This chapter explains how to upgrade cross-connect cards and optical spans (speeds) within a ring or protection group for the Cisco ONS 15454 SDH.

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Before You Begin

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

1. NTP-D234 Upgrade the XC-VXL-2.5G Card to the XC-VXL-10G or XC-VXC-10G Card-Complete as needed.
2. NTP-D333 Upgrade the XC-VXL-10G Card to the XC-VXC-10G Card-Complete as needed.
3. NTP-D314 Upgrade the TCC2 Card to the TCC2P Card-Complete as needed.
4. NTP-D94 Upgrade STM-N Cards and Spans Automatically-Complete this procedure as needed to upgrade optical cards within subnetwork connection protection (SNCP) rings, multiplex section-shared protection rings (MS-SPRings), and 1+1 protection groups.
5. NTP-D95 Upgrade Optical Spans Manually-Complete this procedure as needed to perform error recovery for the Span Upgrade Wizard or to back out of a span upgrade (downgrade).

NTP-D234 Upgrade the XC-VXL-2.5G Card to the XC-VXL-10G or XC-VXC-10G Card

Purpose	This procedure upgrades XC-VXL-2.5G cards to XC-VXL-10G or XC-VXC-10G cards.
Tools/Equipment	Replacement cards
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Maintenance or higher

Note: This procedure applies only to XC-VXL-2.5G cards that are installed in nodes running Software R4.0 and later, R6.0 if upgrading to the XC-VXC-10G cards.

Note: The XC-VXL-2.5G card works only with card speeds up to STM-16.

Note: The UNEQ-P alarm is raised during a cross-connect card upgrade if you have E100T-12 or E1000-2 cards installed in the node. The alarm will clear within a few seconds.

Caution! Always upgrade the standby cross-connect card. Removing an active cross-connect card can cause a protection switch unless a lockout is in place. If the standby card is being upgraded, a lockout is unnecessary.

1. Complete the "DLP-D60 Log into CTC" task. If you are already logged in, continue with Step 2.
2. Determine the standby XC-VXL-2.5G card. The ACT/STBY LED of the standby XC-VXL-2.5G card is amber, and the ACT/STBY LED of the active XC-VXL-2.5G card is green.

   Note: You can also place the cursor on the card graphic in Cisco Transport Controller (CTC) to display a pop-up that identifies the card as Active or Standby.
3. Physically replace the standby XC-VXL-2.5G card on the shelf with an XC-VXL-10G or XC-VXC-10G card:
   1. Open the XC-VXL-2.5G card ejectors.
   2. Slide the card out of the slot. This raises the IMPROPRMVL alarm, which will clear when the upgrade is complete.
   3. Open the ejectors on the XC-VXL-10G or XC-VXC-10G card.
   4. Slide the XC-VXL-10G or XC-VXC-10G card into the slot along the guide rails.
   5. Close the ejectors.

      On the XC-VXL-10G or XC-VXC-10G card, the fail LED above the ACT/STBY LED becomes red, blinks for some time (20 to 30 seconds), and turns off. The ACT/STBY LED turns amber and remains illuminated.
4. In node view, click the **Maintenance > Cross-Connect** tabs.
5. From the Cross Connect Cards drop-down list, choose **Switch**.
6. Click **Yes** in the Confirm Switch dialog box. Traffic switches to the XC-VXL-10G or XC-VXC-10G card that you inserted in Step 3. The ACT/STBY LED on this card changes from amber to green.

   Note: A switch generated on the XC-VXC-10G that is initiated from CTC is hitless.

   Note: The Interconnection Equipment Failure alarm appears, but it will clear when the upgrade procedure is complete and the node has matching cross-connect cards installed.
7. Physically remove the now standby XC-VXL-2.5G card from the shelf and insert the second XC-VXL-10G or XC-VXC-10G card into the empty cross-connect slot:
   1. Open the XC-VXL-2.5G card ejectors.
   2. Slide the XC-VXL-2.5G card out of the slot.
   3. Open the ejectors on the XC-VXL-10G or XC-VXC-10G card.
   4. Slide the XC-VXL-10G or XC-VXC-10G card into the slot along the guide rails.
   5. Close the ejectors.

      The upgrade is complete when the second XC-VXL-10G or XC-VXC-10G card boots up and becomes the standby XC-VXL-10G or XC-VXC-10G card.

