This chapter explains how to convert from one SDH topology to another in a Cisco ONS 15454 SDH network. For initial network turn-up, see Turn Up a Network.

Contents

Before You Begin

Before performing any of the following procedures, investigate all alarms and clear any trouble conditions. Refer to the *Cisco ONS 15454 SDH Troubleshooting Guide* as necessary.

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

1. NTP-D338 Convert a Point-to-Point to a Linear ADM Automatically-Complete as needed.
2. NTP-D154 Convert a Point-to-Point to a Linear ADM Manually-Complete as needed if the in-service topology upgrade wizard is not available or you need to back out of the wizard.
3. NTP-D318 Convert an Unprotected Point-to-Point or Linear ADM to a Two-Fiber MS-SPRing Automatically-Complete as needed.
4. NTP-D155 Convert a Point-to-Point or a Linear ADM to a Two-Fiber MS-SPRing Manually-Complete as needed if the in-service topology upgrade wizard is not available or you need to back out of the wizard.
5. NTP-D351 Convert a Point-to-Point or Linear ADM to an SNCP Automatically-Complete as needed.
6. NTP-D156 Convert a Point-to-Point or Linear ADM to an SNCP Manually-Complete as needed if the in-service topology upgrade wizard is not available or you need to back out of the wizard.
7. NTP-D320 Convert an SNCP to a Two-Fiber MS-SPRing Automatically-Complete as needed.
8. NTP-D210 Convert an SNCP to a Two-Fiber MS-SPRing Manually-Complete as needed if the in-service topology upgrade wizard is not available or you need to back out of the wizard.
9. NTP-D211 Convert a Two-Fiber MS-SPRing to a Four-Fiber MS-SPRing Automatically-Complete as needed.
10. NTP-D159 Modify an MS-SPRing-Complete as needed.

NTP-D338 Convert a Point-to-Point to a Linear ADM Automatically

Purpose	This procedure upgrades a point-to-point configuration (two nodes) to a linear add/drop multiplexer (ADM) configuration (three or more nodes) by adding a node to a 1+1 protection group without losing traffic.
Tools/Equipment	Compatible hardware

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	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 Cisco Transport Controller [CTC]). Two technicians who can communicate with each other during the upgrade might be needed if the PC running CTC and the ONS 15454 SDH nodes are not at the same location.
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 Table 2-4.

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.

1. Complete the "DLP-D60 Log into CTC" task at one of the two point-to-point nodes. If you are already logged in, continue with Step 2.
2. In network view, right-click the span between the two nodes where you want to add the new node. A dialog box appears.
3. Select **Upgrade Protection**. A drop-down list appears.
4. Select **Terminal to Linear**. The Upgrade Protection: Terminal to Linear page appear.
5. The Upgrade Protection: Terminal to Linear page 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 the "DLP-D155 Delete a Protection Group" task. Delete any existing SDH DCC terminations as described in the "DLP-D360 Delete a Regenerator-Section DCC Termination" task.
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.
7. When you have the name of the node in the menu, click **Next**. The Select Protection Group Ports page appears (Figure 13-1).
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.

Figure 13-1: Selecting Protection Group Ports
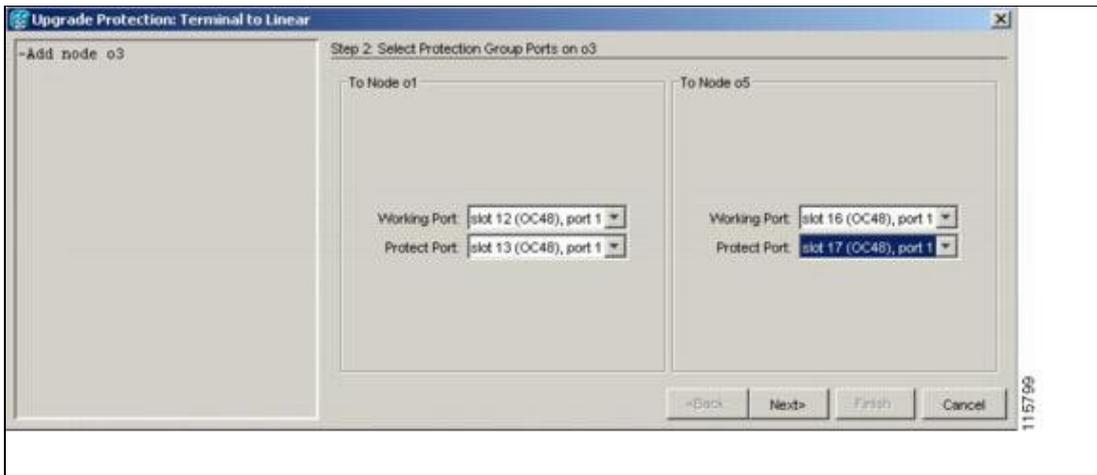
9. Click **Next**. The Re-fiber the Protected Path dialog box appears (Figure 13-2).

