



Installing Cisco ONS 15454 OC-48/STM-16 ELR 100 GHz Cards



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.

Product Numbers:

Product Number	Description
15454-O48E-1-28.7=	OC-48/STM-16 ELR 100 GHz, 1528.77 nm
15454-O48E-1-30.3=	OC-48/STM-16 ELR 100 GHz, 1530.33 nm
15454-O48E-1-31.1=	OC-48/STM-16 ELR 100 GHz, 1531.12 nm
15454-O48E-1-31.9=	OC-48/STM-16 ELR 100 GHz, 1531.90 nm
15454-O48E-1-32.6=	OC-48/STM-16 ELR 100 GHz, 1532.68 nm
15454-O48E-1-33.4=	OC-48/STM-16 ELR 100 GHz, 1533.47 nm
15454-O48E-1-34.2=	OC-48/STM-16 ELR 100 GHz, 1534.25 nm
15454-O48E-1-35.0=	OC-48/STM-16 ELR 100 GHz, 1535.04 nm
15454-O48E-1-35.8=	OC-48/STM-16 ELR 100 GHz, 1535.82 nm
15454-O48E-1-36.6=	OC-48/STM-16 ELR 100 GHz, 1536.61 nm
15454-O48E-1-38.1=	OC-48/STM-16 ELR 100 GHz, 1538.19 nm
15454-O48E-1-38.9=	OC-48/STM-16 ELR 100 GHz, 1538.98 nm
15454-O48E-1-39.7=	OC-48/STM-16 ELR 100 GHz, 1539.77 nm
15454-O48E-1-40.5=	OC-48/STM-16 ELR 100 GHz, 1540.56 nm
15454-O48E-1-41.3=	OC-48/STM-16 ELR 100 GHz, 1541.35 nm



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Product Number	Description
15454-O48E-1-42.1=	OC-48/STM-16 ELR 100 GHz, 1542.14 nm
15454-O48E-1-42.9=	OC-48/STM-16 ELR 100 GHz, 1542.94 nm
15454-O48E-1-43.7=	OC-48/STM-16 ELR 100 GHz, 1543.73 nm
15454-O48E-1-44.5=	OC-48/STM-16 ELR 100 GHz, 1544.53 nm
15454-O48E-1-46.1=	OC-48/STM-16 ELR 100 GHz, 1546.1 2nm
15454-O48E-1-46.9=	OC-48/STM-16 ELR 100 GHz, 1546.92 nm
15454-O48E-1-47.7=	OC-48/STM-16 ELR 100 GHz, 1547.72 nm
15454-O48E-1-48.5=	OC-48/STM-16 ELR 100 GHz, 1548.51nm
15454-O48E-1-49.3=	OC-48/STM-16 ELR 100 GHz, 1549.32 nm
15454-O48E-1-50.1=	OC-48/STM-16 ELR 100 GHz, 1550.12 nm
15454-O48E-1-50.9=	OC-48/STM-16 ELR 100 GHz, 1550.92 nm
15454-O48E-1-51.7=	OC-48/STM-16 ELR 100 GHz, 1551.72 nm
15454-O48E-1-52.5=	OC-48/STM-16 ELR 100 GHz, 1552.52 nm
15454-O48E-1-54.1=	OC-48/STM-16 ELR 100 GHz, 1554.13 nm
15454-O48E-1-54.9=	OC-48/STM-16 ELR 100 GHz, 1554.94 nm
15454-O48E-1-55.7=	OC-48/STM-16 ELR 100 GHz, 1555.75 nm
15454-O48E-1-56.5=	OC-48/STM-16 ELR 100 GHz, 1556.55 nm
15454-O48E-1-57.3=	OC-48/STM-16 ELR 100 GHz, 1557.36 nm
15454-O48E-1-58.1=	OC-48/STM-16 ELR 100 GHz, 1558.17 nm
15454-O48E-1-58.9=	OC-48/STM-16 ELR 100 GHz, 1558.98 nm
15454-O48E-1-59.7=	OC-48/STM-16 ELR 100 GHz, 1559.79 nm
15454-O48E-1-60.6=	OC-48/STM-16 ELR 100 GHz, 1560-61 nm

This document explains how to install the OC-48/STM-16 ELR 100 GHz cards for the Cisco ONS 15454. It also contains removal instructions and technical specifications.

Use this document in conjunction with the *Cisco ONS 15454 Installation and Operations Guide* and the *Cisco ONS 15454 Troubleshooting and Reference Guide* when working with the OC48 ELR cards or any other system components.

