



Installing the 32WSS-L Card in the Cisco ONS 15454 SONET/SDH

Product Name: 15454-WSS-L

This document provides a card description, specifications, and installation procedure for the dense wavelength division multiplexer (DWDM) 32WSS-L card. The 32WSS-L card is compatible with Cisco ONS 15454 SONET (ANSI) and Cisco ONS 15454 SDH (ETSI) shelf assemblies. Use this document in conjunction with the *Cisco ONS 15454 DWDM Procedure Guide* when working with 32WSS-L cards.

This document contains the following sections:

- [32WSS-L Card Description, page 1](#)
- [32WSS-L Card Specifications, page 8](#)
- [Install the 32WSS-L Card, page 9](#)
- [Related Documentation, page 11](#)
- [Obtaining Documentation and Submitting a Service Request, page 11](#)

32WSS-L Card Description

The 32-Channel Wavelength Selective Switch L-Band (32WSS-L) card performs channel add/drop processing within the ONS 15454 DWDM node. The 32WSS-L works in conjunction with the 32DMX-L to implement ROADM functionality within the L band (1570 to 1620 nm). The 32WSS-L card is well suited for use in networks that employ DS fiber or SMF-28 single-mode fiber. Equipped with ROADM functionality, a DWDM node can be configured to add or drop individual optical channels using Cisco Transport Controller (CTC), Cisco MetroPlanner, and Cisco Transport Manager (CTM).

An ROADM node utilizes two 32WSS-L cards (two slots each) and two 32DMX-L cards (one slot each), for a total of six slots in the chassis. For a diagram of a typical ROADM configuration, see the *Cisco ONS 15454 DWDM Reference Manual*. The two-slot 32WSS-L card can be installed in Slots 1 and 2, 3 and 4, 5 and 6, 12 and 13, 14 and 15, or 16 and 17.



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The 32WSS-L has six types of ports:

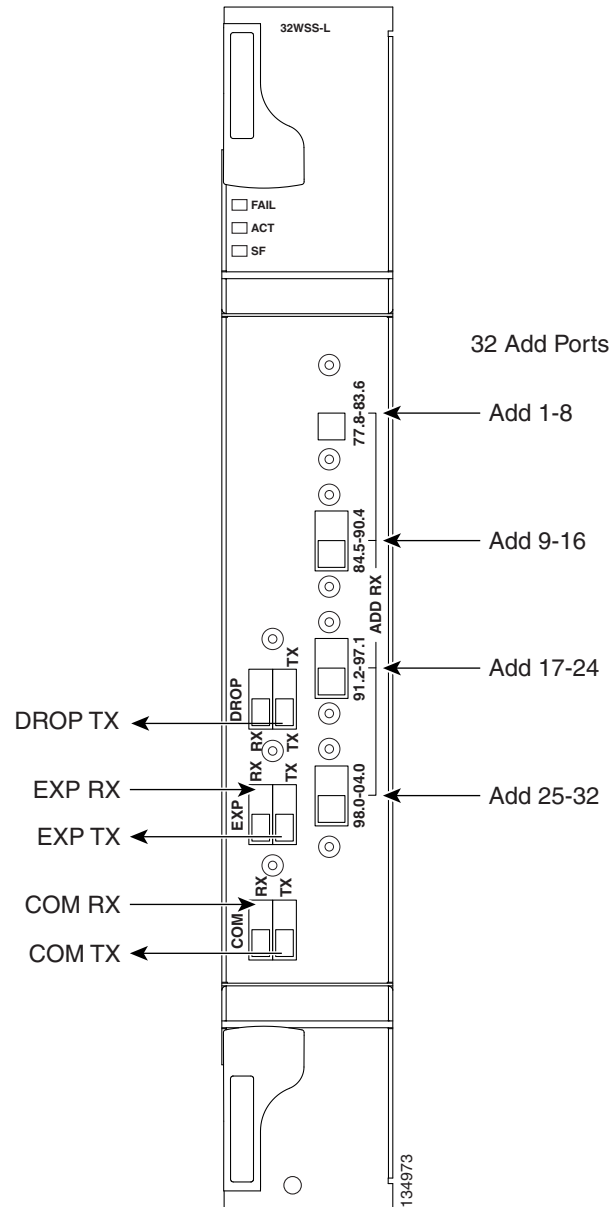
- ADD RX ports (1 to 32): These ports are used for adding channels. Each add channel is associated with an individual switch element that selects whether an individual channel is added. Each add port has optical power regulation provided by a VOA.
- EXP RX port: The EXP RX port receives an optical signal from another 32WSS-L module in the same network element (NE).
- EXP TX port: The EXP TX port sends an optical signal to the other 32WSS-L module within the NE.
- COM TX port: The COM TX port sends an aggregate optical signal to a booster amplifier card (for example, OPT-BST) for transmission outside of the NE.
- COM RX port: The COM RX port receives the optical signal from a preamplifier and sends it to the optical splitter.
- DROP TX port: The DROP TX port sends the drop channels to the 32DMX-L card where the channels are further processed and dropped.

