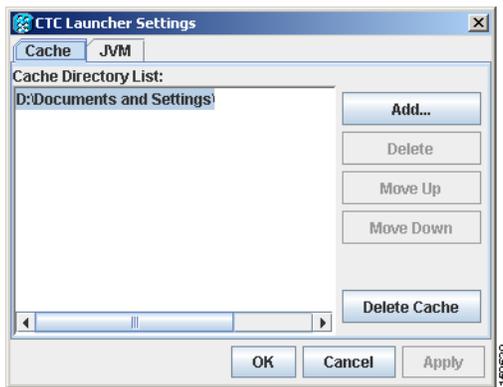
Table 1-12 Sluggish Cisco Transport Controller Operation or Login Problems

Possible Problem	Solution
The CTC cache file is corrupted.	Delete the CTC cache file. This operation forces the ONS 15600 SDH to download a new set of JAR files to your computer hard drive. See the “Delete the CTC Cache File Automatically” procedure on page 1-62 or the “Delete the CTC Cache File Manually” procedure on page 1-62 .
Insufficient heap memory allocation.	Increase the heap size if you are using CTC to manage more than 50 nodes concurrently. See the “1.7.5.1 Set the CTC_HEAP and CTC_MAX_PERM_SIZE_HEAP Environment Variables for Windows” procedure on page 1-62 and the “Set the CTC_HEAP and CTC_MAX_PERM_SIZE_HEAP Environment Variables for Solaris” procedure on page 1-63 . Note 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.

Delete the CTC Cache File Automatically

- Step 1** Enter an ONS 15600 SDH 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 will not allow you to delete files that are in use.
- Step 3** Click the **Settings** button on the initial browser window, then click **Delete CTC Cache** to clear the CTC cache. [Figure 1-19](#) shows the Delete CTC Cache window.

Figure 1-19 The Delete the CTC Cache Window



Delete the CTC Cache File Manually

- Step 1** To delete the JAR files manually, from the Windows Start menu choose **Search > For Files or Folders**.
- Step 2** Enter **ctc*.jar** or **cms*.jar** in the Search for files or folders named field on the Search Results dialog box and click **Search Now**.
- Step 3** Click the **Modified** column on the Search Results dialog box to find the JAR files that match the date when you downloaded the files from the TSC card.
- Step 4** Highlight the files and press the keyboard **Delete** key.
- Step 5** Click **Yes** in the confirmation dialog box.

1.7.5.1 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
```

1.7.6 Node Icon is Gray on Cisco Transport Controller Network View

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

[Table 1-13](#) describes the potential causes of the symptom and the solutions.

Table 1-13 Node Icon is Gray on Cisco Transport Controller Network View

Possible Problem	Solution
Different CTC releases do not recognize each other.	Usually accompanied by an INCOMPATIBLE-SW alarm. Incompatibility occurs on login nodes with compatible software that encounter other nodes in the network that have a newer software version. Note In mixed-platform networks (ONS 15600 SDH and ONS 15454 SDH), you do not necessarily need to log into CTC on an ONS 15600 SDH node to enable operation, administration, maintenance, and provisioning (OAM&P) for all nodes. For example, ONS 15454 SDH also recognizes ONS 15600 SDH nodes.
A username/password mismatch.	Usually accompanied by a NOT-AUTHENTICATED alarm. Correct the username and password as described in the “1.7.8 Username or Password Mismatch” procedure on page 1-65 .
No IP connectivity between nodes.	Usually accompanied by Ethernet-specific alarms. Verify the Ethernet connections between nodes.
A lost DCC connection.	Usually accompanied by an EOC alarm. Clear the EOC alarm and verify the DCC connection as described in the “EOC” alarm on page 2-41 .
OSPF not properly configured.	Usually accompanied by a HELLO failure. Reconfigure the OSPF on the system to proper settings.
CTC launched from ONS 15454 SDH node.	You can manage an ONS 15600 SDH from CTC launched on the same release or higher CTC session from an ONS 1545 SDH node. Restart CTC and log into an ONS 15600 SDH node to enable node management.

1.7.7 Cisco Transport Controller Does Not Recognize the Node

Symptom This situation is often accompanied by the INCOMPATIBLE-SW alarm.

