CHAPTER **14**

Add and Remove Nodes

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Note The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN," refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This chapter explains how to add and remove Cisco ONS 15454 nodes from bidirectional line switched rings (BLSRs), path protection configurations, and linear add-drop multiplexer (ADM) networks.

Before You Begin

Before performing any of the following procedures, complete the "NTP-A195 Document Card, Node, and Network Provisioning" procedure on page 8-2. Also investigate all alarms and clear any trouble conditions. Refer to the *Cisco ONS 15454 Troubleshooting Guide* as necessary.

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

1. NTP-A350 Add a BLSR Node, page 14-2—Complete as needed.

2. NTP-A240 Remove a BLSR Node, page 14-7—Complete as needed.

3. NTP-A351 Add a Path Protection Node, page 14-10—Complete as needed.

4. NTP-A294 Remove a Path Protection Node, page 14-13—Complete as needed.

5. NTP-A262 Add a Node to a Linear ADM, page 14-14—Complete as needed to add a node to the end of a linear ADM. This procedure can be used to add a node between two linear ADM nodes, but requires that circuits be deleted and recreated. To add a node without disrupting traffic, use the following procedure.

6. NTP-A323 Add a Node to a Linear ADM Using the Wizard, page 14-16—Complete as needed to add a node between two linear ADM nodes.

7. NTP-A313 Remove an In-Service Node from a Linear ADM, page 14-18—Complete as needed to remove a node from a linear ADM without disrupting traffic.

NTP-A350 Add a BLSR Node

Purpose	This procedure expands a BLSR by adding a node. All nodes in the ring must be on the same software version.
Tools/Equipment	Fiber for new node connections
Prerequisite Procedures	Cards must be installed and node turn-up procedures completed on the node that will be added to the BLSR. See Chapter 2, "Install Cards and Fiber-Optic Cable," and Chapter 4, "Turn Up a Node."
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

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Caution   Adding a BLSR node can be service affecting and should be performed during a maintenance window.

Step 1   Check the software version on the node you are adding to the BLSR from the node view Maintenance > Software subtab. If it is not the same version as the nodes in the ring, you must upgrade or downgrade the new node to the same version as the other nodes in the ring. Refer to the release-specific software upgrade guide for more information on upgrading the ONS node software.

Step 2   Draw a diagram of the BLSR where you will add the node. In the diagram, identify the east and west BLSR OC-N trunk (span) cards that will connect to the new node. This information is essential to complete this procedure without error. Figure 14-1 shows a drawing of a three-node, two-fiber BLSR that uses Slots 5 and 12 for the BLSR trunk cards. The dashed arrow shows the new fiber connections that will be made to add the fourth node to the BLSR.

***Figure 14-1   Three-Node, Two-Fiber BLSR Before a Fourth Node Is Added***
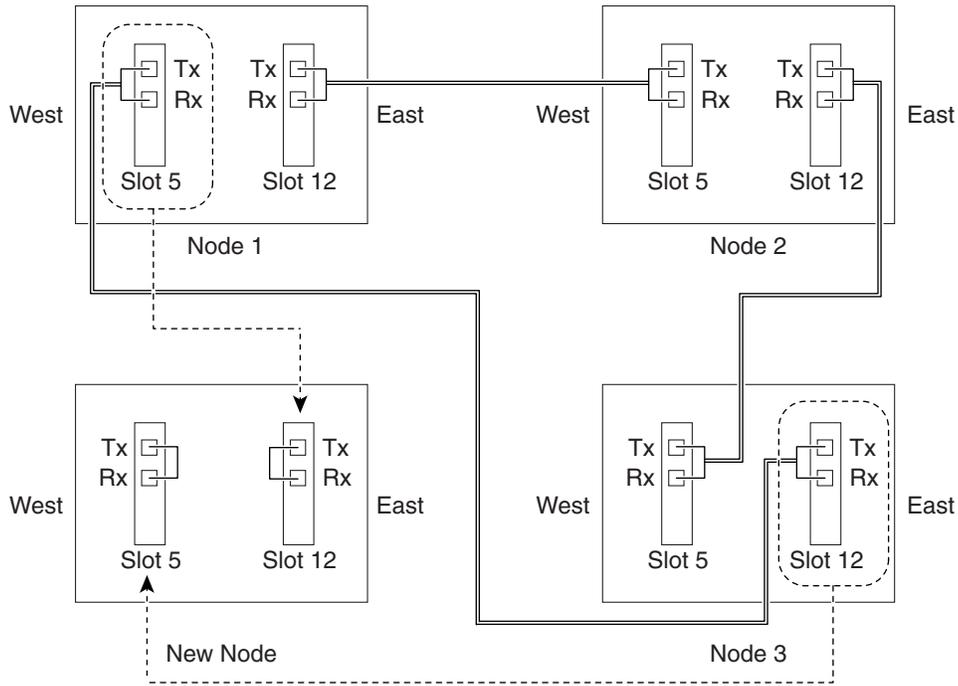
Figure 14-2 shows a sample drawing of a three-node, four-fiber BLSR. The dashed arrow shows the new fiber connections that will be made to add the fourth node. For four-fiber BLSRs, two fiber sets will be reconnected, the working fiber and the protect fiber.

