Installing Cisco ONS 15454 OC192LR/STM64 LH 1550 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 Name: 15454-OC192LR1550

This document lists regulatory requirements and describes installation procedures for the Cisco ONS 15454 OC192 LR/STM64 LH 1550 card. It also contains removal instructions and technical specifications. Use this document in conjunction with the *Cisco ONS 15454 Procedure Guide, Cisco ONS 15454 Reference Manual,* and the *Cisco ONS 15454 Troubleshooting Guide* when working with OC-192 cards.

This document contains the following sections:

This document contains the following procedures:

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Regulatory and Compliance Requirements

Fiber loopback precaution

Caution You must use a 19 to 24 dB (20 recommended) fiber attenuator when connecting a fiber loopback to an OC192 LR/STM64 LH 1550 card. Never connect a direct fiber loopback. Using fiber loopbacks causes irreparable damage to the OC-192 card. A Tx to Rx connection that is not attenuated will damage the receiver.

Safety key warning

Warning **The laser is on when the card is booted and the safety key is in the on position (labeled 1). The port does not have to be in service for the laser to be on. The laser is off when the safety key is off (labeled 0).**

Class 1 and Class 1M laser warning

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam or 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. Use of controls or adjustments or performance of procedures other than those specified may result in hazardous radiation exposure.**

Note For additional regulatory and compliance information, see the *Cisco Optical Transport Products Safety and Compliance Information*.

OC192 LR/STM64 LH 1550 Card Description

The OC192 LR/STM64 LH 1550 card provides one long-range SONET/SDH OC-192 port compliant with ITU G.707, G.957, and Telcordia GR-1377 and GR-253. The card port operates at 9.96 Gbps over unamplified distances up to 80 km with different types of fiber such as C-SMF or dispersion compensated fiber limited by loss and/or dispersion. The card supports VT and non-concatenated or concatenated payloads.

Figure 1 shows the OC192 LR/STM64 LH 1550 faceplate and a block diagram of the card. Figure 2 on page 4 shows an enlarged view of the faceplate warning.