A terminal node can be configured using only a 32WSS-L card and a 32DMX-L card plugged into the east or west side of the shelf.

Faceplate

Figure 1 shows the 32WSS-L module front panel and identifies the traffic flow through the ports.

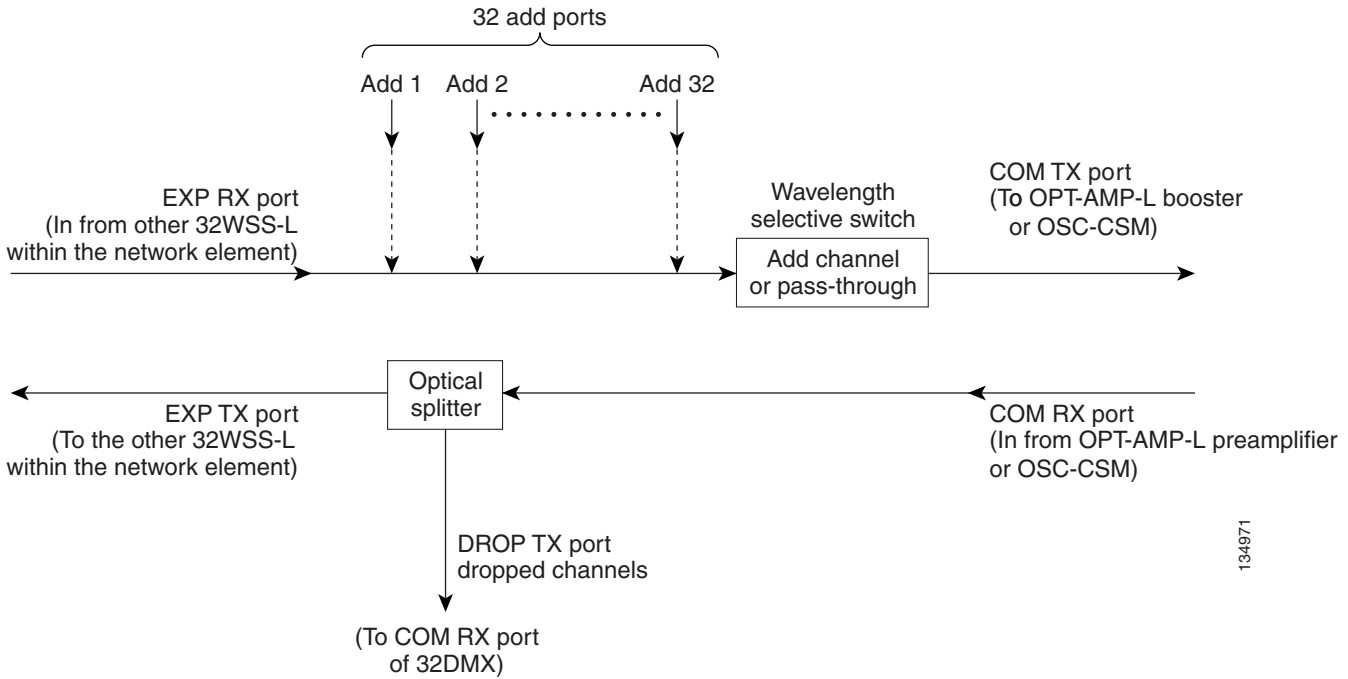
Figure 1 32WSS-L Faceplate



Block Diagrams

Figure 2 provides a high-level functional block diagram of the 32WSS-L card.