Figure 14-2   Three-Node, Four-Fiber BLSR Before a Fourth Node is Added
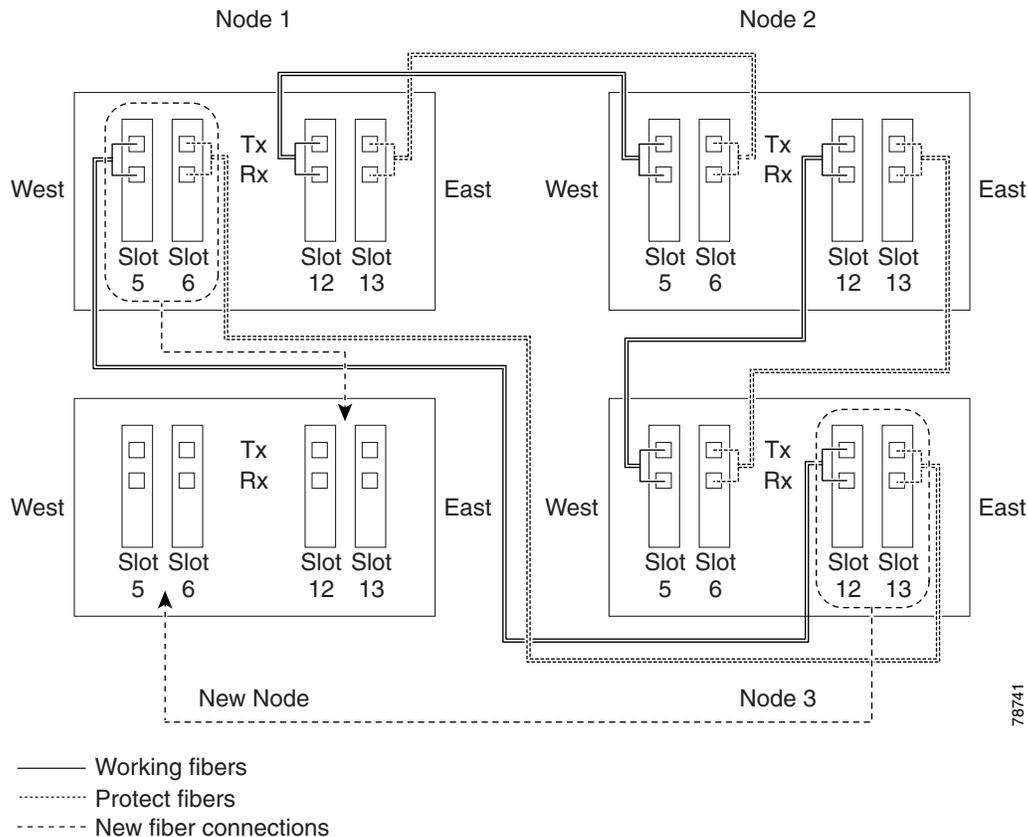
Step 3   According to local site practice, complete the "NTP-A108 Back Up the Database" procedure on page 15-5 for all the nodes in the ring.

Step 4   Verify the card installation on the new node using the "NTP-A323 Verify Card Installation" procedure on page 4-2. Verify that the OC-N cards that will be the BLSR trunk cards match the BLSR optical rate. For example, if the BLSR is OC-48, the new node must have OC-48 cards installed. If the OC-N cards are not installed or the optical rates do not match the BLSR, complete the "NTP-A16 Install Optical Cards and Connectors" procedure on page 2-8.

Step 5   Verify that fiber is available to connect the new node to the existing nodes. Refer to the diagram drawn in Step 2.

Step 6   Complete the "NTP-A35 Verify Node Turn-Up" procedure on page 5-2. In order to have CTC visibility to the new node after it is added, you must be an authorized user on the node and you must have IP connectivity to the node.

Step 7   Create a static route on the new node if the following conditions are present. If the conditions are not present, continue with Step 8.

- The IP address for the new node is on the same subnet as other nodes in the network.
- On the Provisioning > Network > General subtab, the Enable Socks Proxy on Port and External Network Element (ENE) options are not selected under Gateway Settings on the new node.
- A CTC computer is directly connected to the new node.
- CTC computers are directly connected to other nodes on the same subnet.

If these conditions are present, add static routes on the node that will be added to the BLSR, using the following settings:

- Destination IP address: *IP-address-of-the-CTC-computer-connected-to-the-new-node*
- Net Mask: **255.255.255.255**
- Next Hop: *IP-address-of-the-Cisco-ONS-15454*
- Cost: **1**

See the "DLP-A65 Create a Static Route" task on page 17-69. To view gateway settings, see the "DLP-A249 Provision IP Settings" task on page 19-30.

Step 8   Complete the "DLP-A60 Log into CTC" task on page 17-62 at a node in the BLSR.

Step 9   Complete the "DLP-A298 Check the Network for Alarms and Conditions" task on page 19-63 to verify that the BLSR is free of major alarms or problems. If trouble is indicated (for example, a major alarm exists), resolve the problem before proceeding. See Chapter 8, "Manage Alarms" or, if necessary, refer to the *Cisco ONS 15454 Troubleshooting Guide*.

Step 10 From the View menu, choose **Go to Network View** and click the **Provisioning > BLSR** tabs.

Step 11 On paper, record the Ring Name, Ring Type, Line Rate, Ring Reversion, and Span Reversion (4 Fiber).

Step 12 From the Nodes column, record the Node IDs in the BLSR. The Node IDs are the numbers in parentheses next to the node name.

Step 13 Log into the new node:

- If the node has a LAN connection and appears on the network map, from the View menu, choose **Go to Other Node**, then enter the new node.
- If the new node is not connected to the network, log into it using the "DLP-A60 Log into CTC" task on page 17-62.

Step 14 Click the **Alarms** tab.

    a. Verify that the alarm filter is not on. See the "DLP-A227 Disable Alarm Filtering" task on page 19-18 as necessary.

    b. Verify that no unexplained alarms appear on the network. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 Troubleshooting Guide* for procedures.

Step 15 Using the information recorded in Steps 11 and 12 and the diagram created in Step 2, create a BLSR on the new node. See the "DLP-A242 Create a BLSR on a Single Node" task on page 19-24.

Step 16 (Optional.) Create test circuits, making sure they pass through the BLSR trunk cards and run test traffic through the node to ensure the cards are functioning properly. See the "NTP-A344 Create a Manually Routed Optical Circuit" procedure on page 6-45 and the "NTP-A62 Test Optical Circuits" procedure on page 6-51 for information.

Step 17 Create the data communications channel (DCC) terminations on the new node. See the "DLP-A377 Provision Section DCC Terminations" task on page 20-69.

    ✎ **Note**   Creating the DCC terminations causes the SDCC Termination Failure and Loss of Signal alarms to appear. These alarms remains active until you connect the node to the BLSR.

    ✎ **Note**   If you map the K3 byte to another byte (such as E2), you must remap the line cards on either side of the new node to the same byte. See the "DLP-A89 Remap the K3 Byte" task on page 17-84.

Step 18   Complete the "DLP-A60 Log into CTC" task on page 17-62 at a BLSR node that will connect to the new node.

Step 19   Referring to the diagram created in Step 2, complete the "DLP-A303 Initiate a BLSR Force Ring Switch" task on page 20-3 on the node that will connect to the new node on its west line (port). In the Figure 14-2 on page 14-4 example, the BLSR force ring would occur at Node 1, West line (Slot 5 and 6).