[Table 1-14](#) describes the potential cause of the symptom and the solutions.

Table 1-14 Cisco Transport Controller Does Not Recognize the Node

Possible Problem	Solution
The software loaded on the connecting workstation and the software on the TSC card are incompatible.	Incompatibility occurs when the TSC card software is upgraded but the PC has not yet upgraded to 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. In mixed platform networks (ONS 15600 SDH and ONS 15454 SDH), you must log into the same or higher CTC software release as the one loaded on the ONS 15600 SDH node to enable OAM&P of all nodes. Note You cannot access other nodes over DCC (the gray nodes) when the PC is connected to the active TSC card unless that ONS 15600 SDH is configured as a gateway NE.

1.7.8 Username or Password Mismatch

Symptom A mismatch often occurs concurrently with a NOT-AUTHENTICATED alarm.

[Table 1-15](#) describes the potential cause of the symptom and the solution.

Table 1-15 Username or Password Mismatch

Possible Problem	Solution
The username or password entered does not match the information stored in the TSC card.	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 15600 SDH, type the CISCO15 user name in capital letters, type the otbu+1 password, and click Login . See the “Verify Correct Username and Password” procedure on page 1-65 .
The username or password does not match the information stored in the RADIUS server database.	If the node has been configured for 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” chapter in the <i>Cisco ONS 15600 SDH Reference Manual</i> .

Verify Correct Username and Password

-
- Step 1** Ensure that your keyboard Caps Lock key is not turned on and affecting the case-sensitive entry of the user name and password.
 - Step 2** Contact your system administrator to verify the user name and password.
 - Step 3** Contact the Cisco TAC to create a new user name and password. See the [“Obtaining Documentation and Submitting a Service Request” section on page xxxi](#).
-

1.7.9 Superuser Password Needs to Be Reset

Symptom The Superuser password has been lost or compromised.

[Table 1-16](#) describes the potential cause of the symptom and the solution.

Table 1-16 No IP Connectivity Exists Between Nodes

Possible Problem	Solution
A security breach or record-keeping error has occurred.	Reset the ONS 15600 SDH to the default Superuser UID and password combination using the lamp test button using the “Reset the ONS 15600 SDH Password” procedure on page 1-66 .

Reset the ONS 15600 SDH Password


Note

To complete this procedure, you must be on site and have IP connectivity to the node.

-
- Step 1** Locate the recessed button labeled LAMP TEST on the front of the active TSC card.
- Step 2** Press in and hold down the recessed button labelled LAMP TEST for five seconds.
- Step 3** Release the LAMP TEST button for approximately two seconds.
- Step 4** Again press in and hold down the button labelled LAMP TEST for five seconds.
- Step 5** Again release the LAMP TEST button.
- Step 6** Start a normal CTC session. At the login screen, CTC accepts the default username and password set when the ONS 15600 SDH node shipped. The default username is **CISCO15** and the password is **otbu+1**. CISCO15 has Superuser rights and privileges, which allow you to create a user name and assign a password.


Note

Other existing usernames and passwords are not affected by the reset. The Superuser reset applies only to the local node where the procedure is performed.

- Step 7** If you need to create another user name and password, complete the following steps:
- a. Click the **Provisioning > Security** tabs and click **create**.
 - b. Fill in the fields with a new user name and password and assign a security level.
 - c. Click **OK**.


Note

After new user names and passwords are set up, including at least one Superuser, log in as a newly created Superuser and delete the default CISCO15 username and otbu+1 password to ensure that security is not compromised.

1.7.10 No IP Connectivity Exists Between Nodes

Symptom The nodes have a gray icon which is usually accompanied by alarms.

[Table 1-17](#) describes the potential causes of the symptom and the solutions.

Table 1-17 No IP Connectivity Exists Between Nodes

Possible Problem	Solution
The node has lost DCC connection.	Usually is accompanied by DCC termination alarms, such as EOC or EOC-L. Clear the EOC (or EOC-L) alarm and verify the DCC connection as described in the “EOC” alarm on page 2-41 .