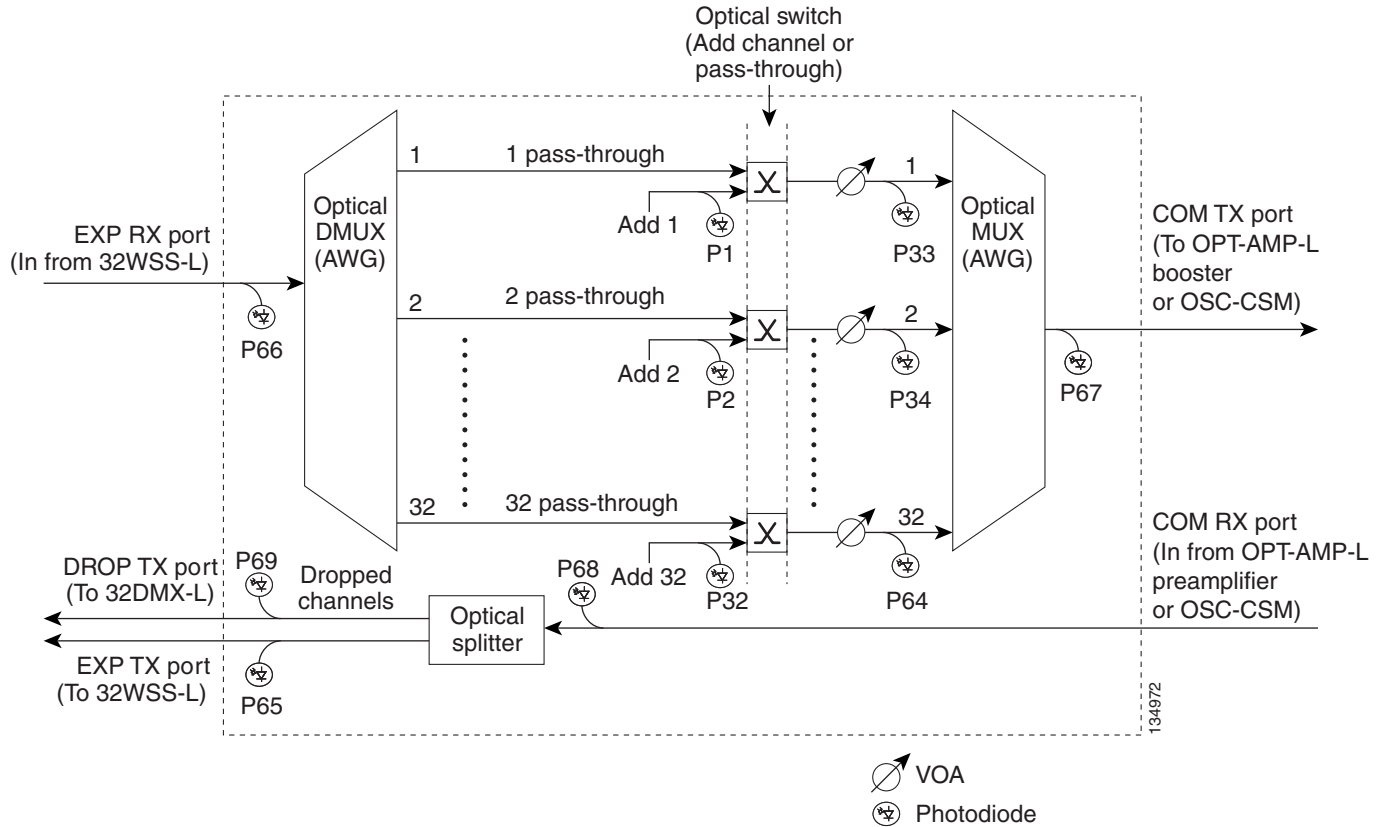
Figure 2 32WSS-L Block Diagram



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Aggregate optical signals that enter the EXP RX and COM RX ports are processed in two ways. The optical processing stages are shown in [Figure 3](#), which provides a detailed optical functional diagram of the 32WSS-L card.