Step 20   Referring to the diagram created in Step 2, complete the "DLP-A303 Initiate a BLSR Force Ring Switch" task on page 20-3 on the node that will connect to the new node on its east line (port). In the Figure 14-2 on page 14-4 example, the BLSR force ring would occur at Node 3, East line (Slot 12 and 13).

Step 21   Click the **Alarms** tab.

    a.   Verify that the alarm filter is not on. See the "DLP-A227 Disable Alarm Filtering" task on page 19-18 as necessary.

    b.   Verify that no unexplained alarms appear on the network. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 Troubleshooting Guide* for procedures.

Step 22   Following the diagram created in Step 2, remove the fiber connections from the two nodes that will connect to the new node.

    a.   Remove the west fiber from the node that will connect to the east port of the new node. In the Figure 14-1 on page 14-3 example, this is Node 1, Slot 5, and in Figure 14-2 on page 14-4 this is Node 1, Slots 5 and 6.

    b.   Remove the east fiber from the node that will connect to the west port of the new node. In the Figure 14-1 on page 14-3 example, this is Node 3, Slot 12, and in Figure 14-2 on page 14-4 this is Node 3, Slots 12 and 13.

Step 23   Connect fibers from the adjacent nodes to the new node following the diagram created in Step 2. Connect the west port to the east port and the east port to the west port. For four-fiber BLSRs, connect the protect fibers.

Step 24   After the newly added node appears in network view, double-click it to display the node in node view.

Step 25   Click the **Provisioning > BLSR** tabs.

Step 26   Click **Ring Map**. Verify that the new node appears on the Ring Map with the other BLSR nodes, then click **OK**.

Step 27   From the View menu, choose **Go to Network View** and check the following:

    a.   Click the **Provisioning > BLSR** tabs. Verify that the new node appears under the Node column.

    b.   Click the **Alarms** tab. Verify that BLSR alarms such as RING MISMATCH, E-W MISMATCH, PRC-DUPID (duplicate node ID), and APSCDFLTK (default K) do not appear.

If the new node does not appear in the Node column, or if BLSR alarms are present, log into the new node and verify that the BLSR is provisioned on it correctly with the information from Steps 11 and 12. If the node still does not appear, or if alarms persist, refer to the *Cisco ONS 15454 Troubleshooting Guide*.

Step 28   Click the **Circuits** tab. Wait until all the circuits are discovered. The circuits that pass through the new node will be shown as incomplete.

    ✎ **Note**   If the circuits take more than a minute to appear, log out of CTC, then log back in.

Step 29   In network view, right-click the new node and choose **Update Circuits With The New Node** from the shortcut menu. Verify that the number of updated circuits in the dialog box is correct.

Step 30 If incomplete circuits are still present, refer to the *Cisco ONS 15454 Troubleshooting Guide*.

Step 31 Click the **History** tab. Verify that BLSR_RESYNC conditions appear for every node in the BLSR.

Step 32 Complete the "DLP-A194 Clear a BLSR Force Ring Switch" task on page 18-65 to remove the ring switch from the east and west BLSR lines.

Step 33 According to local site practice, complete the "NTP-A175 Two-Fiber BLSR Acceptance Test" procedure on page 5-13 or the "NTP-A176 Four-Fiber BLSR Acceptance Test" procedure on page 5-15.

Stop. You have completed this procedure.

NTP-A240 Remove a BLSR Node

Purpose	This procedure removes a BLSR ring or multiple BLSR rings from a node.
Tools/Equipment	None
Prerequisite Procedures	NTP-A126 Create a BLSR, page 5-12
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

⚠

Caution The following procedure minimizes traffic outages during node removals. You will delete all circuits that originate and terminate on the node that will be removed. In addition, you will verify that circuits passing through the node do not enter and exit the node on different STSs and/or VTs. If they do, you will delete and recreate the circuits, and traffic will be lost during this time.

Step 1 According to local site practice, complete the "NTP-A108 Back Up the Database" procedure on page 15-5 for all the nodes in the ring.

Step 2 Complete the "DLP-A60 Log into CTC" task on page 17-62 at the node that you are going to remove from the BLSR.

Step 3 Complete the "DLP-A195 Verify Timing in a Reduced Ring" task on page 18-66.

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Note If you remove a node that is the only building integrated timing supply (BITS) for the ring, you also remove the only source of synchronization for all the nodes in that ring. Circuits that leave the ring to connect to other networks synchronized to a Stratum 1 clock will experience a high level of pointer adjustments, which might adversely affect traffic performance.

Step 4 Create a diagram of the BLSR where you will remove the node. You can draw the BLSR manually, or print it from CTC by performing the following steps:

    a. From the View menu, choose **Go to Network View**.

    b. Click the **Provisioning > BLSR** tabs.

    c. Choose the desired BLSR, then click **Edit**.

    d. In the BLSR window, verify that all the port information is visible. If not, press **Ctrl** and drag the node icons to a new location so the information can be viewed.

    e.   Complete the "DLP-A531 Print CTC Data" task on page 22-31.

    f.   Close the BLSR window by choosing **Close** from the File menu.

Step 5   Referring to the BLSR diagram, identify the following:

- The node that is connected through its west port to the target (removal) node. For example, if you were removing Node 4 in Figure 14-3, Node 1 is the node connected through its west port to Node 4.

- The node that is connected through its east port to the target (removal) node. In Figure 14-3, Node 3 is the node connected through its east port to Node 4.

Write down the slot and port of the BLSR ring in the node.