Figure 13-2: Refibering the Protect Path
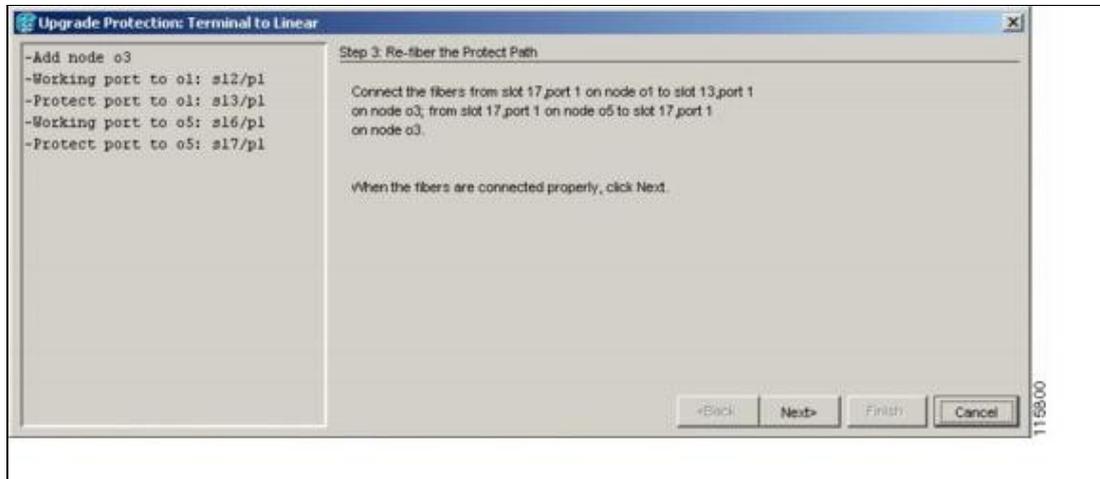
10. Follow the instructions on the page for connecting the fibers between the nodes.
11. When the fibers are connected properly, click **Next**. The Update Circuit(s) on *Node-Name* page appears.

> **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 fiber-optic 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, 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.

12. Click **Next** on the Update Circuit(s) on *Node-Name* page to continue with the procedure.
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**.
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.
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**.
16. The Completed page appears. This page is the final one in the process. Click **Finish**.
17. **Stop. You have completed this procedure.**

Figure 13-1: Selecting Protection Group Ports   3

NTP-D154 Convert a Point-to-Point to a Linear ADM Manually

Purpose	This procedure upgrades a point-to-point configuration (two nodes) to a linear ADM configuration (three or more nodes) manually, that is, without using the in-service topology upgrade wizard. Use this procedure if the wizard is unavailable or you need to back out of the wizard.
Tools/Equipment	None
Prerequisite Procedures	NTP-D124 Provision a Point-to-Point Network
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Caution! This procedure is service-affecting.

Note: Optical transmit and receive levels should be in their acceptable range as shown in Table 2-4.

Note: In a point-to-point configuration, two STM-N cards are connected to two STM-N cards on a second node. The working STM-N ports have data communications channel (DCC) terminations, and the STM-N cards are in a 1+1 protection group.

1. Complete the "DLP-D60 Log into CTC" task at one of the two point-to-point nodes. If you are already logged in, continue with Step 2.
2. Complete the "DLP-D298 Check the Network for Alarms and Conditions" task.
3. Log into the node that will be added to the point-to-point configuration (the new node).
4. Complete the NTP-D24 Verify Card Installation to ensure that the new node has two STM-N cards with the same rate as the point-to-point nodes.
5. Complete the NTP-D35 Verify Node Turn-Up for the new node.
6. Physically connect the fibers between the point-to-point node and the new node. The fiber connections should be connected working card to working card and protect card to protect card.
7. On the new node, create a 1+1 protection group for the STM-N cards that will connect to the point-to-point node. See the "DLP-D73 Create a 1+1 Protection Group" task.
8. Complete the "DLP-D363 Provision Regenerator-Section DCC Terminations" task for the working STM-N cards in the new node that will connect to the linear ADM network. (Alternatively, if additional bandwidth is needed for CTC management, complete the "DLP-D364 Provision Multiplex-Section DCC Terminations" task.) Make sure to set the port administrative state in the Create RS-DCC Termination dialog box to **Unlocked**.
     Note: DCC failure alarms appear until you create DCC terminations in the point-to-point node.
9. Display the point-to-point node that will connect to the new node in CTC node view.
10. Complete the NTP-D24 Verify Card Installation to ensure that the point-to-point node has STM-N cards installed that can connect to the new node.
11. Create a 1+1 protection group for the STM-N cards in the point-to-point node that will connect to the new node. See the "DLP-D73 Create a 1+1 Protection Group" task for instructions.
12. Create DCC terminations on the working STM-N card in the point-to-point node that will connect to the new node. See the "DLP-D363 Provision Regenerator-Section DCC Terminations" task. (Alternatively, if additional bandwidth is needed for CTC management, complete the "DLP-D364 Provision Multiplex-Section DCC Terminations" task.) In the Create RS-DCC Termination dialog box, set the port administrative state to **Unlocked**.
13. From the View menu, choose **Go to Node View** to display the new node in node view.