      Note: After you change out the first card, CTC continues to display the XC-VXL-2.5G card in both slots. The display does not change to reflect the XC-VXC-10G cards until the second card is upgraded and the XC-VXC-10G card in that slot boots up.

Stop. You have completed this procedure.

NTP-D333 Upgrade the XC-VXL-10G Card to the XC-VXC-10G Card

Purpose	This procedure upgrades the XC-VXL-10G card to the XC-VXC-10G card.
Tools/Equipment	Replacement cards
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Maintenance or higher

Note: This procedure applies only to XC-VXL-10G cards that are installed in nodes running Software R6.0 and later.

Note: The UNEQ-P alarm is raised during a cross-connect card upgrade if you have E100T-12 or E1000-2 cards installed in the node. The alarm will clear within a few seconds.

Caution! Always upgrade the standby cross-connect card. Removing an active cross-connect card can cause a protection switch unless a lockout is in place. If the standby card is being upgraded, a lockout is unnecessary.

1. Complete the "DLP-D60 Log into CTC" task. If you are already logged in, continue with Step 2.
2. Determine the standby XC-VXL-10G card. The ACT/STBY LED of the standby XC-VXL-10G card is amber, and the ACT/STBY LED of the active XC-VXL-10G card is green.
   Note: You can also place the cursor on the card graphic in CTC to display a pop-up that identifies the card as **Active** or **Standby**.
3. Physically replace the standby XC-VXL-10G card on the shelf with an XC-VXC-10G card:
   1. Open the XC-VXL-10G card ejectors.
   2. Slide the card out of the slot. This raises the IMPROPRMVL alarm, which will clear when the upgrade is complete.
   3. Open the ejectors on the XC-VXC-10G card.
   4. Slide the XC-VXC-10G card into the slot along the guide rails.
   5. Close the ejectors.
      On the XC-VXC-10G card, the fail LED above the ACT/STBY LED becomes red, blinks for some time (20 to 30 seconds), and turns off. The ACT/STBY LED turns amber and remains illuminated.
4. In node view, click the **Maintenance > Cross-Connect** tabs.
5. From the Cross Connect Cards drop-down list, choose **Switch**.
   Note: When upgrading from XC-VXL-10G Card to the XC-VXC-10G card with Path Protection circuits and a cross connect side switch is performed, the path protected circuits may switch from a working to protect path causing traffic hit.
6. Click **Yes** on the Confirm Switch dialog box. Traffic switches to the XC-VXC-10G card that you inserted in Step 3. The ACT/STBY LED on this card changes from amber to green.
   Note: A switch generated on the XC-VXC-10G that is initiated from CTC is hitless.
   Note: The Interconnection Equipment Failure alarm appears, but it will clear when the upgrade procedure is complete and the node has matching cross-connect cards installed.
7. Physically remove the now standby XC-VXL-10G card from the shelf and insert the second XC-VXC-10G card into the empty cross-connect slot:
   1. Open the XC-VXL-10G card ejectors.
   2. Slide the XC-VXL-10G card out of the slot.
   3. Open the ejectors on the XC-VXC-10G card.
   4. Slide the XC-VXC-10G card into the slot along the guide rails.
   5. Close the ejectors.
      The upgrade is complete when the second XC-VXC-10G card boots up and becomes the standby XC-VXC-10G card.
      Note: After you change out the first card, CTC continues to display the XC-VXL-10G card in both slots. The display does not change to reflect the XC-VXC-10G cards until the second card is upgraded and the XC-VXC-10G card in that slot boots up.

Stop. You have completed this procedure.

NTP-D314 Upgrade the TCC2 Card to the TCC2P Card

Purpose	This procedure upgrades the TCC2 card to the TCC2P card. The TCC2 and TCCP2 cards support ONS 15454 SDH Software R4.0 and later software versions.
Tools/Equipment	Two TCC2P cards
Prerequisite Procedures	None
Required/As Needed	As needed

Onsite/Remote	Onsite
Security Level	Maintenance or higher

Note: The TCC2P card does not support software earlier than R4.0. You will not be able to revert to a software release earlier than Software R4.0 with TCC2P cards installed.

Note: Downgrade procedures from TCC2P cards to TCC2 cards are not supported. Contact Cisco Technical Assistance Center (TAC). See the Obtaining Documentation and Submitting a Service Request.