Figure 14-3   *Four-Node, Two-Fiber BLSR Before a Node Is Removed*
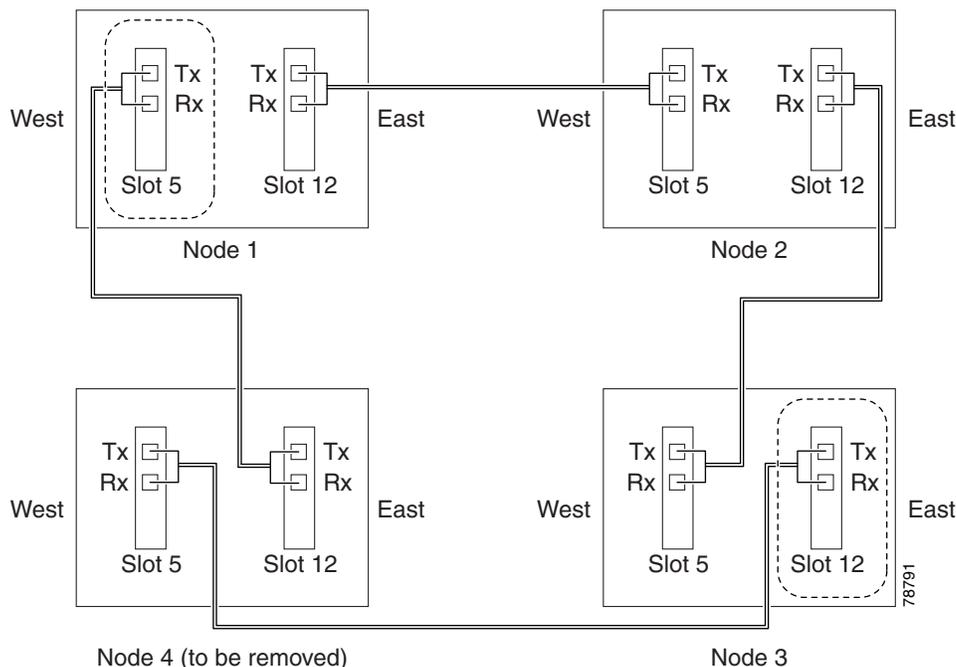
Step 6   Complete the "DLP-A298 Check the Network for Alarms and Conditions" task on page 19-63 to verify that the BLSR is free of alarms. If trouble is indicated (for example, a major alarm exists), resolve the problem before proceeding. See Chapter 8, "Manage Alarms" or, if necessary, refer to the *Cisco ONS 15454 Troubleshooting Guide*.

Step 7   From the View menu, choose **Go to Other Node**. Choose the node that you will remove and click **OK**.

Step 8   Click the **Circuits** tab. If the Scope setting is set to Network, choose **Node** from the Scope drop-down list. Make sure that the Filter button is off (not indented) to ensure that all circuits are visible.

Step 9   Delete all circuits that originate or terminate on the node. See the "DLP-A333 Delete Circuits" task on page 20-21.

Step 10   Complete the "DLP-A442 Verify Pass-Through Circuits" task on page 21-25 to verify that circuits passing through the target node enter and exit the node on the same STS and/or VT. K3 extension byte mapping is supported on all ONS 15600 OC-48 and OC-192 traffic cards, as well as the ONS 15454 OC-48 AS card.

Step 11   From the View menu, choose **Go to Network View**.

Step 12 Referring to the diagram created in Step 4, complete the "DLP-A303 Initiate a BLSR Force Ring Switch" task on page 20-3 at each node that connects to the target (removal) node to force traffic away from it. You must perform a Force switch at each port connected to the target node. For example, in Figure 14-3, you would perform a Force switch on the east port of Node 3 and the west port of Node 1.

Step 13 Click the **Alarms** tab.

    a. Verify that the alarm filter is not on. See the "DLP-A227 Disable Alarm Filtering" task on page 19-18 as necessary.

    b. Verify that no unexplained alarms appear on the network. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 Troubleshooting Guide* for procedures.

Step 14 Remove the fiber connections between the node being removed and the two neighboring nodes.

Step 15 If the two nodes that will be connected after the BLSR node is removed have OC-48 AS trunk (span) cards and their K3 bytes were remapped, complete the "DLP-A422 Verify BLSR Extension Byte Mapping" task on page 21-7. If not, continue with Step 16.

Step 16 Reconnect the fiber of the two neighboring nodes directly, west port to east port. For example, in Figure 14-3, the east port of Node 3 (Slot 12) connects to the west port of Node 1 (Slot 5).

Step 17 Complete the following substeps:

    a. From the View menu, choose **Go to Other Node**. Choose one of the newly connected nodes and click **OK**.

    b. Click the **Provisioning > BLSR** tabs.

    c. Choose the BLSR that originally contained the removed node, and then click **Ring Map**.

    d. Wait until the removed node is no longer listed.

    e. Repeat steps a through d for the other newly connected node in the BLSR.

Step 18 Complete the "DLP-A196 Delete a BLSR from a Single Node" task on page 18-67.

Step 19 Click the **History** tab. Verify that the BLSR_RESYNC condition appears for every node in the BLSR.

Step 20 Complete the "DLP-A194 Clear a BLSR Force Ring Switch" task on page 18-65 to remove the Force protection switches.

Step 21 According to local site practice, complete the "NTP-A175 Two-Fiber BLSR Acceptance Test" procedure on page 5-13.

Step 22 Complete the "DLP-A371 Remove Pass-through Connections" task on page 20-55.

Step 23 Log back into a node on the reduced ring. In the CTC Login dialog box, uncheck the **Disable Network Discovery** check box.

    Note The deleted node will appear in network view until all SDCC terminations are deleted. To delete SDCC terminations, complete the "DLP-A156 Delete a Section DCC Termination" task on page 18-24.

Step 24 Click the **Circuits** tab and verify that no incomplete circuits are present. If incomplete circuits appear, repeat Steps 22 and 23.

Step 25 If you delete a node that was in a login node group, you will see incomplete circuits for that node in the CTC network view. Although it is no longer part of the ring, the removed node still reports to CTC until it is no longer in a login node group. If necessary, complete the "DLP-A372 Delete a Node from a Specified Login Node Group" task on page 20-56.

Step 26 To remove another node from a BLSR, repeat this procedure for the desired node.

Step 27 According to local site practice, complete the "NTP-A175 Two-Fiber BLSR Acceptance Test" procedure on page 5-13 or the "NTP-A176 Four-Fiber BLSR Acceptance Test" procedure on page 5-15.

Stop. You have completed this procedure.

NTP-A351 Add a Path Protection Node

Purpose	This procedure adds a node to a path protection configuration.
Tools/Equipment	None
Prerequisite Procedures	Cards must be installed and node turn-up procedures completed on the node that will be added to the path protection configuration. See Chapter 2, "Install Cards and Fiber-Optic Cable," and Chapter 4, "Turn Up a Node."
	NTP-A44 Provision Path Protection Nodes, page 5-20
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 According to local site practice, complete the "NTP-A108 Back Up the Database" procedure on page 15-5 for all the nodes in the ring.

Step 2 Log into an existing node in the path protection configuration where you want to add a node. See the "DLP-A60 Log into CTC" task on page 17-62 for instructions. In order to have CTC visibility to the new node after it is added, you must be an authorized user on the node and you must have IP connectivity to the node.