14. Complete the <u>NTP-D28 Set Up Timing</u> for the new node. If the new node is using line timing, set the working STM-N card as the timing source.
15. From the View menu, choose **Go to Network View** to display the network view to verify that the newly created linear ADM configuration is correct. One green span line should appear between each linear node.
16. Click the **Alarms** tab.
    1. Verify that the alarm filter is not on. See the <u>"DLP-D227 Disable Alarm Filtering"</u> task as necessary.
    2. Verify that no unexplained alarms appear on the network. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 SDH Troubleshooting Guide* for procedures.
17. Repeat the procedure to add an additional node to the linear ADM.
    Stop. You have completed this procedure.

NTP-D318 Convert an Unprotected Point-to-Point or Linear ADM to a Two-Fiber MS-SPRing Automatically

Purpose	This procedure converts an unprotected point-to-point or linear ADM to a two-fiber multiplex section-shared protection ring (MS-SPRing) without disrupting traffic.
Tools/Equipment	None
Prerequisite Procedures	NTP-D44 Provision SNCP Nodes
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note: Before beginning this procedure, you should have a unique ring name to identify the new MS-SPRing and a unique node ID number for each node on the ring.

Note: Before beginning this procedure, optical transmit and receive levels should be in their acceptable range as shown in <u>Table 2-4</u>.

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.

1. Complete the <u>"DLP-D60 Log into CTC"</u> task at a node on the point-to-point or linear ADM. If you are already logged in, continue with Step 2.
2. Complete the <u>"DLP-D298 Check the Network for Alarms and Conditions"</u> task.
3. Complete the <u>"DLP-D155 Delete a Protection Group"</u> task at the nodes that support the point-to-point or linear ADM span.
4. Complete the <u>"DLP-D363 Provision Regenerator-Section DCC Terminations"</u> task at the nodes that support the point-to-point or linear ADM span. (Alternatively, if additional bandwidth is needed for CTC management, complete the <u>"DLP-D364 Provision Multiplex-Section DCC Terminations"</u> task.) Provision the slot in each node that is not already in the RS-DCC Terminations list.
5. In the Tools menu, choose **Topology Upgrade > Convert SNCP to MS-SPRing**.
6. In the Topology Conversion dialog box, set the MS-SPRing properties:
   - Ring Type-(Display only) The default is two-fiber.
   - Speed-Choose the MS-SPRing ring speed: STM-1, STM-16, or STM-64. The speed must match the OC-N speed of the MS-SPRing trunk (span) cards.
     Note: If you are creating an STM-1 MS-SPRing and will eventually upgrade it to STM-16 or STM-64, use the single-port STM-1 cards (OC12 IR/STM4 SH 1310, OC12 LR/STM4 SH 1310, or OC12 LR/STM4 LH 1550).

- ◆ Ring Name-Assign a ring name. The name can be from 1 to 6 characters in length. Any alphanumeric string is permissible, and upper and lower case letters can be combined. Do not use the character string "All" in either upper or lower case letters. This is a TL1 keyword and will be rejected. Do not choose a name that is already assigned to another MS-SPRing.
- ◆ Reversion time-Set the amount of time that will pass before the traffic reverts to the original working path following a ring switch. The default is 5 minutes. Ring reversions can be set to Never.

7. Click **Next**. If the network graphic appears, go to Step 8.

If CTC determines that a MS-SPRing cannot be created, for example, not enough optical cards are installed or it finds circuits with subnetwork connection protection (SNCP) selectors, a "Cannot Create MS-SPRing" message appears. If this occurs, complete the following steps:

1. Click **OK**.
2. In the Create MS-SPRing window, click **Excluded Nodes**. Review the information explaining why the MS-SPRing could not be created, then click **OK**.
3. Depending on the problem, click **Back** to start over or click **Cancel** to cancel the operation.
4. Complete the <u>NTP-D40 Provision MS-SPRing Nodes</u>, making sure all steps are completed accurately, then start this procedure again.

8. In the network graphic, double-click a MS-SPRing span line. If the span line is DCC connected to other MS-SPRing cards that constitute a complete ring, the lines turn blue. If the lines do not form a complete ring, double-click span lines until a complete ring is formed. Click **Next.**

9. The SNCP to MS-SPRing Topology Conversion dialog box appears. The dialog box states that the system is about to force traffic to the shortest SNCP paths. Click **Next** to continue.

10. Another dialog box appears, stating that the force has been applied to the shortest SNCP path. Click **Finish**. If the MS-SPRing window appears with the MS-SPRing you created, go to Step 11.

If a "Cannot Create MS-SPRing" or "Error While Creating MS-SPRing" message appears, complete the following:

1. Click **OK**.
2. In the Create MS-SPRing window, click **Excluded Nodes.** Review the information explaining why the MS-SPRing could not be created, then click **OK**.
3. Depending on the problem, click **Back** to start over or click **Cancel** to cancel the operation.
4. Complete the <u>NTP-D40 Provision MS-SPRing Nodes</u>, making sure all steps are completed accurately, then start this procedure again.

Note: Some or all of the following alarms may briefly appear during MS-SPRing setup: E-W MISMATCH, RING MISMATCH, APSCIMP, APSDFLTK, and MS-SPRingOSYNC.

11. Verify the following:
- ◆ On the network map, a green span line appears between all MS-SPRing nodes.
- ◆ All E-W MISMATCH, RING MISMATCH, APSCIMP, DFLTK, and MS-SPRingOSYNC alarms are cleared.