The nodes are in different subnetworks and required static routes that are not provisioned.	Usually is accompanied by DCC termination alarms. Properly provision required static routes and nodes in the same subnets. Refer to the procedure for setting up CTC access in the <i>Cisco ONS 15600 SDH Procedure Guide</i> .
OSPF is not properly configured.	Usually is accompanied by OSPF Hello Fail alarms. Configure the OSPF to the proper settings. See the “HELLO” alarm on page 2-65 .

1.7.11 DCC Connection Lost

Symptom A span between nodes on the network view is gray or the node is reporting DCC termination alarms, such as EOC.

[Table 1-18](#) describes the potential cause of the symptom and the solution.

Table 1-18 DCC Connection Lost

Possible Problem	Solution
The DCC connection is lost.	Clear the EOC alarm and verify the DCC connection as described in the “EOC” alarm on page 2-41 .

1.7.12 Loss of IP Communication Between Nodes on an OSPF LAN

Symptom The CTC session on an ONS 15600 SDH connected to Router 1 loses communication with the ONS 15600 SDH connected to Router 2 on the same LAN in OSPF backbone Area 0.

[Table 1-19](#) describes the potential causes of the symptom and the solutions.

Table 1-19 Loss of IP Communication in Segmented OSPF Area

Possible Problem	Solution
The OSPF backbone Area 0 has segmented into multiple gateway network elements (GNEs_.	If multiple ONS 15600 SDH nodes and routers are connected to the same LAN in OSPF backbone Area 0 and a link between two routers breaks, the backbone OSPF area 0 could divide into multiple GNEs. If this occurs, the CTC session on the ONS node connected to Router 1 will not be able to communicate with the ONS 15600 SDH connected to Router 2. This is standard behavior for an OSPF network.
A broken link between two routers on the LAN in OSPF backbone Area 0.	To resolve this problem, you must repair the link between the routers or provide another form of redundancy in the network. Refer to the <i>Cisco ONS 15600 SDH Procedure Guide</i> for procedures to repair the link between the routers.

1.8 Circuits and Timing

This section provides solutions to circuit creation and reporting errors, as well as common timing reference errors and alarms.

1.8.1 ONS 15600 SDH Switches Timing Reference

Symptom Timing references switch when one or more problems occur.

[Table 1-20](#) describes the potential causes of the symptom and the solutions.

Table 1-20 ONS 15600 Switches Timing Reference

Possible Problem	Solution
The optical or building integrated timing supply (BITS) input is receiving loss of signal (LOS), loss of frame (LOF), or AIS from its timing source.	Clear the alarm and set up the timing source to a reliable source. To clear an LOS (BITS) alarm, see the “LOS (BITS)” alarm on page 2-85 . To clear an LOF (BITS) alarm, see the “LOF (BITS)” alarm on page 2-81 . To clear an AIS (BITS) alarm, see the “AIS” condition on page 2-15 . Refer to the procedure for setting up timing in the <i>Cisco ONS 15600 SDH Procedure Guide</i> .
The optical or BITS input is not functioning.	
Synchronization status messaging (SSM) message is set to do not use (DUS).	The Synchronization Status Message (SSM) Changed to Do Not Use (DUS) condition occurs when the synchronization status message quality level is changed to DUS. The port that reports the condition is not at fault. The condition applies to the timing source. SSM-DUS prevents timing loops by providing a termination point for the signal usage.
SSM indicates a Stratum 3 or lower clock quality.	To clear the SSM-DUS alarm, see the “SSM-DUS” condition on page 2-111 .

Table 1-20 ONS 15600 Switches Timing Reference (continued)

Possible Problem	Solution
The input frequency is off by more than 15 ppm.	Set up the timing input to a reliable timing source. Refer to the procedure for setting up timing in the <i>Cisco ONS 15600 SDH Procedure Guide</i> .
The input clock wanders and has more than three slips in 30 seconds.	

1.8.2 Holdover Synchronization Alarm

Symptom The clock is running at a different frequency than normal and the HLDOVRSYNC alarm appears. Holdover occurs when the node is provisioned for external or line timing and both of the provisioned references fail. The timing switches to the internal Stratum 3E clock on the TSC card.