Step 3 Complete the "DLP-A298 Check the Network for Alarms and Conditions" task on page 19-63 to verify that the path protection configuration is free of major alarms or problems. If trouble is indicated (for example, a major alarm exists), resolve the problem before proceeding. See the *Cisco ONS 15454 Troubleshooting Guide*, as necessary.

Step 4 Count the total number of circuits on the fiber that is cut between the existing nodes. To count the number of circuits, right click on the fiber that is cut, and click circuits.

Step 5 In network view, click the **Circuits** tab.

To view Partial circuits, click the Filter button and select **PARTIAL** from the **Status** drop-down list. The Partial circuits, if any, are displayed.

To view Partial_TL1 circuits, click the Filter button and select **PARTIAL_TL1** from the **Status** drop-down list. The Partial_TL1 circuits, if any, are displayed.

Resolve any partial circuits (both Partial and Partial_TL1) in the network before proceeding. However, if you want to continue with Step 6, match the number of partial circuits and circuit names that existed before and after adding a path protection node. This ensures that no additional partial circuits are created after this procedure is completed.

Step 6 Verify the card installation on the new node. See the "NTP-A323 Verify Card Installation" procedure on page 4-2. Check that the OC-N cards that will serve as the path protection trunk (span) cards match the path protection optical rate of the trunk cards to which the new node will be connected. For example, if the adjacent nodes have OC-48 trunk cards, the new node must have OC-48 cards installed. If the OC-N cards are not installed or the rate does not match the rate of the adjacent node trunk cards, complete the "NTP-A16 Install Optical Cards and Connectors" procedure on page 2-8 to install them.

Step 7 Verify that fiber is available to connect the new node to the existing nodes.

Step 8 Complete the "NTP-A35 Verify Node Turn-Up" procedure on page 5-2.

Step 9 Create a static route on the new node if the following conditions are present. If the conditions are not present, continue with Step 10.

- The IP address for the new node is on the same subnet as other nodes in the network.
- On the Provisioning > Network > General subtab, the Enable Socks Proxy on Port and External Network Element (ENE) options are not selected under Gateway Settings for the new node.
- A CTC computer is directly connected to the new node.
- CTC computers are directly connected to other nodes on the same subnet.

If these conditions are present, add static routes on the node that will be added to the path protection configuration, using the following settings:

- Destination IP address: *Local-PC-IP-address*
- Net Mask: **255.255.255.255**
- Next Hop: *IP-address-of-the-Cisco-ONS-15600-SDH*
- Cost: **1**

See the "DLP-A65 Create a Static Route" task on page 17-69. To view gateway settings, see the "DLP-A249 Provision IP Settings" task on page 19-30. The gateway settings area provisions the ONS 15600 SDH SOCKS proxy server features.

Step 10 Log into the new node:

- If the node has a LAN connection and appears on the network map, from the View menu, choose **Go to Other Node**, then enter the new node.
- If the new node is not connected to the network, log into it using the "DLP-A60 Log into CTC" task on page 17-62.

Step 11 Click the **Alarms** tab. Verify that no critical or major alarms are present, nor any facility alarms, such as LOS, LOF, AIS-L, SF, and SD. If trouble is indicated (for example, a major alarm exists), resolve the problem before proceeding. See the *Cisco ONS 15454 Troubleshooting Guide*, as necessary.

Step 12 In network view, click the **Circuits** tab.

To view Partial circuits, click the Filter button and select **PARTIAL** from the **Status** drop-down list. The Partial circuits, if any, are displayed.

To view Partial_TL1 circuits, click the Filter button and select **PARTIAL_TL1** from the **Status** drop-down list. The Partial_TL1 circuits, if any, are displayed.

Resolve any partial circuits (both Partial and Partial_TL1) in the network before proceeding. However, if you want to continue with Step 13, match the number of partial circuits and circuit names that existed before and after adding a path protection node. This ensures that no additional partial circuits are created after this procedure is completed.

Step 13 (Optional.) Create test circuits, making sure they pass through the path protection trunk cards, and run test traffic through the node to ensure that the cards are functioning properly. See the "NTP-A344 Create a Manually Routed Optical Circuit" procedure on page 6-45 and the "NTP-A62 Test Optical Circuits" procedure on page 6-51 for information.

Step 14 Create the DCC terminations on the new node. See the "DLP-A377 Provision Section DCC Terminations" task on page 20-69.

Step 15 From the View menu, choose **Go to Network View**.

Step 16   Complete the "DLP-A197 Initiate a Path Protection Force Switch" task on page 18-67 to switch traffic away from the span that will be broken to connect to the new node.

Step 17   Two nodes will connect directly to the new node; remove their fiber connections:

    a.   Remove the east fiber connection from the node that will connect to the west port of the new node.

    b.   Remove the west fiber connection from the node that will connect to the east port of the new node.

Step 18   Replace the removed fibers with the fibers that are connected to the new node.

Step 19   Log out of CTC and log back into a node in the network.

Step 20   From the View menu, choose **Go to Network View** to display the path protection nodes. The new node should appear in the network map. Wait for a few minutes to allow all the nodes to appear.

Step 21   Click the **Circuits** tab and wait for all the circuits to appear, including spans. Count the number of incomplete circuits.

> ✎
> **Note**   UNEQ-P alarms might appear on the nodes in your network; this is normal, and the alarms will clear after the circuits are updated.

Step 22   Ensure that nodes involved in the node addition operation are in the initialized state. This is because, CTC does not consider nodes that are not initialized (they appear as gray icons in the CTC network map) when evaluating the circuits.

> ✎
> **Note**   Step 23 is recommended to be performed only on nodes (the newly added node, and the existing two nodes in the network between which the new node is added) involved in the node addition operation. Disable network discovery while launching CTC, add only those nodes involved in the node addition operation.

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> **Note**   CTC automatically creates VT Tunnels. The cross connects should not be created manually in the intermediate nodes.

> ✎
> **Note**   Step 23 does not create the overlay ring circuits. To create overlay ring circuits that route traffic around multiple rings passing through one or more nodes more than once, see the "NTP-A361 Create an Overlay Ring Circuit" procedure on page 6-97.

Step 23   In the network view, right-click the new node and choose **Update Circuits With New Node** from the shortcut menu. Wait for the confirmation dialog box to appear. Verify that the number of updated circuits in the dialog box is correct (the circuit count should be same as obtained in Step 4).