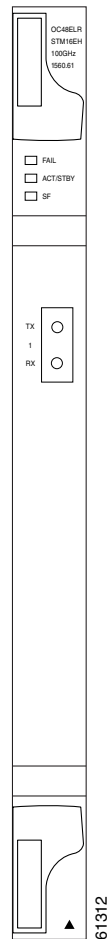
This document contains the following sections:

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- [Installation Procedures, page 6](#)
- [Related Documentation, page 81](#)
- [Obtaining Documentation and Submitting a Service Request, page 8](#)

OC-48/STM-16 ELR 100 GHz Card Description

37 distinct OC-48 ITU 100 GHz dense wavelength division multiplexing (DWDM) cards provide the ONS 15454 DWDM channel plan. Each OC-48 DWDM card provides one Telcordia-compliant, GR-253 SONET OC-48 port. The port operates at 2.48 Gbps over a single-mode fiber span. The card carries VT, concatenated, and non-concatenated payloads at STS-1, STS-3c, STS-6c, STS-12c or STS-48c signal levels. [Figure 1](#) shows the OC-48 ELR DWDM faceplate and [Figure 2](#) shows a block diagram of the card.

Figure 1 OC-48 ELR/STM-16 100 GHz card faceplate



Each card provides one bidirectional OC-48/STM16 interface compliant with Telcordia GR-253-CORE.

Nineteen of the cards operate in the blue band with spacing of 100 GHz on the ITU grid standard G.692 and Telcordia GR-2918-CORE, issue 2 (1528.77 nm, 1530.33 nm, 1521.12 nm, 1531.90 nm, 1532.68 nm, 1533.47 nm, 1534.25 nm, 1535.04 nm, 1535.82 nm, 1536.61 nm, 1538.19 nm, 1538.98 nm, 1539.77 nm, 1540.56 nm, 1541.35 nm, 1542.14 nm, 1542.94 nm, 1543.73 nm, 1544.53 nm). The other eighteen cards operate in the red band with spacing of 100 GHz on the ITU grid (1546.12 nm, 1546.92 nm, 1547.72 nm, 1548.51 nm, 1549.32 nm, 1550.12 nm, 1550.92 nm, 1551.72 nm, 1552.52 nm, 1554.13 nm, 1554.94 nm, 1555.75 nm, 1557.36 nm, 1556.55 nm, 1557.36 nm, 1558.17 nm, 1558.98 nm, 1559.79 nm, 1560.61 nm). These cards are also designed to interoperate with the Cisco ONS 15216 DWDM solution.

You can install the OC-48 ELR DWDM cards in any high-speed slot and provision this card as part of a bidirectional line switched ring (BLSR) or path protection. The card can serve as either an access tributary or a transport span interface. The OC-48/STM-16 ELR 100 GHz card requires a cross-connect (XC) card or cross-connect virtual tributary (XCVT) card for proper operation.

Each OC-48 ELR DWDM card uses extended long reach optics operating individually within the ITU-T 100 GHz grid. The OC-48 DWDM cards are intended to be used in applications with long unregenerated spans of up to 200 km (with mid-span amplification). These transmission distances are achieved through the use of inexpensive optical amplifiers (flat gain amplifiers) such as Cisco ONS 15216 erbium-doped fiber amplifiers (EDFAs).

Maximum system reach in filterless applications is 26 dB without the use of optical amplifiers or regenerators. However, system reach also depends on the condition of the facilities, number of splices and connectors, and other performance-affecting factors. When used in combination with ONS 15216 100 GHz filters, a 2dB power penalty reduces the link budget to 24 dB. The OC-48 ELR DWDM cards feature wavelength stability of +/- 0.08 nm. Each interface contains a transmitter and receiver.

The OC-48 ELR cards detect loss of signal (LOS), loss of frame (LOF), loss of pointer (LOP), and line-layer alarm indication signal (AIS-L) conditions. See the *Cisco ONS 15454 Troubleshooting and Reference Guide* for a description of these conditions. The cards also count section and line BIT errors.

OC48 ELR Card-Level Indicators

The OC-48 ELR cards have three card-level LEDs.