Stop. You have completed this procedure.

NTP-D155 Convert a Point-to-Point or a Linear ADM to a Two-Fiber MS-SPRing Manually

Purpose	This procedure upgrades a point-to-point configuration (two nodes) or a linear ADM configuration (three or more nodes) to a two-fiber MS-SPRing manually, that is, without using the in-service topology upgrade wizard. Use this procedure if the wizard is unavailable or you need to back out of the wizard.
Tools/Equipment	None
Prerequisite Procedures	NTP-D124 Provision a Point-to-Point Network or

	NTP-D38 Provision a Linear ADM Network
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Caution! This procedure is service affecting.

Note: Optical transmit and receive levels should be in their acceptable range as shown in Table 2-4.

1. Complete the "DLP-D60 Log into CTC" task at one of the nodes that you want to convert from a point-to-point or linear ADM to an MS-SPRing. If you are already logged in, continue with Step 2.
2. According to local site practice, complete the NTP-D108 Back Up the Database for each node in the configuration.
3. Check for alarms and conditions. See the "DLP-D298 Check the Network for Alarms and Conditions" task for instructions.
4. On the network map, right-click a span adjacent to the node you are logged into. A shortcut menu appears.
5. From the shortcut menu, click **Circuits**. The Circuits on Span window appears.
6. Verify that the total number of active VC4 circuits does not exceed 50 percent of the span bandwidth. In the Circuits column, there is a block titled "Unused." This number should exceed 50 percent of the span bandwidth.
   > **Note:** If the span is an STM-16, no more than 8 VC4s can be provisioned on the span. If the span is an STM-64, no more than 32 VC4s can be provisioned on the span. If the span is an STM-4, no more than 2 VC4s can be provisioned on the span.
   > **Caution!** If the first half of the capacity is exceeded, this procedure cannot be completed. Bandwidth must be 50 percent unassigned to convert to an MS-SPRing. Refer to local procedures for relocating circuits if these requirements are not met.
7. Repeat Step 4 through Step 6 for each node in the point-to-point or linear ADM that you will convert to MS-SPRing. When all nodes comply with Step 6, continue with the next step.
8. For every node in the point-to-point or linear ADM network that you want to convert to an MS-SPRing, complete the following tasks:
   1. Complete the "DLP-D189 Verify that a 1+1 Working Slot is Active" task for every 1+1 protection group that supports a span in the point-to-point or linear ADM network.
   2. Complete the "DLP-D155 Delete a Protection Group" task at each node that supports the point-to-point or linear ADM span.
   3. Complete the "DLP-D214 Change the Service State for a Port" task to put the protect ports in the Unlocked-enabled service state at each node that supports the point-to-point or linear ADM span.
9. (Linear ADM only) Physically remove the protect fibers from all nodes in the linear ADM; for example, the fiber running from Node 2/Slot 13 to Node 3/Slot 13 can be removed (Figure 13-3).

Figure 13-3: Linear ADM to MS-SPRing Conversion

Figure 13-3: Linear ADM to MS-SPRing Conversion   7
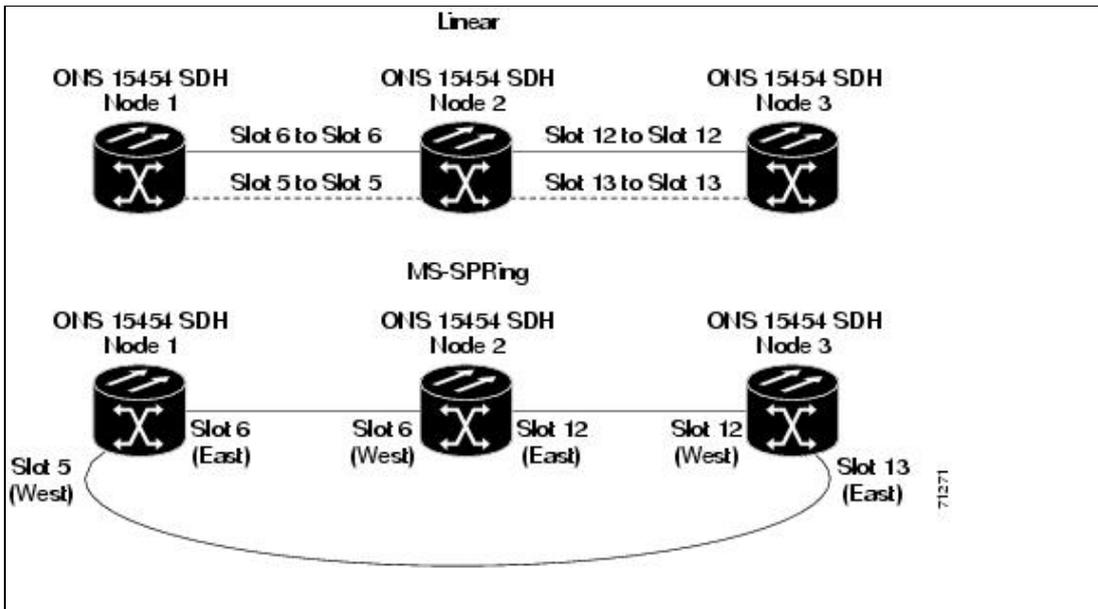
10. Create the ring by connecting the protect fiber from one end node to the protect port on the other end node. For example, the fiber between Node 1/Slot 5 and Node 2/Slot 5 can be rerouted to connect Node 1/Slot 5 to Node 3/Slot 13 (Figure 13-3).