Step 24   Click the **Circuits** tab and verify that no incomplete circuits are present. However, if the partial circuits still exist in the network, verify whether they were present in Step 5 and Step 12. This will ensure that no additional partial circuits are created by this procedure.

> ✎
> **Note**   If the circuits take more than a minute to appear, log out of CTC, then log back in.

Step 25   Complete the "DLP-A198 Clear a Path Protection Force Switch" task on page 18-68 to clear the protection switch.

Step 26 According to local site practice, complete the "NTP-A177 Path Protection Acceptance Test" procedure on page 5-22.

Stop. You have completed this procedure.

NTP-A294 Remove a Path Protection Node

Purpose	This procedure removes a path protection or multiple path protection configurations from a node.
Tools/Equipment	None
Prerequisite Procedures	NTP-A44 Provision Path Protection Nodes, page 5-20
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

⚠
Caution The following procedure minimizes traffic outages during node removals.

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Caution If you remove a node that is the only BITS timing source for the ring, you also remove the only source of synchronization for all the nodes in that ring. Circuits that connect to other networks that are synchronized to a Stratum 1 clock will experience a high level of pointer adjustments, which might adversely affect customer service.

Step 1 Draw a diagram of the path protection configuration where you will remove the node. In the diagram, identify the following:

- The node that is connected through its west port to the node that will be removed.
- The node that is connected through its east port to the node that will be removed.

Step 2 Complete the "DLP-A60 Log into CTC" task on page 17-62 at a node in the network where you will remove a path protection node.

Step 3 Complete the "DLP-A298 Check the Network for Alarms and Conditions" task on page 19-63 to verify that the path protection configuration is free of alarms. If trouble is indicated (for example, a major alarm exists), resolve the problem before proceeding. See Chapter 8, "Manage Alarms" or, if necessary, refer to the *Cisco ONS 15454 Troubleshooting Guide*.

Step 4 Complete the "DLP-A333 Delete Circuits" task on page 20-21 for circuits that originate or terminate in the node you will remove. (If a circuit has multiple drops, delete only the drops that terminate on the node you are deleting.)

Step 5 Complete the "DLP-A442 Verify Pass-Through Circuits" task on page 21-25 to verify that circuits passing through the target node enter and exit the node on the same STS.

Step 6 Complete the "DLP-A197 Initiate a Path Protection Force Switch" task on page 18-67 for all spans connected to the node you are removing.

Step 7 Remove all fiber connections between the node being removed and the two neighboring nodes.

Step 8 Reconnect the fiber of the two neighboring nodes directly, west port to east port.

Step 9 Exit CTC and log back in. See the "DLP-A60 Log into CTC" task on page 17-62 for instructions.

Step 10 Log into each newly connected node and click the **Alarms** tab. Verify that the span cards are free of alarms. Resolve any alarms before proceeding. Refer to the *Cisco ONS 15454 Troubleshooting Guide*.

Step 11 Complete the "DLP-A195 Verify Timing in a Reduced Ring" task on page 18-66.

Step 12 Complete the "DLP-A198 Clear a Path Protection Force Switch" task on page 18-68 to clear the protection switch.

Step 13 Complete the "NTP-A177 Path Protection Acceptance Test" procedure on page 5-22.

Step 14 Complete the "DLP-A371 Remove Pass-through Connections" task on page 20-55.

Step 15 Log back into a node on the reduced ring. In the CTC Login dialog box, uncheck the **Disable Network Discovery** check box.

> ✎
> **Note** The deleted node will appear in network view until all SDCC terminations are deleted. To delete SDCC terminations, complete the "DLP-A156 Delete a Section DCC Termination" task on page 18-24.

Step 16 Click the **Circuits** tab and verify that no incomplete circuits are present. If incomplete circuits appear, repeat Steps 14 and 15.

Step 17 If you delete a node that was in a login node group, you will see incomplete circuits for that node in the CTC network view. Although it is no longer part of the ring, the removed node still reports to CTC until it is no longer in a login node group. If necessary, complete the "DLP-A372 Delete a Node from a Specified Login Node Group" task on page 20-56.

Step 18 To remove another node from a path protection configuration, repeat this procedure for the desired node.

Stop. You have completed this procedure.

NTP-A262 Add a Node to a Linear ADM

Purpose	This procedure adds a single ONS 15454 node to the end of an ONS 15454 linear add-drop multiplexer (ADM) network. If the linear ADM carries traffic, you cannot add a node between two linear ADM nodes using this procedure unless you delete and recreate the circuits. To avoid deleting and recreating the circuits, use the "NTP-A323 Add a Node to a Linear ADM Using the Wizard" procedure on page 14-16 to add a node between two linear ADM nodes.
Tools/Equipment	None
Prerequisite Procedures	NTP-A38 Provision a Linear ADM Network, page 5-6
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

> ✎
> **Note** Optical transmit and receive levels should be in their acceptable range as shown in the specifications section for each card in Table 2-5 on page 2-19.

Note In a linear ADM configuration, two OC-N cards in 1+1 protection are connected to two OC-N cards in 1+1 protection on a second node. On the second node, two more OC-N cards are connected to a third node. The third node can be connected to a fourth node, and so on, depending on the number of nodes in the linear ADM. Slots 1 to 4 and 14 to 17 or Slots 5 to 6 and 12 to 13 can be used if connections between nodes are consistent. For example, Slot 5 on the first linear ADM node connects to Slot 5 on the second linear ADM node for the working path, and Slot 6 connects to Slot 6 for the protect path. The working OC-N ports have DCC terminations, and the OC-N cards are in a 1+1 protection group.

Step 1 According to local site practice, complete the "NTP-A108 Back Up the Database" procedure on page 15-5 for all the nodes in the ring.

Step 2 At the new node, complete one of the following procedures:

- If the node has not been turned up, complete all procedures in Chapter 4, "Turn Up a Node."

- If the node has been turned up, complete the "NTP-A35 Verify Node Turn-Up" procedure on page 5-2.

Step 3 Verify that the new node has two OC-N cards with the same rate as the linear ADM. If the OC-N cards are not installed, complete the "NTP-A16 Install Optical Cards and Connectors" procedure on page 2-8.