[Table 1-21](#) describes the potential cause of the symptom and the solution.

Table 1-21 Holdover Synchronization Alarm

Possible Problem	Solution
The primary and secondary reference inputs have failed.	This alarm is raised when the primary and secondary reference inputs fail. See the “HLDOVRSYNC” condition on page 2-66 for a detailed description. Note The ONS 15600 SDH supports holdover timing per Telcordia GR-436-CORE when provisioned for external timing.

1.8.3 Free-Running Synchronization Mode

Symptom The clock is running at a different frequency than normal and the FRNGSYNC alarm appears. Free Running is reported when the node is running on the internal clock after a failure of the primary and secondary clock references.

[Table 1-22](#) describes the potential cause of the symptom and the solution.

Table 1-22 Free-Running Synchronization Mode

Possible Problem	Solution
No reliable reference input is available.	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” condition on page 2-64 for a detailed description.

1.8.4 Daisy-Chained BITS Not Functioning

Symptom You are unable to daisy-chain the BITS.

[Table 1-23](#) describes the potential cause of the symptom and the solution.

Table 1-23 *Daisy-Chained BITS Not Functioning*

Possible Problem	Solution
Daisy-chaining BITS is not supported on the ONS 15600 SDH.	Daisy-chaining BITS causes additional wander buildup in the network and is therefore not supported. Instead, use a timing signal generator to create multiple copies of the BITS clock and separately link them to each ONS 15600 SDH. You cannot use BITS Out A and/or BITS Out B outputs when providing a clock source from BITS In A and/or BITS In B inputs. To provide BITS Out A and/or BITS Out B external outputs, the clock source must be derived from an optical input.

1.8.5 Circuits Remain in PARTIAL Status

Symptom Circuits remain in the PARTIAL status.

[Table 1-26](#) describes the potential cause of the symptom and the solution.

Table 1-24 *Circuits Remain in PARTIAL Status*

Possible Problem	Solution
The MAC address changed.	Repair the circuits. See the “Repair Circuits” procedure on page 1-70 .
The node is resetting.	Wait for the node to finish the reset.
The node has lost DCC connectivity.	See the “1.6.9 TCP/IP Connection is Lost” section on page 1-57 .
There are user ID and/or password issues.	See the “1.7.8 Username or Password Mismatch” section on page 1-65 .
Server Trail deleted.	—

Repair Circuits

-
- Step 1** In node view, click the **Circuits** tab. Note that all circuits listed are PARTIAL.
 - Step 2** In node view, choose **Repair Circuits** from the Tools drop-down list. The Circuit Repair dialog box appears.
 - Step 3** Read the instructions in the Circuit Repair dialog box. If all the steps in the dialog box have been completed, click **Next**. Ensure that you have the old and new MAC addresses.

- Step 4** The Node MAC Addresses dialog box appears:
- From the Node drop-down list, choose the name of the node where you replaced the CAP.
 - In the Old MAC Address field, enter the old MAC address.
 - Click **Next**.
- Step 5** The Repair Circuits dialog box appears. Read the information in the dialog box and click **Finish**.



Note The CTC session freezes until all circuits are repaired. Circuit repair can take up to five minutes or more depending on the number of circuits provisioned.

When the circuit repair is complete, the Circuits Repaired dialog box appears.

- Step 6** Click **OK**.
- Step 7** In node view of the new node, click the **Circuits** tab. Note that all circuits listed are DISCOVERED. If all circuits listed do not have a DISCOVERED status, call the Cisco TAC (1 800 553-2447) to open an RMA.

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 an Optical Traffic Card

Symptom An optical traffic card has multiple bit errors.

[Table 1-25](#) describes the potential causes of the symptom and the solutions.

Table 1-25 *Bit Errors Appear for a Traffic Card*

Possible Problem	Solution
Faulty cabling	Bit errors on line (traffic) ports usually originate from cabling problems or low or high optical-line power levels. The errors can be caused by synchronization problems, especially if PJ (pointer justification) errors are reported. Troubleshoot cabling problems using the “1.1 Network Troubleshooting Tests” section on page 1-2. Troubleshoot low or high optical-line power levels using the “1.9.2 Faulty Fiber-Optic Connections” section on page 1-71. Use a test set whenever possible to check for errors.