Figure 1 OC192 LR/STM64 LH 1550 faceplate and block diagram

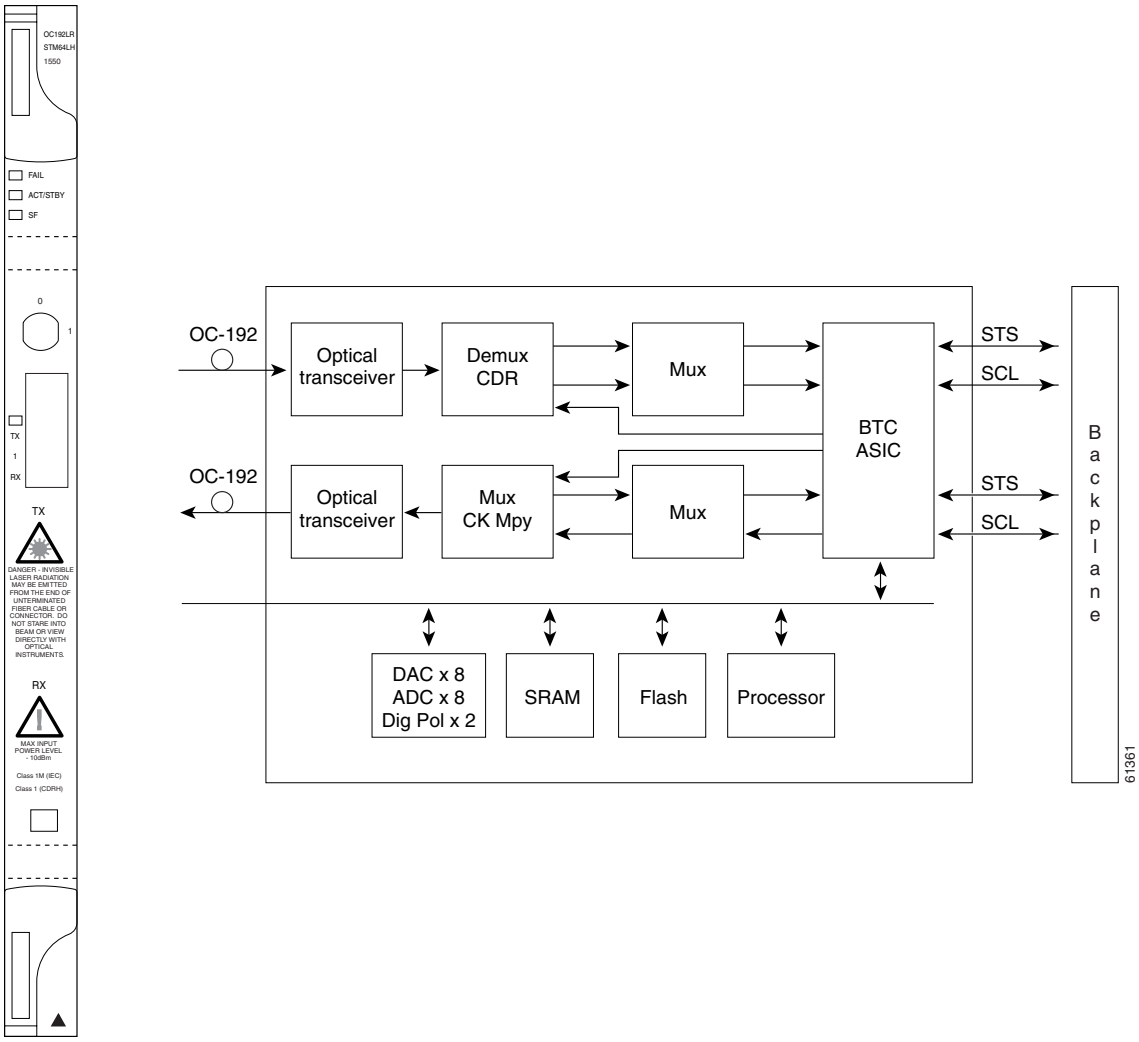
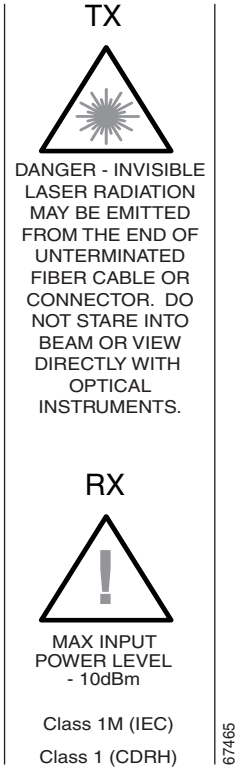


Figure 2 Enlarged section of the OC192 LR/STM64 LH 1550 faceplate



Caution You must use a 19 to 24 dB (20 recommended) fiber attenuator when connecting a fiber loopback to an OC192 LR/STM64 LH 1550 card. Never connect a direct fiber loopback. Using fiber loopbacks causes irreparable damage to the OC-192 card. A Tx to Rx connection that is not attenuated will damage the receiver.

You can install OC192 LR/STM64 LH 1550 cards in any high-speed slot on the ONS 15454 and provision the card as a drop or span card in a two-fiber or four-fiber BLSR, path protection, or in an ADM (linear) configuration.

The OC-192 card port features a 1550 nm laser and contains a transmit and receive connector (labeled) on the card faceplate.

Warning **On the OC-192 card, the laser is on when the card is booted and the safety key is in the on position (labeled 1). The port does not have to be in service for the laser to be on. The laser is off when the safety key is off (labeled 0).**

The card uses a dual SC connector for optical cable termination. The card supports 1+1 unidirectional and bidirectional facility protection. It also supports 1:1 protection in four-fiber bidirectional line switched ring applications where both span switching and ring switching may occur.

The OC192 LR/STM64 LH 1550 card detects SF, LOS, or LOF conditions on the optical facility. See the *Cisco ONS 15454 Troubleshooting Guide* for a description of these conditions. The card also counts section and line BIT errors from B1 and B2 byte registers in the section and line overhead.