> **Note:** If you need to remove any STM-N cards from the shelf, do so now. In this example, cards in Node 2/Slots 5 and 13 can be removed. See the NTP-D227 Remove and Replace a Card.

11. From network view, click the **Circuits** tabs and complete the "DLP-D147 Export CTC Data" task to save the circuit data to a file on your hard drive.

12. Complete the "DLP-D363 Provision Regenerator-Section DCC Terminations" task at the end nodes; provision the slot in each node that is not already in the RS-DCC Terminations list (in the Figure 13-3 example, Port 1 of Node 1/Slot 5 and Port 1 of Node 3/Slot 13). (Alternatively, if additional bandwidth is needed for CTC management, complete the "DLP-D364 Provision Multiplex-Section DCC Terminations" task.)

13. For circuits provisioned on a VC4 that is now part of the protection bandwidth (VC4s 3 to 4 for an STM-4 MS-SPRing, VC4s 9 to 16 for an STM-16 MS-SPRing, and VC4s 33 to 64 for an STM-64), delete and recreate each circuit:

  1. Complete the "DLP-D27 Delete Circuits" task for one circuit.
  2. Create the circuit on VC4s 1 to 2 for an STM-4 MS-SPRing, 1 to 8 for an STM-16 MS-SPRing, or 1 to 32 for an STM-64 MS-SPRing on the fiber that served as the protect fiber in the linear ADM. See the NTP-D324 Create a Manually Routed High-Order Circuit for instructions.
  3. Repeat SubSteps 1 and 2 for each circuit residing on an MS-SPRing protect VC4.

14. Complete the NTP-D41 Create the MS-SPRing to put the nodes into an MS-SPRing.

Stop. You have completed this procedure.

NTP-D351 Convert a Point-to-Point or Linear ADM to an SNCP Automatically

Purpose	This procedure upgrades a point-to-point or linear ADM to an SNCP without disrupting traffic. You can upgrade synchronous transport signal (STS), Virtual Tributary (VT), and VT tunnel circuits to SNCP. This option is a single circuit operation.

Tools/Equipment	None
Prerequisite Procedures	NTP-D124 Provision a Point-to-Point Network
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note: When upgrading VT tunnels, CTC does not convert the VT tunnel to SNCP, but instead creates a secondary tunnel for the alternate path. The result is two unprotected VT tunnels using alternate paths.

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.

1. Complete the "DLP-D60 Log into CTC" task at a node on the point-to-point or linear ADM. If you are already logged in, continue with Step 2.
2. If the point-to-point or linear ADM is 1+1 protected, complete the "DLP-D155 Delete a Protection Group" task. If the point-to-point or linear ADM is unprotected, continue with Step 3.
3. Complete the "DLP-D363 Provision Regenerator-Section DCC Terminations" task at the nodes that support the point-to-point or linear ADM span. (Alternatively, if additional bandwidth is needed for CTC management, complete the "DLP-D364 Provision Multiplex-Section DCC Terminations" task.) Provision the slot in each node that is not already in the RS-DCC Terminations list.
4. From network or node view, click the **Circuits** tab. Click the circuit you want to upgrade.
5. From the Tools menu, choose **Topology Upgrade > Convert Unprotected to SNCP**.
6. To set the SNCP parameters, complete the "DLP-D218 Provision SNCP Ring Selectors During Circuit Creation" task.
   > **Note:** When upgrading point-to-point or linear ADM circuits to an SNCP topology, a traffic hit of greater than 300 ms occurs if the "Provision working go & return on primary path" routing option is not checked in the Circuit Attributes pane.
7. Click **Next**.
8. Complete one of the following tasks:
   1. To route the new SNCP circuit automatically, complete the "DLP-D471 Automatically Route an SNCP Circuit for a Topology Upgrade" task.
   2. To route the new SNCP circuit manually, complete the "DLP-D470 Manually Route an SNCP Circuit for a Topology Upgrade" task.
      Stop. You have completed this procedure.

NTP-D156 Convert a Point-to-Point or Linear ADM to an SNCP Manually

Purpose	This procedure upgrades a point-to-point or linear ADM configuration to a SNCP ring manually, that is, without using the in-service topology upgrade wizard. Use this procedure if the wizard is unavailable or you need to back out of the wizard.
Tools/Equipment	None
Prerequisite Procedures	NTP-D124 Provision a Point-to-Point Network or NTP-D38 Provision a Linear ADM Network
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution! This procedure is service affecting. All circuits are deleted and reprovisioned.