Low optical-line power	
High optical-line power	

1.9.2 Faulty Fiber-Optic Connections

Symptom An optical (STM-N) card has multiple SDH alarms or signal errors.

[Table 1-26](#) describes the potential cause of the symptom and the solution.

Table 1-26 Faulty Fiber-Optic Connections

Possible Problem	Solution
Faulty fiber-optic connections to the optical (STM-N) card	Faulty fiber-optic connections can be the source of SDH alarms and signal errors. See the “ Verify Fiber-Optic Connections ” procedure on page 1-72.



Warning

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051



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

Verify Fiber-Optic Connections

- Step 1** Ensure that a single-mode fiber connects the ONS 15600 SDH optical (STM-N) port(s). SM or SM Fiber should be printed on the fiber span cable. ONS 15600 SDH optical (STM-N) cards do not use multimode fiber.
- Step 2** Ensure that the OGI fiber connector is properly aligned and locked.
- Step 3** Verify that the single-mode fiber optical-line power level coming into the breakout panel is within the specified range:
- Remove the Rx end of the suspect fiber.
 - Connect the Rx end of the suspect fiber to a fiber-optic power meter, such as a GN Nettest LP-5000.
 - Determine the power level of the fiber with the fiber-optic power meter.
 - Verify that the power meter is set to the appropriate wavelength for the optical (STM-N) card you are testing (either 1310 nm or 1550 nm depending on the specific card).
 - Verify that the power level falls within the range specified for the card; see the “[1.9.3 Optical Traffic Card Transmit and Receive Levels](#)” section on page 1-75.
 - If the power level is within tolerance, the problem is with the fan-out cables or the optical (STM-N) card.
 - If the power level is too high, add the appropriate attenuation.
- Step 4** If the power level falls below the specified range:



Note When this condition occurs, the far-end node is usually an ONS 15454 SDH.

- Clean or replace the OGI fiber fan-out cables. If possible, do this for the optical (STM-N) card you are working on and the far-end card. Refer to the *Cisco ONS 15600 SDH Procedure Guide* for fiber cleaning procedures.

- b. Clean the optical connectors on the card. If possible, do this for the optical (STM-N) card you are working on and the far-end card. Refer to the *Cisco ONS 15600 SDH Procedure Guide* for fiber cleaning procedures.
- c. Replace the far-end transmitting optical (STM-N) card to eliminate the possibility of a degrading transmitter on the far-end optical (STM-N) card.
- d. If the power level still falls below the specified range with the replacement fibers and replacement card, check for one of these three factors that attenuate the power level and affect link loss (LL):
 - Excessive fiber distance; single-mode fiber attenuates at approximately 0.5 dB/km.
 - Excessive number of fiber connectors; connectors take approximately 0.5 dB each.
 - Excessive number of fiber splices; splices take approximately 0.5 dB each.



Note These are typical attenuation values. Refer to the specific product documentation for the actual values or use an optical time domain reflectometer (OTDR) to establish precise link loss and budget requirements.

- Step 5** If no power level shows on the fiber, the fiber is bad or the transmitter on the STM-N port failed.
- a. Check that the Tx and Rx fibers are not reversed. LOS and EOC alarms normally accompany reversed Tx and Rx fibers. Fixing reversed Tx and Rx fibers clears the alarms and restores the signal.
 - b. Clean or replace the OGI fiber fan-out cables. If possible, do this for both the STM-N port you are working on and the far-end STM-N port. Refer to the *Cisco ONS 15600 SDH Procedure Guide* for fiber cleaning procedures.
 - c. Retest the fiber power level.
 - d. If the replacement fiber still shows no power, replace the optical (STM-N) card.



Tip

To prevent overloading the receiver, use an attenuator on the fiber between the STM-N port transmitter and the receiver. Place the attenuator on the receive transmitter of the STM-N ports. Refer to the attenuator documentation for specific instructions.