OC192 LR/STM64 LH 1550 Card-Level Indicators

The OC192 LR/STM64 LH 1550 card has three card-level LED indicators.

Table 1 OC192 LR/STM64 LH 1550 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.
ACT/STBY LED **Green (Active)** **Amber (Standby)**	When the ACTV/STBY LED is green, the OC-192 card is operational and ready to carry traffic. When the ACTV/STBY LED is amber, the OC-192 card is operational and in standby (protect) mode.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF or high BERs on the card's port. 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.

OC192 LR/STM64 LH 1550 Port-Level Indicators

You can find the status of the OC192 LR/STM64 LH 1550 card port using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of the 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 Guide* for a complete description of the alarm messages.

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam or 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. Use of controls or adjustments or performance of procedures other than those specified may result in hazardous radiation exposure.**

OC192 LR/STM64 LH 1550 Compatibility

Use the XC10G card, the TCC+/TCC2 card, the new 15454-SA-ANSI shelf assembly, and Software R3.1 or higher to enable the OC192 LR/STM64 LH 1550 card.

OC192 LR/STM64 LH 1550 Card Specifications

- Line
  - Bit Rate: 9.96 Gbps
  - Code: Scrambled NRZ
  - Fiber: 1550 nm Single Mode
- Loopback Modes: Terminal and Facility

Note You must use a 19 to 24 dB (20 recommended) fiber attenuator when connecting a fiber loopback to an OC192 LR/STM64 LH 1550 card. Never connect a direct fiber loopback.

  - Connectors: SC
  - Compliance: Telcordia SONET, GR-GSY-00253, ITU-T G.707, ITU-T G.957
- Transmitter
  - Max. Transmitter Output Power: +10 dBm
  - Min. Transmitter Output Power: +7 dBm
  - Center Wavelength: 1530 nm – 1565 nm
  - Nominal Wavelength: 1550 nm
  - Transmitter: LN (Lithium Niobate) external modulator transmitter
- Receiver
  - Max. Receiver Level: -10 dBm
  - Min. Receiver Level: -19 dBm
  - Receiver: APD/TIA
  - Link Loss Budget: 24 dB min., with no dispersion or 22 dB optical path loss at BER = 1- exp (-12) including dispersion
- Environmental
  - Operating Temperature:

    C-Temp (15454-OC192LR1550): 0 to +55 degrees Celsius
  - Operating Humidity: 5 - 95%, non-condensing
  - Power Consumption: 72.20 W, 1.50 amps, 246.52 BTU/Hr.
- Dimensions
  - Height:12.650 in.
  - Width: 0.716 in.
  - Depth: 9.000 in.
  - Card Weight: 3.1 lbs, 1.3 kg
- Compliance
  - ONS 15454 OC192/STM64 cards, when installed in a system, comply with these standards: Safety: UL 1950, CSA C22.2 No. 950, EN 60950, IEC 60950
  - Eye Safety Compliance: Class I (21 CFR 1040.10 and 1040.11) and Class 1M (IEC 60825-12001-01) laser products