1. Verify that the LAN wires on the backplane are installed properly. The TCC2 card does not autodetect miswired LAN connections. If a LAN connection is miswired, a "LAN Connection Polarity Reversed" condition appears. See the "DLP-D326 Install LAN Wires on the MIC-C/T/P" task for instructions.
2. Complete the "DLP-D60 Log into CTC" task. If you are already logged in, continue with Step 2.
3. According to local site practice, complete the NTP-D108 Back Up the Database.
4. Ensure that no alarms or abnormal conditions are present. See the "DLP-D298 Check the Network for Alarms and Conditions" task for instructions.
5. Before you begin the upgrade, complete the NTP-D108 Back Up the Database. Make sure ONS 15454 Software R4.0 or later is installed on the node. Refer to the release-specific software upgrade document. TCC2 and TCC2P cards are not compatible with releases prior to Software R4.0.
6. Physically replace the standby TCC2 card on the ONS 15454 with a TCC2P card.
    1. Check the LED on the faceplate. The ACT/STBY LED on the faceplate of the TCC2 card indicates whether the card is in active or standby mode. A green ACT/STBY LED indicates an active card and an amber light indicates a standby card.
    2. Open the standby TCC2 card ejectors.
    3. Slide the card out of the slot. This raises the IMPROPRMVL alarm which will clear when the upgrade is complete.
    4. Open the ejectors on the TCC2P card to be installed.
    5. Slide the TCC2P card into the slot along the guide rails.
    6. Close the ejectors.
    7. In CTC node view, Ldg (loading) appears on the recently installed TCCP2 card.
       Note: During a TCC2 upgrade, the CONTBUS-IO-A or CONTBUS-IO-B TCC A (or B) To Shelf Slot Communication Failure alarm is raised as the TCC2 briefly loses communication with the backplane. This alarm usually clears after approximately 13 minutes. If the condition does not clear after a period contact Cisco TAC; see the Obtaining Documentation and Submitting a Service Request.
       Note: It takes approximately 10 minutes for the active TCC2 card to transfer the database to the newly installed TCC2P card. During this operation, the LEDs on the TCC2P flash Fail and then the active/standby LED flashes. When the transfer completes, the TCC2P card reboots and goes into standby mode after approximately three minutes. Do not remove the card from the shelf during a database transfer.
       Caution! If your active TCC2 card resets during the upgrade before the new TCC2P card has come to a full standby mode, remove the new TCC2P card immediately.
7. When the newly installed TCC2P card is in standby, go to the active TCC2 and right-click the card.
8. From the shortcut menu, click **Reset Card**.
   Wait for the TCC2 card to reboot. The ONS 15454 switches the standby TCC2P card to active mode. The TCC2 card verifies that it has the same database as the TCC2P card and then switches to standby.
9. Verify that the remaining TCC2 card is now in standby mode (the ACT/STBY LED changes to amber).
10. Perform Step 6 to physically replace the remaining TCC2 card with the second TCC2P card.
    The ONS 15454 boots up the second TCC2P card. The second TCC2P card must also copy the database, which can take approximately 10 minutes. Do not remove the card from the shelf during a database transfer.

11. If power-related alarms occur after the second TCC2P card is installed, complete the "DLP-D33 Measure Voltage" task. Refer to the *Cisco ONS 15454 SDH Troubleshooting Guide* for information about clearing alarms.

    Stop. You have completed this procedure.

NTP-D94 Upgrade STM-N Cards and Spans Automatically

Purpose	This procedure upgrades cards and STM-N speeds within MS-SPRings, SNCPs, and 1+1 (linear) protection groups using the Span Upgrade wizard.
Tools/Equipment	Replacement cards
Prerequisite Procedures	The span upgrade procedure requires at least two technicians (one at each end of the span) who can communicate with each other during the upgrade.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Warning! Do not reach into a vacant slot or chassis while you install or remove a module or a fan. Exposed circuitry could constitute an energy hazard. Statement 206

Note: Optical transmit and receive levels should be in their acceptable range as shown in the specifications section for each card in Table: Optical Card Transmit and Receive Levels.

Caution! Do not perform any other maintenance operations or add any circuits during a span upgrade.

Note: An STM-1 to eight-port STM-1 span upgrade, or an STM-4 to four-port STM-4 span upgrade can only be performed from Slots 1 to 4 and 14 to 17, because the STM1-8 and STM4-4 card can only be installed in these slots. Ensure that the STM-1 and STM-4 cards are in these slots before performing a span upgrade to the STM1-8 and STM4-4. The four STM-1 ports will be sequentially mapped to Ports 1 to 4 on the eight-port STM-1 card. The STM-4 port will be mapped to Port 1 on the four-port STM-4 card.