1. Complete the <u>"DLP-D60 Log into CTC"</u> task at a node on the point-to-point or linear ADM. If you are already logged in, continue with Step 2.
2. Complete the <u>"DLP-D298 Check the Network for Alarms and Conditions"</u> task.
3. Complete the <u>"DLP-D189 Verify that a 1+1 Working Slot is Active"</u> task for each node.
4. Complete the <u>"DLP-D155 Delete a Protection Group"</u> task for each 1+1 protection group that supports the point-to-point or linear ADM span.
5. Complete the <u>"DLP-D363 Provision Regenerator-Section DCC Terminations"</u> task at the protect cards in all nodes that will be part of the SNCP ring. Alternatively, if additional bandwidth is needed for CTC management, complete the <u>"DLP-D364 Provision Multiplex-Section DCC Terminations"</u> task.
6. Complete the <u>"DLP-D27 Delete Circuits"</u> task and the <u>NTP-D323 Create an Automatically Routed High-Order Circuit</u> to delete and recreate the circuits one at a time.

Note: If you want to add additional nodes to the SNCP, see the <u>NTP-D360 Add an SNCP Node</u>.

Note: An SNCP is the default configuration if the cards installed are installed and the DCCs are configured.

Stop. You have completed this procedure.

NTP-D320 Convert an SNCP to a Two-Fiber MS-SPRing Automatically

Purpose	This procedure converts a SNCP to a two-fiber MS-SPRing without disrupting traffic.
Tools/Equipment	None
Prerequisite Procedures	<u>NTP-D44 Provision SNCP Nodes</u>
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note: Open-ended SNCP and SNCP dual-ring interconnect (DRI) configurations do not support in-service topology upgrades.

Note: Before beginning this procedure, you should have a unique ring name to identify the new MS-SPRing and a unique node ID number for each node on the ring.

Note: Before beginning this procedure, optical transmit and receive levels should be in their acceptable range as shown in <u>Table: Optical Card Transmit and Receive Levels</u>.

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.

1. Complete the <u>"DLP-D60 Log into CTC"</u> task at a node on the SNCP. If you are already logged in, continue with Step 2.
2. Complete the <u>"DLP-D298 Check the Network for Alarms and Conditions"</u> task.
3. From the Tools menu, choose **Topology Upgrade > Convert SNCP to MS-SPRing**.
4. In the SNCP to MS-SPRing Topology Conversion dialog box, set the MS-SPRing properties:
   - ◆ Ring Type-(Display only) The default is two-fiber.

♦ Speed-Choose the MS-SPRing ring speed: **STM-1**, **STM-16**, or **STM-64**. The speed must match the OC-N speed of the MS-SPRing trunk (span) cards.
Note: If you are creating an STM-1 MS-SPRing and will eventually upgrade it to STM-16 or STM-64, use the single-port STM-1 cards (OC12 IR/STM4 SH 1310, OC12 LR/STM4 SH 1310, or OC12 LR/STM4 LH 1550).

♦ Ring Name-Assign a ring name. The name can be from 1 to 6 characters in length. Any alphanumeric string is permissible, and upper and lower case letters can be combined. Do not use the character string "All" in either upper or lower case letters. This is a TL1 keyword and will be rejected. Do not choose a name that is already assigned to another MS-SPRing.

♦ Reversion time-Set the amount of time that will pass before the traffic reverts to the original working path following a ring switch. The default is 5 minutes. Ring reversions can be set to Never.

5. Click **Next**. If the SNCP to MS-SPRing Topology Conversion dialog box with the network graphic appears, go to Step 6.

If CTC determines that a MS-SPRing cannot be created, for example, not enough optical cards are installed or it finds circuits with SNCP selectors, a "Cannot Create MS-SPRing" message appears. If this occurs, complete the following steps:

1. Click **OK**.
2. In the Create MS-SPRing window, click **Excluded Nodes**. Review the information explaining why the MS-SPRing could not be created, then click **OK**.
3. Depending on the problem, click **Back** to start over or click **Cancel** to cancel the operation.
4. Complete the NTP-D40 Provision MS-SPRing Nodes, making sure all steps are completed accurately, then start this procedure again.

6. In the network graphic, double-click a MS-SPRing span line. If the span line is DCC connected to other MS-SPRing cards that constitute a complete ring, the lines turn blue. If the lines do not form a complete ring, double-click span lines until a complete ring is formed. Click **Next.**

7. The next SNCP to MS-SPRing Topology Conversion page appears. The page states that the system is about to force traffic to the shortest SNCP paths. Click **Next** to continue.

8. Another page appears, stating that the force has been applied to the shortest SNCP path. Click **Finish**.

If the MS-SPRing window appears with the MS-SPRing you created, go to Step 9. If a "Cannot Create MS-SPRing" or "Error While Creating MS-SPRing" message appears, complete the following:

1. Click **OK**.
2. In the Create MS-SPRing window, click **Excluded Nodes.** Review the information explaining why the MS-SPRing could not be created, then click **OK**.
3. Depending on the problem, click **Back** to start over or click **Cancel** to cancel the operation.
4. Complete the NTP-D40 Provision MS-SPRing Nodes, making sure all steps are completed accurately, then start this procedure again.
Note: Some or all of the following alarms might briefly appear during MS-SPRing setup: E-W MISMATCH, RING MISMATCH, APSCIMP, APSDFLTK, and MS-SPRingOSYNC.