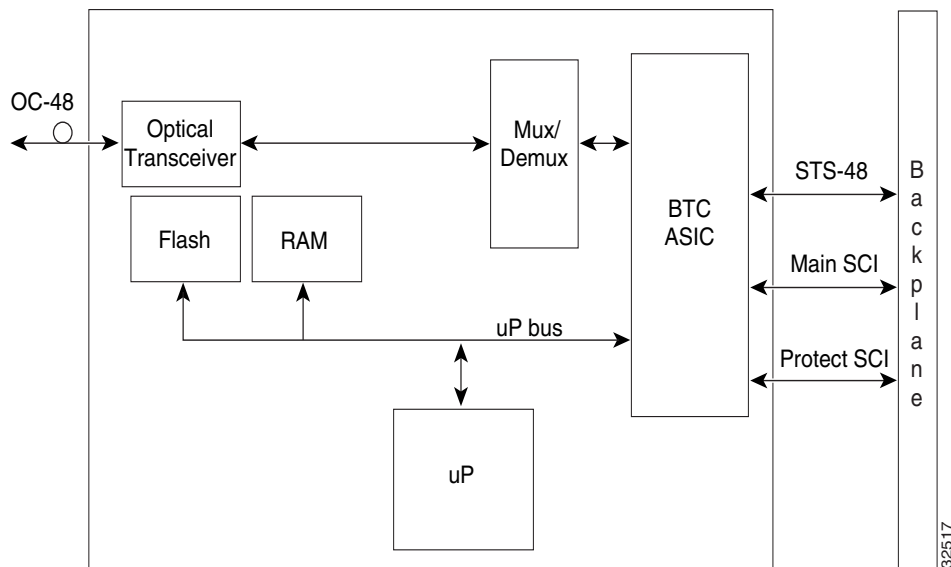
Table 1 OC48 ELR Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OC-48 ELR card is carrying traffic or is traffic-ready.
Yellow SF LED	The yellow SF LED indicates a signal failure or condition such as LOS, LOF or high bit error rates (BERs) on one or more of the card's ports. The yellow SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

OC48 ELR Port-Level Indicators

You can find the status of the OC-48 ELR card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to quickly view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. See the *Cisco ONS 15454 Troubleshooting and Reference Guide* for a complete description of the alarm messages.

Figure 2 OC48 ELR block diagram



Warning

Follow all directions and warning labels when working with optical fibers. To prevent eye damage, never look directly into a fiber or connector.

OC48 ELR Card Specifications

- Line
 - Bit Rate: 2488.320 Mbps
 - Code: Scrambled NRZ
 - Fiber: 1550 nm single-mode
 - Loopback Modes: Terminal and Facility
 - Connectors: SC
 - Compliance: Telcordia SONET, GR-GSY-00253, ITU-T G692, ITU-T G958
- Transmitter
 - Max. Transmitter Output Power: 0 dBm
 - Min. Transmitter Output Power: -2 dBm
 - Transmitter: Electro-absorption laser
- Receiver
 - Max. Receiver Level: -9 dBm
 - Min. Receiver Level: -27 dBm
 - Receiver: InGaAs APD photo detector
 - Link Loss Budget: 26 dB min. at BER=10E-12, (not including the power dispersion penalty)
- Environmental

- Eye Safety Compliance: Class I
- Operating Temperature: 0 to +55 degrees Celsius
- Operating Humidity: 5 - 95%, non-condensing
- Power Consumption: 24 W, 0.50 AMPS, 82 BTU/Hr.
- Dimensions
 - Height: 12.650 in.
 - Width: 0.716 in.
 - Depth: 9.000 in.

Installation Procedures

Use this section if you are installing the OC-48 card for the first time. After you become familiar with ONS 15454 card installation and boot up, use this section as a reference.