Note: The only cards that can be upgraded to a MRC-12 or MRC-2.5G-12 card are one-port STM-4 cards or one-port STM-16 cards. The port from the lower-speed card will be mapped to Port 1 on the MRC-12 or MRC-2.5G-12 card.

Note: If you are replacing a MRC-12 or MRC-12 2.5G card with a MRC-12 or MRC-12 2.5G card, an additional port selection box is displayed to allow you to configure the rate of the port on the span you are upgrading.

1. Determine the span upgrade you need to perform. Valid span upgrades include:
   - Four-port STM-1 to eight-port STM-1
   - Single-port STM-4 to four-port STM-4
   - Single-port STM-4 to STM-16
   - Single-port STM-4 to STM-64
   - Single-port STM-4 to 15454_MRC-12
   - Single-port STM-4 to MRC-2.5G-12
   - STM-16 to STM-64
   - STM-16 to MRC-12
   - Single-port STM-16 to MRC-2.5G-12
   - STM-64 to OC192SR1/STM64IO Short Reach or OC192/STM64 Any Reach

     Note: You cannot upgrade a four-port STM-4 span. If the ring contains any STM4-4 cards and you want to upgrade the entire ring, you will have to downgrade the STM4-4 card to a single-port STM-4 card (which is not possible unless only one port on the STM4-4 card is

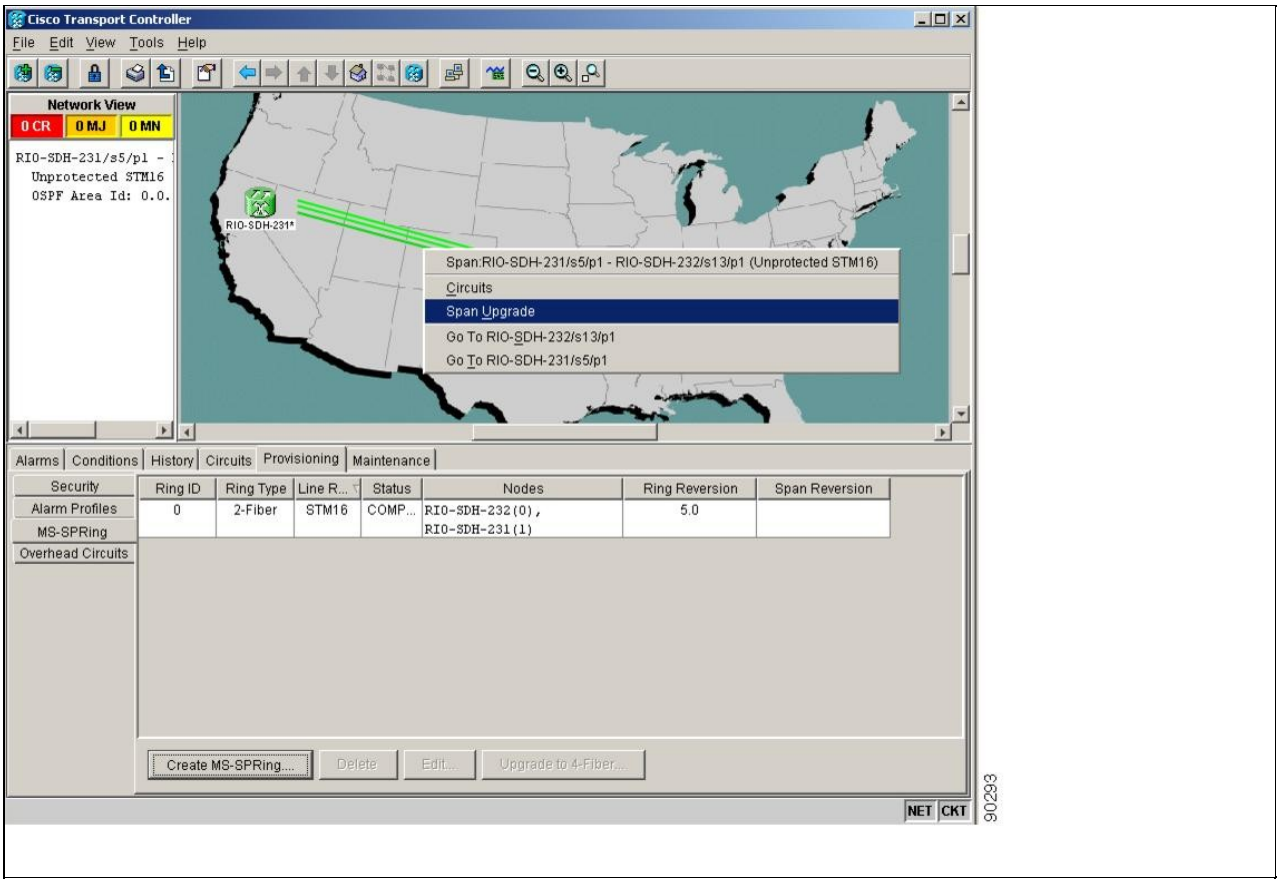
being used).