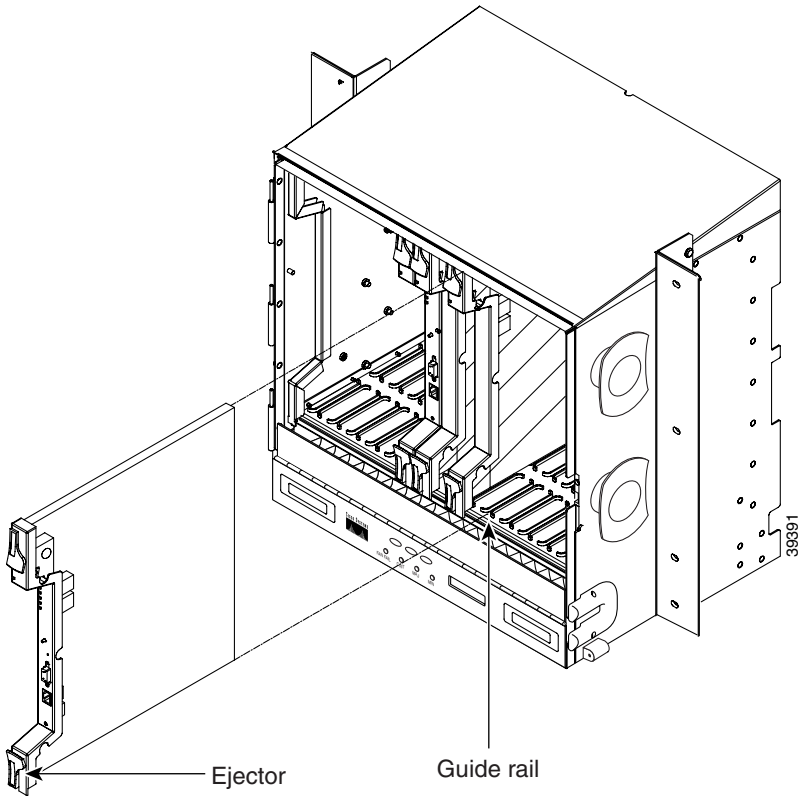
Installation Procedures

Use this section if you are installing the OC-192 card for the first time. After you become familiar with ONS 15454 card installation and boot up, use this section as a reference. For information about fiber optic cable installation, see the *Cisco ONS 15454 Procedure Guide*.

Caution 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-192 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 3 shows general card installation.

Figure 3 Installing a card in an ONS 15454



Procedure: Install the OC-192 Card

Although the installation procedure is the same for optical and electrical, you must install the optical cards before installing the electrical cards.

Warning **Before installing an OC-192 card, make sure the safety key on the faceplate is in off position (labeled 0). When in the on position (labeled 1), the laser is activated.**

Step 1 Open the card ejectors.

Step 2 Slide the card along the guide rails into the correct slot.

Step 3 Close the ejectors.

Step 4 Verify that power is applied to the shelf assembly.

Step 5 Verify the LED activity, as described in Table 2.

Table 2 LED Activity during Optical and Electrical Card Installation

Card Type	LED Activity
OC-192	1. The red FAIL LED turns on and remains lit for 20 to 30 seconds. 2. The red FAIL LED blinks for 35 to 45 seconds. 3. All LEDs blink once and turn off for 5 to 10 seconds. 4. The ACT LED turns on.

Step 6 Verify that the ACT or ACT/STBY LED is on. The signal fail (SF) LED can persist until all card ports connect to their far end counterparts and a signal is present.

Step 7 When you have displayed Cisco Transport Controller (CTC) on your workstation, verify that the card appears in the correct slot on the CTC node view. See the *Cisco ONS 15454 Procedure Guide* for CTC information and setup instructions.

Card Turn Up

Follow the steps in this section to verify card turn up. If one or more of the LED or CTC software screen conditions are not met, see the "Card Boot Up" section on page 9. 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+/TCC2 card, at least one TCC+/TCC2 card must be installed in order to boot the OC-192 card.

Procedure: Verify Successful Turn Up of the OC-192 Card

Step 1 Install the OC-192 card in any high speed slot (Slots 5, 6, 12 and 13 are high-speed slots).

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, amber 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

After you install a Cisco ONS 15454 card in a valid card slot, the card's software automatically updates to the version that operates correctly with the system software installed on the TCC+/TCC2. When the TCC+/TCC2 is writing to the active or standby TCC+/TCC2, its Active or Standby LED will blink. To prevent memory corruption, do not pull the TCC+/TCC2 out during this time. You can use CTC inventory commands to configure the card software. See the *Cisco ONS 15454 Procedure Guide* for more information.

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-192 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 *Cisco ONS 15454 Procedure Guide*.

Related Documentation

- *Cisco ONS 15454 Procedure Guide*
- *Cisco ONS 15454 Reference Manual*
- *Cisco ONS 15454 Troubleshooting 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

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