Crimp Replacement CAT-5 Cables

You can crimp your own CAT-5 cables for use with the ONS 15600 SDH. To connect the CAP of an ONS 15600 SDH directly to your laptop/PC or a router, use a straight-through CAT-5 cable. To connect the CAP of an ONS 15600 SDH to a hub or a LAN switch, use a cross-over CAT-5 cable. To connect an ONS 15600 SDH active TSC card directly to your laptop/PC, you might use either a straight-through or cross-over CAT-5 cable because the RJ-45 port on the faceplate is autosensing.

Use a straight-through or cross-over cable to connect to the backplane Ethernet connections of an ONS 15600 SDH. Use a straight-through cable to connect to the faceplate connector of the ONS 15600 SDH TSC card. Use CAT-5 cable RJ-45 T-568B, Color Code (100 Mbps), and a crimping tool. [Figure 1-20](#) shows the layout of an RJ-45 connector.

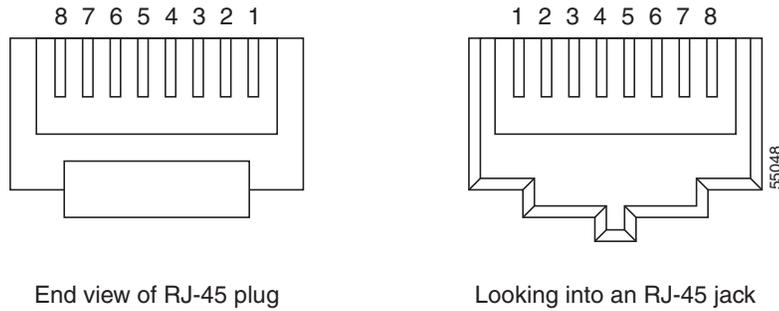
Figure 1-20 RJ-45 Pin Numbers

Figure 1-21 shows the layout of a straight-through cable.

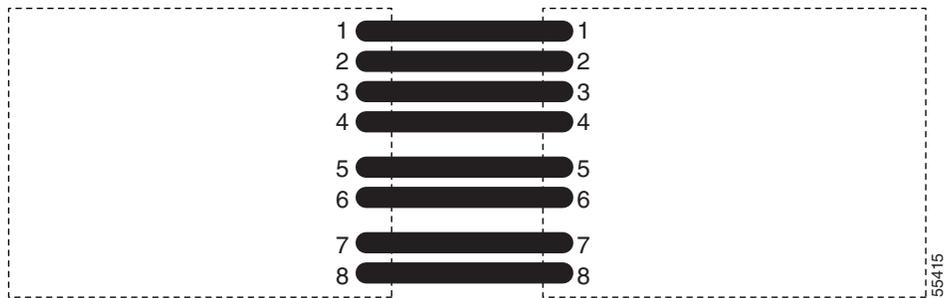
Figure 1-21 Straight-Through Cable Layout

Table 1-27 shows the straight-through cable pinout.

Table 1-27 Straight-Through 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 1-22 shows the layout of a cross-over cable.

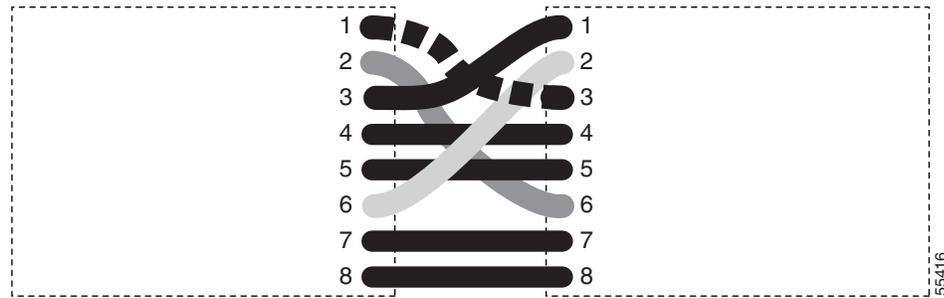
Figure 1-22 Crossover Cable Layout

Table 1-28 shows the cross-over cable pinout.

Table 1-28 Crossover 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.