Note: Do not upgrade an STM-16 to an STM-64 if you have XC-VXL-2.5Gs installed. The XC-VXL-2.5G card works only with card speeds up to STM-16.

2. Complete the "DLP-D60 Log into CTC" task. If you are already logged in, continue with Step 3.
3. Ensure that no alarms or abnormal conditions (regardless of severity), including LOS, LOF, AIS-L, SF, SD, and FORCED-REQ-RING are present. See the "DLP-D298 Check the Network for Alarms and Conditions" task for instructions.

   Note: During the upgrade/downgrade some minor alarms and conditions display and then clear automatically. No service-affecting alarms (SA, Major, or Critical) should occur other than MSSP-OSYNC, which will clear when the upgrade/downgrade of all nodes is complete. If any other service-affecting alarms occur, Cisco recommends backing out of the procedure. A four-node MS-SPRing can take up to five minutes to clear all of the MSSP-OSYNC alarms. Allow extra time for a large MS-SPRing to clear all of the MSSP-OSYNC alarms.
4. In network view, right-click the span you want to upgrade.
5. Choose **Span Upgrade** from the shortcut menu (Figure 12-1).

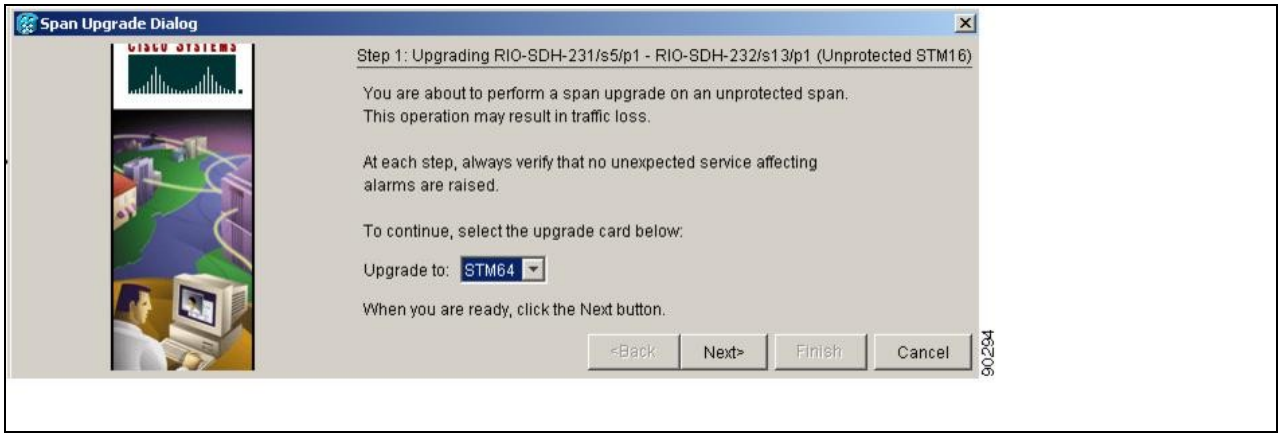
Figure 12-1: Span Upgrade Shortcut Menu



6. The first Span Upgrade dialog box appears (Figure 12-2). Follow the instructions in the dialog box and the wizard will lead you through the rest of the span upgrade.

   Note: The Back button is only enabled on Step 2 of the wizard; because you cannot back out of an upgrade through the wizard, close the wizard and initiate the manual procedure if you need to back out of the upgrade at any point beyond Step 2.

Figure 12-2: Span Upgrade Wizard



Caution! As indicated by the wizard, when installing cards you must wait for the cards to boot up and become active before proceeding to the next step.