Step 4 Complete "DLP-A73 Create a 1+1 Protection Group" task on page 17-78 for the two OC-N cards that will connect to the linear ADM node.

Step 5 Complete the "DLP-A377 Provision Section DCC Terminations" task on page 20-69 for the working OC-N card at the new node. Make sure to set the port service state in the Create SDCC Termination dialog box to **IS**. (Do not create a DCC termination on the protect card.)

Note DCC failure alarms appear until you create DCC terminations in the linear ADM node and connect the fiber during Step 12.

Step 6 Complete the "DLP-A60 Log into CTC" task on page 17-62 at the linear ADM node that will connect to the new node. If you are already logged in, continue with Step 7.

Step 7 Complete the "DLP-A298 Check the Network for Alarms and Conditions" task on page 19-63.

Step 8 Install the OC-N cards that will connect to the new node. See the "NTP-A16 Install Optical Cards and Connectors" procedure on page 2-8. If the cards are already installed, continue with Step 9.

Step 9 Connect the working card at the existing linear ADM node to the working card at the new node. See the "DLP-A428 Install Fiber-Optic Cables in a 1+1 Configuration" task on page 21-8.

Step 10 Connect the protect card at the existing linear ADM node to the protect card at the new node.

Step 11 Complete the "DLP-A73 Create a 1+1 Protection Group" task on page 17-78 for the two OC-N cards that connect to the new node.

Step 12 Complete the "DLP-A377 Provision Section DCC Terminations" task on page 20-69 for the working OC-N card that connects to the working card on the new node. Make sure to set the port service state in the Create SDCC Termination dialog box to **IS**. (Do not create a DCC termination for the protect card.)

Step 13 From the View menu, choose **Go to Network View.** Verify that the newly created linear ADM configuration is correct. Two green span lines should appear between each linear node.

Step 14 Complete the "DLP-A298 Check the Network for Alarms and Conditions" task on page 19-63 to verify that no unexpected alarms or conditions are present.

Stop. You have completed this procedure.

NTP-A323 Add a Node to a Linear ADM Using the Wizard

Purpose	This procedure adds a node between two nodes in a 1+1 protection group without losing traffic.
Tools/Equipment	Compatible hardware necessary for the upgrade
	Attenuators might be needed for some applications.
Prerequisite Procedures	The in-service topology upgrade procedure requires that the node to be added is reachable (has IP connectivity with CTC). Two technicians who can communicate with each other during the upgrade might be needed if the PC running CTC and the ONS 15454s are not at the same location.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Note OC-N transmit and receive levels should be in their acceptable range as shown in the specifications for each card in Table 2-5 on page 2-19.

Note If overhead circuits exist on the network, an in-service topology upgrade is service affecting. The overhead circuits will drop traffic and have a status of PARTIAL after the upgrade is complete.

Step 1 Complete the "DLP-A60 Log into CTC" task on page 17-62 at a linear ADM node that will connect to the new node. If you are already logged in, continue with Step 2.

Step 2 In network view, right-click the span between the two nodes where you want to add the new node. A dialog appears.

Step 3 Select **Upgrade Protection**. A drop-down list appears.

Step 4 Select **Terminal to Linear** and the first page of the upgrade protection: terminal to linear dialog box appears.

Step 5 The dialog box lists the following conditions for adding a new node:

- The terminal network has no critical or major alarms.

- The node that you will add has no critical or major alarms.

- The node has compatible software version with that of the terminal nodes.

- The node has four unused optical ports matching the speed of the 1+1 protection and no DCC has been provisioned on these four ports.

- Fiber is available to connect the added node to the terminal nodes.

If all of these conditions are met and you wish to continue with the procedure, click **Next**.

> **Note** If you are attempting to add an unreachable node, you must first log in to the unreachable node using a separate CTC session and configure that node. Delete any existing protection groups as described in "DLP-A155 Delete a Protection Group" task on page 18-23. Delete any existing DCC terminations as described in the "DLP-A156 Delete a Section DCC Termination" task on page 18-24 and the "DLP-A359 Delete a Line DCC Termination" task on page 20-45.

Step 6 Enter the node host name or IP address, or choose the name of the new node from the drop-down list. If you type in the name, make sure it is identical to the actual node name. The node name is case sensitive.

Step 7 Click **Next**. The Select Protection Group Ports page (Figure 14-4) appears.

Figure 14-4   Selecting Protection Group Ports
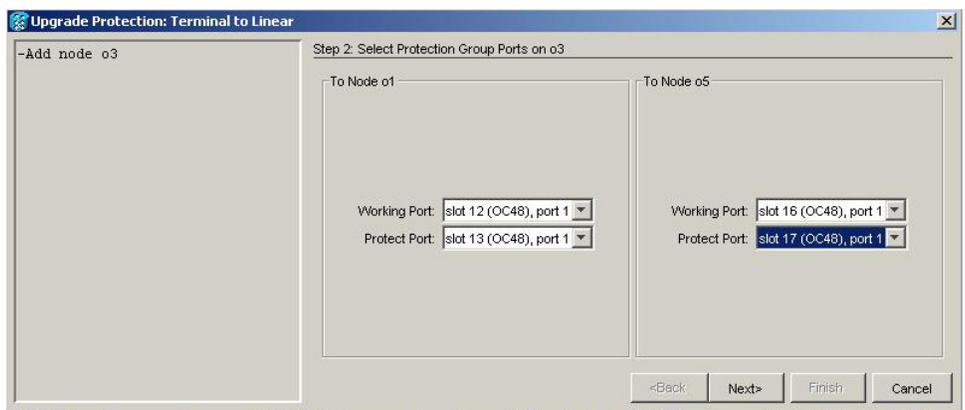
Step 8 From the drop-down lists, select the working and protect ports on the new node that you want to connect to each terminal node.

Step 9 Click **Next**. The Re-fiber the Protected Path dialog box appears (Figure 14-5).