Figure 3 32WSS-L Optical Functional Diagram



The EX PORT and COM PORT operate as follows:

- **EXP RX Port Add Channel/Pass-through Processing**

The incoming optical signal is received at the EXP RX port from the other 32WSS-L module within the NE. The incoming aggregate optical signal is demultiplexed into 32 individual wavelength components, or channels. Then each channel is individually processed by the optical switch, which does add/pass-through processing. Under software control, the switch either selects the optical channel coming in from the demultiplexer (the pass-through channel) or it selects the external ADD channel. If the ADD port channel is selected, the optical signal coming from the demultiplexer is blocked, and the ADD channel is transmitted in its place.

After the optical switch stage, all of the channels are multiplexed together into an aggregate optical signal, which is sent out on the COM TX port. The output is typically connected to an OPT-AMP-L (in the event a booster amplifier is needed) or to an OSC-CSM (if no amplification is needed).

- **COM RX Port Optical Splitter Processing**

The incoming optical signal received at the COM RX port is applied to the optical splitter within the 32WSS-L card. Channels that are designated to be dropped are diverted optically to the DROP TX port by the splitter. The DROP TX port on the 32WSS-L is typically connected to the COM RX port of the 32DMX-L where the drop channels are dropped. Channels that are not dropped pass through the optical splitter and flow out of the EXP TX port of the 32WSS-L card. This optical signal is typically connected to the other 32WSS-L module within the NE.

Power Monitoring

Physical photodiodes P1 through P69 monitor the power for the 32WSS-L card. The returned power level values are calibrated to the ports as shown in [Table 1](#).

Table 1 32WSS-L Port Calibrations

| Photodiode | CTC Type Name | Calibrated to Port |
|------------|-----------------|--------------------|
| P1–P32 | ADD (Power) | COM TX |
| | ADD (Power ADD) | ADD RX |
| P33–P64 | PASS THROUGH | COM TX |
| P65 | OUT EXP | EXP TX |
| P66 | IN EXP | EXP RX |
| P67 | OUT COM | COM TX |
| P68 | IN COM | COM RX |
| P69 | DROP | DROP TX |

Channel Plan

The 32WSS-L card uses 32 channels on the ITU 100-GHz grid in a banded configuration (see [Table 2](#)).

Table 2 32WSS-L Channel Plan

| Band ID | Channel Label | Frequency (THz) | Wavelength (nm) |
|---------|---------------|-----------------|-----------------|
| B77.8 | 77.8 | 190 | 1577.86 |
| | 78.6 | 189.9 | 1578.69 |
| | 79.5 | 189.8 | 1579.52 |
| | 80.3 | 189.7 | 1580.35 |
| B81.1 | 81.1 | 189.6 | 1581.18 |
| | 82.0 | 189.5 | 1582.02 |
| | 82.8 | 189.4 | 1582.85 |
| | 83.6 | 189.3 | 1583.69 |
| B84.5 | 84.5 | 189.2 | 1584.53 |
| | 85.3 | 189.1 | 1585.36 |
| | 86.2 | 189 | 1586.20 |
| | 87.0 | 188.9 | 1587.04 |
| B87.8 | 87.8 | 188.8 | 1587.88 |
| | 88.7 | 188.7 | 1588.73 |
| | 89.5 | 188.6 | 1589.57 |
| | 90.4 | 188.5 | 1590.41 |

Table 2 32WSS-L Channel Plan (Continued)

| Band ID | Channel Label | Frequency (THz) | Wavelength (nm) |
|---------|---------------|-----------------|-----------------|
| B91.2 | 91.2 | 188.4 | 1591.26 |
| | 92.1 | 188.3 | 1592.10 |
| | 92.9 | 188.2 | 1592.95 |
| | 93.7 | 188.1 | 1593.79 |
| B94.6 | 94.6 | 188 | 1594.64 |
| | 95.4 | 187.9 | 1595.49 |
| | 96.3 | 187.8 | 1596.34 |
| | 97.1 | 187.7 | 1597.19 |
| B98.0 | 98.0 | 187.6 | 1598.04 |
| | 98.8 | 187.5 | 1598.89 |
| | 99.7 | 187.4 | 1599.75 |
| | 00.6 | 187.3 | 1600.60 |
| B01.4 | 01.4 | 187.2 | 1601.46 |
| | 02.3 | 187.1 | 1602.31 |
| | 03.1 | 187 | 1603.17 |
| | 04.0 | 186.9 | 1604.03 |

32WSS-L Card Level Indicators

Table 3 describes the three card-level LED indicators on the 32WSS-L card.