9. Verify the following:
♦ On the network view graphic, a green span line appears between all MS-SPRing nodes.
♦ All E-W MISMATCH, RING MISMATCH, APSCIMP, DFLTK, and MS-SPRingOSYNC alarms are cleared. Refer to the *Cisco ONS 15454 SDH Troubleshooting Guide* for alarm troubleshooting.
Stop. You have completed this procedure.

NTP-D210 Convert an SNCP to a Two-Fiber MS-SPRing Manually

Purpose	This procedure converts an SNCP to an MS-SPRing manually, that is, without using the in-service topology upgrade wizard. Use this procedure if the wizard

	is unavailable or you need to back out of the wizard.
Tools/Equipment	None
Prerequisite Procedures	NTP-D44 Provision SNCP Nodes
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution! This procedure is service affecting. All circuits on the ring are deleted and reprovisioned.

Caution! Read through this procedure completely before beginning the conversion.

Note: Prior to beginning this procedure, you should have a unique ring ID name to identify the new MS-SPRing and a unique node ID number for each node on the ring.

Note: Prior to beginning this procedure, optical transmit and receive levels should be in their acceptable range as shown in Table: Optical Card Transmit and Receive Levels.

1. Log into an ONS 15454 SDH on the network where you will begin the ring conversion. See the "DLP-D60 Log into CTC" task. If you are already logged in, continue with Step 2.
2. Complete the "DLP-D298 Check the Network for Alarms and Conditions" task.
3. On the network map, right-click a span adjacent to the node you are logged into. A shortcut menu appears.
4. From the shortcut menu, click **Circuits**. The Circuits on Span window appears.
5. Verify that the total number of active VC4 circuits does not exceed 50 percent of the span bandwidth. In the Circuits column, there is a block titled "Unused." This number should exceed 50 percent of the span bandwidth.
   > **Note:** If the span is an STM-16, no more than 8 VC4s can be provisioned on the span. If the span is an STM-64, no more than 32 VC4s can be provisioned on the span. If the span is an STM-4, no more than 2 VC4s can be provisioned on the span.
   > **Caution!** If the first half of the capacity is exceeded, this procedure cannot be completed. Bandwidth must be 50 percent unassigned to convert to MS-SPRing. Refer to your site plan for relocating circuits if these requirements are not met.
6. Repeat Steps 1 to 5 for each node in the SNCP that you will convert to an MS-SPRing. When all nodes comply with Step 5, continue with the next step.
7. Save all circuit information:
   1. In network view, click the **Circuits** tab.
   2. Record the circuit information using one of the following options:
      ◊ From the File menu, click **Print** to print the circuits table. See the "DLP-D146 Print CTC Data" task.
      ◊ From the File menu, click **Export** and choose the data format: HTML, CSV (comma separated values), or TSV (tab separated values). Click **OK** and save the file in a temporary directory. See the "DLP-D147 Export CTC Data" task.
8. Delete the circuits:
   > **Note:** This method uses the network view. To delete circuits one at a time from each node, see the "DLP-D27 Delete Circuits" task.
   1. In network view, click the **Circuits** tab. All circuits on the ring appear.
   2. With the **Ctrl** key pressed, click each circuit. Each line turns dark blue as it is selected.
   3. After all circuits have been selected, click **Delete**. Allow several minutes for processing; the actual length of time depends on the number of circuits in the network.
9. Complete the NTP-D41 Create the MS-SPRing to create the MS-SPRing.
10. To recreate the circuits, see Create Circuits and Low-Order Tunnels. and choose the applicable procedure for the circuit type you want to enter.

Note: To add additional nodes to an MS-SPRing, see the <u>NTP-D359 Add an MS-SPRing Node</u>.

Stop. You have completed this procedure.

NTP-D211 Convert a Two-Fiber MS-SPRing to a Four-Fiber MS-SPRing Automatically

Purpose	This procedure upgrades a two-fiber MS-SPRing to a four-fiber MS-SPRing without disrupting traffic. The conversion will be easier if the same east and west configuration is used on all nodes being upgraded.
Tools/Equipment	None
Prerequisite Procedures	<u>NTP-D41 Create the MS-SPRing</u>
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Note: Two-fiber STM-16 or STM-64 MS-SPRings can be converted to four-fiber MS-SPRings. To convert, you install two additional STM-16 or STM-64 cards at each two-fiber MS-SPRing node, then log into CTC and convert the MS-SPRing from two-fiber to four-fiber. The fibers that were divided into working and protect bandwidths for the two-fiber MS-SPRing are now fully allocated for working MS-SPRing traffic. A span upgrade can be performed prior to the two-fiber to four-fiber MS-SPRing conversion.

Note: MS-SPRing protection channel access (PCA) circuits, if present, will remain in their existing VC4s. Therefore, they will be located on the working path of the four-fiber MS-SPRing and will have full MS-SPRing protection. To route PCA circuits on protection channels in the four-fiber MS-SPRing, delete and recreate the circuits after the upgrade. For example, if you upgrade a two-fiber STM-16 MS-SPRing to four-fiber, PCA circuits on the protection VC4s (VCs 8 to 16) in the two-fiber MS-SPRing will remain in their existing VC4s, which are working VC4s in the four-fiber MS-SPRing. Deleting and recreating the STM-16 PCA circuits moves the circuits to VC4s 1 to 7 in the protect bandwidth of the four-fiber MS-SPRing. To delete circuits, see the <u>NTP-D288 Modify and Delete Overhead Circuits and Server Trails</u>. To create circuits, see <u>Create Circuits and Low-Order Tunnels</u>.