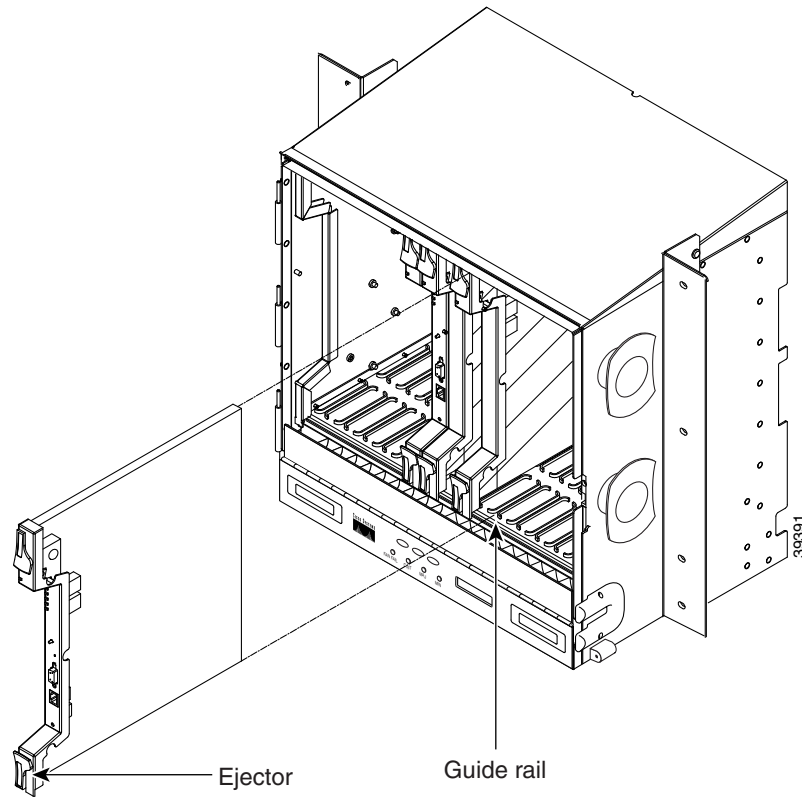


Warning

Always use the supplied electrostatic discharge (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 and ensure the shelf assembly is properly grounded.

OC-48 cards have electrical plugs that plug into electrical connectors on the shelf assembly backplane. When the ejectors are fully closed, the card plugs into the shelf assembly backplane. [Figure 1](#) shows general card installation.

Figure 3 Installing a card in an ONS 15454



Procedure: Install the OC-48 ELR Card

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- Step 1** Open the card ejectors.
 - Step 2** Slide the cards along the guide rails into the desired card slot.
 - Step 3** Close the ejectors.

Card Turn Up

Follow the steps in this section to verify card turn up. If one or more of the LED or Cisco Transport Controller (CTC) software screen conditions are not met, see the “[Card Boot Up](#)” section on page 8. If the problem is not resolved, re-install the card. Replace the unit if the FAIL LED persists.



Note

Because all other cards boot from the active TCC+ card, at least one TCC+ card must be installed in order to boot the OC-48 ELR DWDM or any other card.

Procedure: Verify Successful Turn Up of the OC-48 Card

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- Step 1** Install the OC-48 card in the correct slot (Slot 5, 6 and 12, 13).

- Step 2** Verify that power is applied to the shelf assembly.
- Step 3** Verify that the red FAIL LED blinks for 30 to 45 seconds.
- Step 4** Verify that after 30 to 45 seconds all LEDs blink once and turn off.
- Step 5** Verify that the ACT/STBY LED is the correct color for the card (green for active, yellow for standby).
- Step 6** Verify that the card appears in the correct slot on the CTC software screen.
- Step 7** Verify that the card is white on the CTC software screen.

Card Boot Up

When you install a card in an ONS 15454, the card automatically loads the software version running on the active TCC+. Although you do not need to do anything in this situation, be aware that the card will not be available for service until boot up completes. After boot up the ACT/STBY LED should illuminate green or amber for normal operation. If the RED FAIL LED remains illuminated after boot up, reseal the card. If the card remains in a failed state (RED FAIL LED illuminated) replace the card.

Optical Card Protection

The ONS 15454 supports 1+1 protection to create redundancy for optical cards. With 1+1 protection, one optical port can protect another optical port; therefore, in any two high-speed slots a single working card and a single dedicated protect card of the same type (for example, two OC-48 cards) can be paired for protection. If the working port fails, the protect port takes over. 1+1 span protection can be either revertive or non-revertive.

With non-revertive 1+1 protection, when a failure occurs and the signal switches from the working card to the protect card, the signal stays switched to the protect card until it is manually switched back. Revertive 1+1 protection automatically switches the signal back to the working card when the working card comes back online.

You create and modify protection schemes using CTC software. For more information, see the *Creating Protection Groups* section in the *Cisco ONS 15454 Installation and Operations Guide*.

Related Documentation

- DOC-7812575= Cisco ONS 15454 Installation and Operations Guide
- DOC-7812576= Cisco ONS 15454 Troubleshooting and Reference Guide

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the *What's New in Cisco Product Documentation* as an RSS feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service. Cisco currently supports RSS Version 2.0.

This document is to be used in conjunction with the documents listed in the “[Related Documentation](#)” section.

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