Table 3 32WSS-L Card-Level Indicators

| Card-Level Indicators | Description |
|-----------------------|--|
| Red FAIL LED | The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists. |
| Green ACT LED | The green ACT LED indicates that the 32WSS-L card is carrying traffic or is traffic-ready. |
| Amber SF LED | The amber SF LED indicates a signal failure on one or more of the card's ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off. |

32WSS-L Port-Level Indicators

You can find the status of the 32WSS-L card's ports using the LCD screen on the ONS 15454 ANSI fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot.

The 32WSS-L card has five sets of ports located on the faceplate. COM RX is the line input, COM TX is the line output, EXP RX is the port where a channel can be added or passed through, EXP TX is the port that passes through the channels that are not dropped, and DROP TX is the port for the dropped channels. The xx.x to yy.y TX ports represent the four groups of eight channels ranging from the xx.x wavelength to the yy.y wavelength according to the channel plan.

32WSS-L Card Specifications

The 32WSS-L card optical specifications are listed in [Table 4](#).



Note

For power specifications, see *Cisco ONS 15454 DWDM Reference Manual*.

Table 4 32WSS-L Card Optical Specifications

| Parameter | Note | Condition | Min | Typical | Max | Units |
|-----------------------------|---|------------------------|--------|---------|------|-------|
| -0.1 dB bandwidth | All SOP and within whole operating temperature range, connectors included, and for maximum VOA operating attenuation. | EXP RX => COM TX | — | +/-/57 | — | pm |
| -0.25 dB bandwidth | | | +/-/61 | +/-/89 | — | |
| -0.5 dB bandwidth | | | +/-91 | +/-/116 | — | |
| -1.0 dB bandwidth | | | +/-135 | +/-/149 | — | |
| -0.1 dB bandwidth | | Add 1, 32 => COM TX | +/-32 | +/-/69 | — | |
| -0.25 dB bandwidth | | | +/-98 | +/-/129 | — | |
| -0.5 dB bandwidth | | | +/-135 | +/-/161 | — | |
| -1.0 dB bandwidth | | | +/-160 | +/-/201 | — | |
| Insertion loss | All SOP, any optical switch state, and within whole operating temperature range, connectors included. | EXP RX => COM TX | — | 9.7 | 11.3 | dB |
| | | COM RX => EXP TX | — | 1.4 | 1.6 | dB |
| | | Add 1, 32 => COM TX | — | 6.2 | 8.0 | dB |
| | | COM RX => DROP TX | 6.0 | 8.0 | 8.5 | dB |
| VOA dynamic range | — | EXP RX => COM TX | 20 | 25 | — | dB |
| | — | Add 1, 32 => COM TX | 25 | 25 | — | dB |
| Maximum optical input power | — | — | 300 | — | — | mW |

The 32WSS-L card has the following additional specifications:

- Environmental
 - Operating temperature:
 - C-Temp: -5 to +55 degrees Celsius (+23 to +131 degrees Fahrenheit)

- Operating humidity: 5 to 95 percent RH
- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 1.84 in. (46.8 mm)
 - Depth: 9.00 in. (228.6 mm)

Install the 32WSS-L Card



Warning

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



Warning

Class 1M laser radiation when open. Do not view directly with optical instruments. Statement 1053



Warning

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



Caution

Always use the supplied ESD wristband when working with a powered ONS 15454. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.



Note

If protective clips are installed on the card connectors, remove the clips before installing the cards.