1.9.3 Optical Traffic Card Transmit and Receive Levels

Each optical traffic card has connectors on its faceplate that contain both transmit and receive ports. Table 1-29 shows the optical power levels for the transmit and receive ports of the optical traffic cards.

Table 1-29 Optical Transmit and Receive Levels

Card	Transmit		Receive	
	Minimum	Maximum	Minimum	Maximum
OC48/STM16 LR16 1550	-2 dBm	+3 dBm	-28 dBm	-9 dBm
OC192/STM64 LR4 1550	+4 dBm	+7 dBm	-22 dBm	-9 dBm
OC48/STM16 SR16 1310	-10 dBm	-3 dBm	-18 dBm	-3 dBm
OC192/STM64 SR4 1310	-6 dBm	-1 dBm	-11 dBm	-1 dBm
OC192/STM64 4 Port ITU C-Band				
ASAP SFPs				

Table 1-29 Optical Transmit and Receive Levels (continued)

Card	Transmit		Receive	
	Minimum	Maximum	Minimum	Maximum
ONS-SE-Z1 (Supports STM-1 SR-1, STM-4 SR-1, STM-16 IR-1, or GE LX)	-5.0 dBm	0 dBm	-23 ¹ -19 ² -18 ³	-3 ¹ -3 ² 0 ³
ONS-SI-155-L2 (Supports STM-1 LR-2)	-15	-8.0	-28	-8
ONS-SI-622-L2 (Supports STM-4 LR-2)	-5.0	0	-34	-10
ONS-SE-2G-L2 (Supports STM-16 LR-2)	-2.0	3.0	-28	-9
ONS-SI-2G-S1 (Supports STM-16, LR-2)	-2.0	3.0	-9	

1. 155.52/622.08 Mbps
2. 1250 Mbps
3. 2488.32 Mbps

The CTC Maintenance > Transceiver tab shows the optical power transmitted (OPT) and optical power received (OPR) levels.

**Note**

CTC might show OPT levels at 1 dBm more or less than the actual card OPT level.

1.10 Power Supply Problems

This section provides the a procedure for troubleshooting power supply difficulties.

**Note**

For information about power consumption for nodes and cards, refer to the *Cisco ONS 15600 SDH Reference Manual*.

Symptom Loss of power or low voltage, resulting in a loss of traffic.

[Table 1-30](#) describes the potential causes of the symptom and the solutions.

Table 1-30 Power Supply Problems

Possible Problem	Solution
A loss of power or low voltage reading.	The ONS 15600 SDH requires a constant source of DC power to properly function. Input voltage range is from -40.5 VDC to -72 VDC.
An improperly connected power supply.	<p>A newly installed ONS 15600 SDH that is not properly connected to its power supply will not operate. Power problems can be confined to a specific ONS 15600 SDH or affect several pieces of equipment on the site.</p> <p>A loss of power or low voltage can result in a loss of traffic.</p> <p>See the “Isolate the Cause of Power Supply Problems” procedure on page 1-77.</p>

**Caution**

Operations that interrupt power supply or short the power connections to the ONS 15600 SDH are service-affecting.

**Warning**

The power supply circuitry for the equipment can constitute an energy hazard. Before you install or replace the equipment, remove all jewelry (including rings, necklaces, and watches). Metal objects can come into contact with exposed power supply wiring or circuitry inside the equipment. This could cause the metal objects to heat up and cause serious burns or weld the metal object to the equipment. Statement 207

**Warning**

Static electricity can damage electro-optical modules. While handling electro-optical module, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment. Statement 312

Isolate the Cause of Power Supply Problems

- Step 1** If a single ONS 15600 SDH show signs of fluctuating power or power loss:
- a. Verify that the -48 VDC power terminals are properly connected to the power distribution unit (PDU).
 - b. Verify that the power cable is in good condition.
 - c. Verify that the power cable connections are properly crimped.
 - d. Verify that 50-A circuit breakers are used in the PDU.
 - e. Verify that the circuit breakers are not blown or tripped.
 - f. Verify that a rack-ground cable attaches to the frame-ground terminal (FGND) on the ONS 15600 SDH. 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 voltage is in the specified range from -40.5 VDC to -72 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.
-