Figure 14-5   Refibering the Protect Path
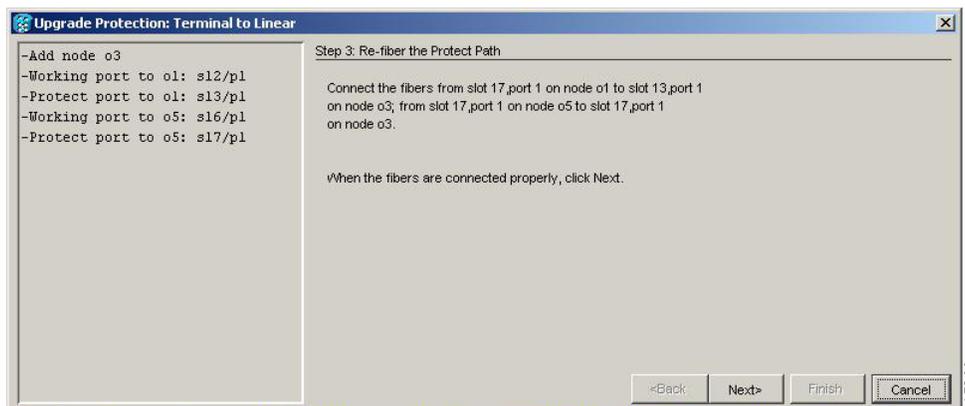
Step 10 Follow the instructions in the dialog box for connecting the fibers between the nodes.

Step 11 When the fibers are connected properly, click **Next**. The Update Circuit(s) on *Node-Name* dialog box appears.

✎

Note   The Back button is not enabled in the wizard. You can click the **Cancel** button at this point and choose the **Yes** button if you want to cancel the upgrade protection procedure. If the procedure fails after you have physically moved the fiber-optic cables, you will need to restore the cables to the original positions and verify through CTC that traffic is on the working path of the nodes before restarting the process. To check traffic status, go to node view and click the **Maintenance > Protection** tabs. In the Protection Groups area, click the 1+1 protection group. You can see the status of the traffic in the Selected Group area.

Step 12   Click **Next** on the Update Circuit(s) on *Node-Name* page to continue with the procedure.

Step 13   The Force Traffic to Protect Path page states that it is about to force the traffic from the working to protect path for the terminal nodes. When you are ready to proceed, click **Next**.

Step 14   Follow each step as instructed by the wizard as it guides you through the process of refibering the working path between nodes and forcing the traffic back to the working path.

Step 15   The Force Traffic to Working Path page states that it is about to force the traffic from the protect to working path for the terminal nodes. When you are ready to proceed, click **Next**.

Step 16   The Completed page appears. This page is the final one in the process. Click **Finish.**

Stop. You have completed this procedure.

NTP-A313 Remove an In-Service Node from a Linear ADM

Purpose	This procedure removes a node from a linear ADM without losing traffic.
Tools/Equipment	None
Prerequisite Procedures	NTP-A38 Provision a Linear ADM Network, page 5-6
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

✎

Note   The 1+1 protection group must be unidirectional in order to delete a node from a linear ADM. If your 1+1 protection group is bidirectional, see the "DLP-A154 Modify a 1+1 Protection Group" task on page 18-23 to change it to unidirectional. After you have removed the node from the linear group, you can change the protection setting back to bidirectional.

Step 1   Complete the "DLP-A60 Log into CTC" task on page 17-62 at a node in the network where you will remove the node.

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

Step 3   Click the **Alarms** tab.

    a.   Verify that the alarm filter is not on. See the "DLP-A227 Disable Alarm Filtering" task on page 19-18 as necessary.

    b.   Verify that no unexplained alarms appear on the network. If unexplained alarms appear, resolve them before continuing. Refer to the *Cisco ONS 15454 Troubleshooting Guide* if necessary.

Step 4 Click the **Conditions** tab. Verify that no unexplained conditions appear on the network. If unexplained conditions appear, resolve them before continuing. Refer to the *Cisco ONS 15454 Troubleshooting Guide* if necessary.

Step 5 On the network map, double-click a node in the 1+1 protection group that is adjacent to the node you intend to remove from the group (the target node).

Step 6 In node view, click the **Maintenance > Protection** tabs.

Step 7 Initiate a Force switch on the working port:

   a. In the Protection Groups area, click the 1+1 protection group.

   b. In the Selected Group area, click the working port.

   c. Next to Switch Commands, click **Force**.

   d. In the Confirm Force Operation dialog box, click **Yes**.

   e. In the Selected Group area, verify that the following appears:

   • Protect port - Protect/Active [FORCE_SWITCH_TO_PROTECT] [PORT STATE]

   • Working port - Working/Standby [FORCE_SWITCH_TO_PROTECT], [PORT STATE]

Step 8 Repeat Step 5 through Step 7 for the node that is connected directly to the other side of the target node.

Step 9 Remove the fiber from the working ports of the target node.

Step 10 Connect the fiber between the working ports of the two nodes that were directly connected to either side of the target node.

Step 11 On the node where you initiated a Force switch in Step 8, clear the switch:

   a. Next to Switch Commands, click **Clear**.

   b. In the Confirm Clear Operation dialog box, click **Yes**.

Step 12 Initiate a Force switch on the protect port:

   a. In the Selected Group area, click the protect port. Next to Switch Commands, click **Force**.

   b. In the Confirm Force Operation dialog box, click **Yes**.

   c. In the Selected Group area, verify that the following appears:

   • Protect port - Protect/Standby [FORCE_SWITCH_TO_WORKING], [PORT STATE]

   • Working port - Working/Active [FORCE_SWITCH_TO_WORKING], [PORT STATE]

Step 13 From the View menu, choose **Go to Network View**.

Step 14 On the network map, double-click the other node where you initiated a Force switch.

Step 15 In node view, click the **Maintenance > Protection** tabs.

Step 16 Clear the Force switch on the working port:

   a. In the Protection Groups area, click the 1+1 protection group.

   b. In the Selected Group area, click the working port.

   c. Next to Switch Commands, click **Clear**.

   d. In the Confirm Clear Operation dialog box, click **Yes**.

Step 17 Complete Step 12 to initiate a Force switch on the protect port.

Step 18 Remove the fiber from the protect ports on the target node.

Step 19 Connect the fiber between the protect ports of the two nodes on each side of the target node.

Step 20   Clear the Force switch:

  a.   Next to Switch Commands, click **Clear**.

  b.   In the Confirm Clear Operation dialog box, click **Yes**.

  c.   In the Selected Group area, verify the following states:

   • Protect port - Protect/Standby

   • Working port - Working/Active

Step 21   Repeat Step 13 through Step 16 to clear the switch on the other node.

Step 22   Exit CTC.

Step 23   Relaunch CTC at any one of the nodes that were adjacent to the target node. The nodes will now show the circuit status as DISCOVERED when checked.

Stop. You have completed this procedure.