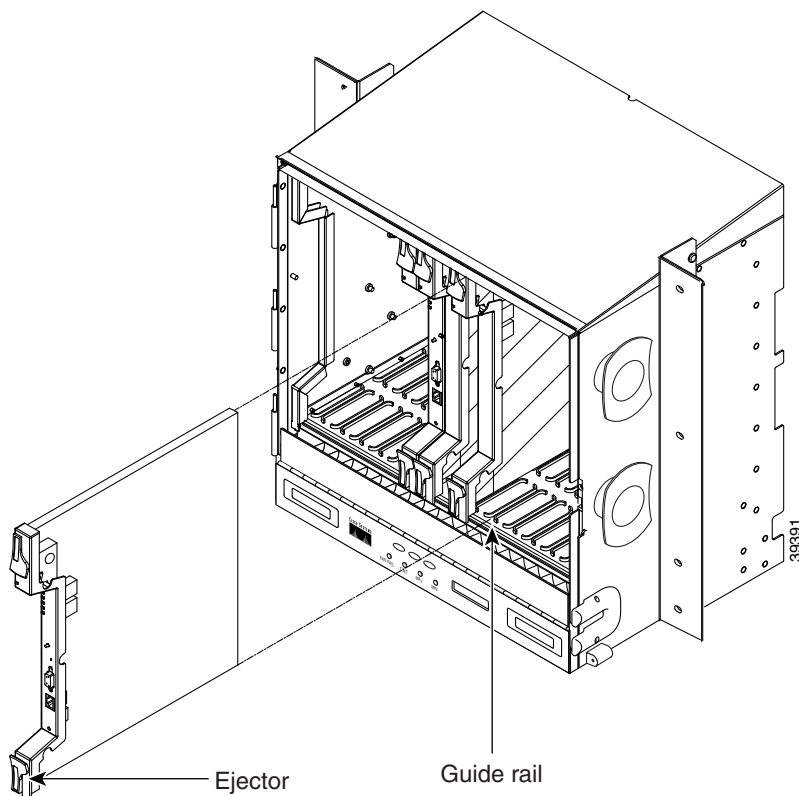


Note

If you install a card incorrectly, the FAIL LED flashes continuously.

Figure 4 shows general card installation.

Figure 4 Installing a Card in the Cisco ONS 15454 (ANSI)



- Step 1** Display the card installation plan for the node using one of the following sources:
- The Cisco MetroPlanner Site Dialog window for the node you are provisioning.
 - CTC node view with slots preprovisioned based on the Cisco MetroPlanner Site Dialog window.
 - Written slot plan. The plan must be based on the Cisco MetroPlanner Site Dialog window for your installation.
- Step 2** Remove the 32WSS-L card from its packaging, then remove the protective caps from the card's rear connectors.
- Step 3** Open the card latches/ejectors.
- Step 4** Use the latches/ejectors to firmly slide the card along the slot guide rails until the card plugs into the receptacle at the back of the slot.
- Step 5** Verify that the card is inserted correctly and close the latches/ejectors on the card.



Note It is possible to close the latches/ejectors when the card is not completely plugged into the backplane. Ensure that you cannot insert the card any further.

- Step 6** Verify the LED activity:
- The FAIL LED turns on for approximately 35 seconds.
 - The FAIL LED blinks for approximately 40 seconds.
 - All LEDs turn on and then turn off within 5 seconds.

- If new software is being downloaded to the card, the ACT and SF LEDs blink for 20 seconds to 3.5 minutes, depending on the card type.
- The ACT LED turns on.
- The signal fail (SF) LED stays on until all card ports connect to their far-end counterparts and a signal is present.

Step 7 If the card does not boot up properly, or the LED activity does not mimic [Step 6](#), check the following:

- When a physical card type does not match the type of card provisioned for that slot in CTC, the card might not boot. If a 32WSS-L card does not boot, open CTC and ensure that the slot is not provisioned for a different card type before assuming that the card is faulty.
- If the red FAIL LED does not turn on, check the power.
- If you insert a card into a slot provisioned for a different card, all LEDs turn off.
- If the red FAIL LED is on continuously or the LEDs behave erratically, the card is not installed. Remove the card and repeat Steps 3 to 7. If the card does not boot up properly the second time, it may be defective. Contact your next level of support.



Note

The DWDM node type is determined by the cards that are installed. For example, if two 32DMX-O and two 32MUX-O cards are installed but no AD-xC or AD-xB cards are installed, CTC considers the node a hub node. However, if one 32DMX-O and one 32MUX-O card is installed with no AD-xC or AD-xB cards, CTC considers the node a terminal node. For more information, refer to the *iCisco ONS 15454 DWDM Reference Manual*

Related Documentation

- *Cisco ONS 15454 DWDM Reference Manual*
- *Cisco ONS 15454 DWDM Procedure Guide*
- *Cisco ONS 15454 DWDM Troubleshooting Guide*
- *Cisco MetroPlanner DWDM Operations Guide*

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