Note: Before beginning this procedure, optical transmit and receive levels should be in their acceptable range as shown in <u>Table 2-4</u>.

Note: If you use source and drop cards that are already carrying traffic to upgrade a two-fiber MS-SPRing to a four-fiber MS-SPRing, the APSC-IMP alarms will generate and remain outstanding.

1. Complete the <u>"DLP-D60 Log into CTC"</u> task at one of the two-fiber nodes that you want to convert.
2. Complete the <u>"DLP-D298 Check the Network for Alarms and Conditions"</u> task.
3. Complete the <u>NTP-D16 Install STM-N Cards and Connectors</u> to install two STM-16 or STM-64 cards at each MS-SPRing node. You must install the same STM-N card rate as the two-fiber MS-SPRing.
4. Connect the fiber to the new cards. Use the same east-west connection scheme that was used to create the two-fiber connections. See the <u>"DLP-D338 Install Fiber-Optic Cables for MS-SPRing Configurations"</u> task.
5. Complete the <u>"DLP-D214 Change the Service State for a Port"</u> task to put the ports in the Unlocked-enabled service state on each new STM-N card.
6. Test the new fiber connections using procedures standard for your site.
7. Convert the MS-SPRing:
   1. From the View menu, choose **Go to Network View**. Click the **Provisioning > MS-SPRing** tabs.

2. Choose the two-fiber MS-SPRing you want to convert, then click the **Upgrade to 4 Fiber** button.
3. In the Upgrade MS-SPRing dialog box, set the amount of time that will pass before the traffic reverts to the original working path after the condition that caused the switch has been resolved. The default is 5 minutes.
4. Click **Next**.
5. Assign the east and west protection ports:
   ◊ West Protect-Select the west MS-SPRing port that will connect to the west protect fiber from the drop-down list.
   ◊ East Protect-Select the east MS-SPRing port that will connect to the east protect fiber from the drop-down list.
6. Click **Finish**.
8. Click the **Alarms** tab.
   1. Verify that the alarm filter is not on. See the "DLP-D227 Disable Alarm Filtering" task as necessary.
   2. Verify that no unexplained alarms appear on the network. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 SDH Troubleshooting Guide* for procedures.
9. Complete the NTP-D342 Four-Fiber MS-SPRing Acceptance Test.
   Stop. You have completed this procedure.

NTP-D159 Modify an MS-SPRing

Purpose	This procedure changes an MS-SPRing ring ID, node ID, or ring and span reversion times.
Tools/Equipment	None
Prerequisite Procedures	DLP-D468 Create a Two-Fiber MS-SPRing Using the MS-SPRing Wizard
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

1. Complete the "DLP-D60 Log into CTC" task at a node in the MS-SPRing that you want to modify. If you are already logged in, continue with Step 2.
2. Complete the "DLP-D298 Check the Network for Alarms and Conditions" task for instructions.
   Note: Some or all of the following alarms appear during MS-SPRing setup: E-W MISMATCH, RING MISMATCH, APSCIMP, APSDFLTK, and MSSP-OSYNC. The alarms clear after you configure all the nodes in the MS-SPRing. For definitions of these alarms, see the *Cisco ONS 15454 SDH Troubleshooting Guide*.
3. To change the MS-SPRing ring name or the ring or span reversion times, complete the following steps. If you want to change a node ID, continue with Step 4.
   1. Switch to network view and click the **Provisioning > MS-SPRing** tabs.
   2. Click the MS-SPRing you want to modify and click **Edit**.
   3. In the MS-SPRing window, change any of the following:
      ◊ Ring Name-If needed, change the MS-SPRing ring name. The name can be from 1 to 6 characters in length. The alphanumeric character strings that can be used are 0 to 9 and A to Z. You can combine numbers and letters and use upper or lower case letters. Do not use the character string "All" in either upper or lower case letters because it is a TL1 keyword. Do not choose a name that is already assigned to another MS-SPRing.

◊ Reversion time-If needed, change the amount of time that will pass before the traffic reverts to the original working path after a ring switch.

◊ Span Reversion-(Four-fiber MS-SPRings only) If needed, change the amount of time that will pass before the traffic reverts to the original working path after a span switch.

4. Click **Apply**.

5. If you changed the ring name, the MS-SPRing window closes automatically. If you only changed a reversion time, close the window by choosing **Close** from the File menu.

4. As needed complete the "DLP-D24 Change an MS-SPRing Node ID" task; otherwise, continue with Step 5.

5. In network view, verify the following:

♦ A green span line appears between all MS-SPRing nodes.

♦ All E-W MISMATCH, RING MISMATCH, APSCIMP, DFLTK, MSSP-OSYNC, and Node ID Mismatch alarms are cleared.
Note: For definitions of these alarms, see the *Cisco ONS 15454 SDH Troubleshooting Guide*.
Stop. You have completed this procedure.