> **Note:** If you install STM-64 cards, a disabled STM-64 laser causes an LOS alarm to be reported for each STM-64 slot. Enable the STM-64 laser by setting the safety key lock on the STM-64 faceplate to the ON position (labeled 1).
> **Note:** Remember to attach the fiber after installing the STM-N cards.

7. Repeat Steps 4 through 6 for additional spans in the ring.

Note: The span upgrade process resets the line's CV-L threshold to factory default. The CV-L threshold is reset because the threshold is dependent on line rate.

Stop. You have completed this procedure.

NTP-D95 Upgrade Optical Spans Manually

Purpose	This procedure upgrades STM-N speeds within MS-SPRings, SNCPs, and 1+1 protection groups by upgrading STM-N cards. Complete a manual upgrade task if you need to perform error recovery for the Span Upgrade wizard or back out of a span upgrade (downgrade).
Tools/Equipment	Replacement cards
Prerequisite Procedures	The manual span upgrade procedure requires at least two technicians (one at each end of the span) who can communicate with each other during the upgrade.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Caution! If you want to upgrade all of the spans in a ring, determine if there are any four-port STM-4 cards in the ring. If the ring contains any STM4-4 cards and you wish to continue with the upgrade, you will have to downgrade the STM4-4 card to a single-port STM-4 card (which is not possible unless only one port on the STM4-4 card is being used).

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

Note: In this context the word "span" represents the optical path between two nodes. The words "span endpoint" represent the nodes on each end of a span.

Note: If any of the cross-connect cards reboot during the span upgrade, you must reset each one when the span upgrade procedure is complete for all the nodes in the ring.

1. Determine the span upgrade you need to perform. Valid span upgrades include:
   - Four-port STM-1 to eight-port STM-1
   - Single-port STM-4 to four-port STM-4
   - Single-port STM-4 to STM-16
   - Single-port STM-4 to STM-64
   - Single-port STM-4 to MRC-12
   - Single-port STM-4 to MRC-2.5G-12
   - Single-port STM-16 to MRC-12
   - Single-port STM-16 to MRC-2.5G-12
   - STM-16 to STM-64
   - STM-64 to OC192SR1/STM64IO Short Reach or OC192/STM64 Any Reach
     Note: Do not upgrade an STM-16 to an STM-64 if you have XC-VXL-2.5Gs installed. The XC-VXL-2.5G works only with card speeds up to STM-16.
2. Complete the "DLP-D60 Log into CTC" task. If you are already logged in, continue with Step 3.
3. Ensure that no alarms or abnormal conditions (regardless of severity), including LOS, LOF, AIS-L, SF, SD, and FORCED-REQ-RING are present. See the "DLP-D298 Check the Network for Alarms and Conditions" task for instructions.
   Note: During the upgrade/downgrade some minor alarms and conditions display and then clear automatically. No service-affecting alarms (SA, Major, or Critical) should occur other than MSSP-OSYNC, which will clear when the upgrade/downgrade of all nodes is complete. If any other service-affecting alarms occur, Cisco recommends backing out of the procedure. A four-node MS-SPRing can take up to five minutes to clear all of the MSSP-OSYNC alarms. Allow extra time for a large MS-SPRing to clear all of the MSSP-OSYNC alarms.
4. Complete the appropriate task:
   - DLP-D293 Perform a Manual Span Upgrade on a Two-Fiber MS-SPRing
   - DLP-D294 Perform a Manual Span Upgrade on a Four-Fiber MS-SPRing
   - DLP-D295 Perform a Manual Span Upgrade on an SNCP
   - DLP-D296 Perform a Manual Span Upgrade on a 1+1 Protection Group
   - DLP-D297 Perform a Manual Span Upgrade on an Unprotected Span
     Note: The span upgrade process resets the line's CV-L threshold to factory default. The CV-L threshold is reset because the threshold is dependent on line rate.
     Note: Span upgrades do not upgrade SDH topologies; for example, 1+1 protection group to a two-fiber MS-SPRing.
     Note: An STM-1 to eight-port STM-1 span upgrade, or an STM-4 to four-port STM-4 span upgrade can only be performed from Slots 1 to 4 and 14 to 17 because the STM1-8 and STM4-4 card can only be installed in these slots. Ensure that the STM-1 and STM-4 cards are in these slots before performing a span upgrade to the STM1-8 and STM4-4. The four STM-1 ports will be sequentially mapped to Ports 1 to 4 on the eight-port STM-1 card. The STM-4 port will be mapped to Port 1 on the four-port STM-4 card.

Stop. You have completed this procedure.