

This chapter provides a description of Cisco ONS 15454 SDH shelf and backplane hardware. Card and cable descriptions are provided in [Common Control Cards](#), [Electrical Cards](#), [Optical Cards](#), [Ethernet Cards](#), and [Storage Access Networking Cards](#). To install equipment, refer to the *Cisco ONS 15454 SDH Procedure Guide*.

Chapter topics include:

- [Overview](#)
- [Front Door](#)
- [Front Mount Electrical Connection](#)
- [E1-75/120 Conversion Panel](#)
- [Coaxial Cable](#)
- [Twisted-Pair Balanced Cable](#)
- [Cable Routing and Management](#)
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- [Power and Ground Description](#)
- [Alarm, Timing, LAN, and Craft Pin Connections](#)
- [Cards and Slots](#)
- [Software and Hardware Compatibility](#)

**Note:** The Cisco ONS 15454 SDH assembly is intended for use with telecommunications equipment only.

**Caution!** Unused multiservice card slots should be filled with a filler card (Cisco P/N 15454-BLANK) and unused FMEC slots should be covered with a blank faceplate (Cisco P/N 15454E-BLANK-FMEC). The filler cards and blank faceplates ensure proper airflow when operating the ONS 15454 SDH without the front door attached, although Cisco recommends that the front door remain attached.

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## Overview

When installed in an equipment rack, the ONS 15454 SDH assembly is typically connected to a fuse and alarm panel to provide centralized alarm connection points and distributed power for the ONS 15454 SDH. Fuse and alarm panels are third-party equipment and are not described in this documentation. If you are unsure about the requirements or specifications for a fuse and alarm panel, consult the user documentation for the related equipment. The front door of the ONS 15454 SDH allows access to the shelf assembly, fan-tray assembly, and cable-management area. The FMEC cover at the top of the shelf allows access to power connectors, external alarms and controls, timing input and output, and craft interface terminals.

You can mount the ONS 15454 SDH in an ETSI rack. The shelf assembly weighs approximately 26 kg (57 pounds) with no cards installed. The shelf assembly includes a front door and a Front Mount Electrical Connection (FMEC) cover for added security, a fan tray module for cooling, and extensive cable-management space.

All ONS 15454 SDH optical cards have SC connectors on the card faceplate, except the STM-1SH 1310-8 card, which has LC connectors. Fiber-optic cables are routed into the front of the optical and Ethernet cards. Electrical cards (E-1, E-3, DS3i, STM-1E) require FMEC cards to provide the cable connection points for the shelf assembly.

The ONS 15454 ETSI is powered using - 48 VDC power. Negative and return power terminals are connected via the MIC-A/P and the MIC-C/T/P FMECs. The ground terminal is connected via the 2-hole grounding lug.

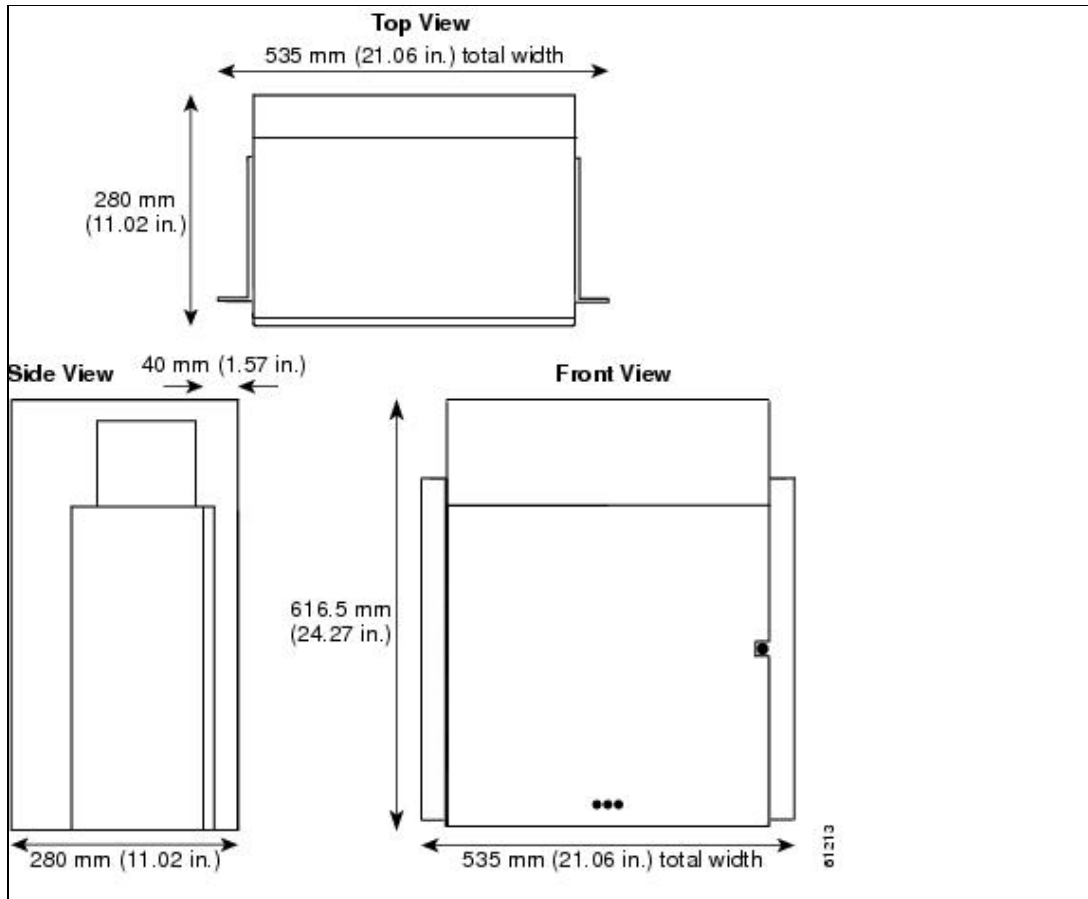
**Note:** In this chapter, the terms "ONS 15454 SDH" and "shelf assembly" are used interchangeably. In the installation context, these terms have the same meaning. Otherwise, shelf assembly refers to the physical steel enclosure that holds cards and connects power, and ONS 15454 SDH refers to the entire system, both hardware and software.

Install the ONS 15454 SDH in compliance with your local and national electrical codes:

- United States: National Fire Protection Association (NFPA) 70; United States National Electrical Code
- Canada: Canadian Electrical Code, Part I, CSA C22.1
- Other countries: If local and national electrical codes, are not available, refer to IEC 364, Part 1 through Part 7.

Figure 1-1 provides the dimensions of the ONS 15454 SDH.

**Figure 1-1: ONS 15454 SDH Dimensions**

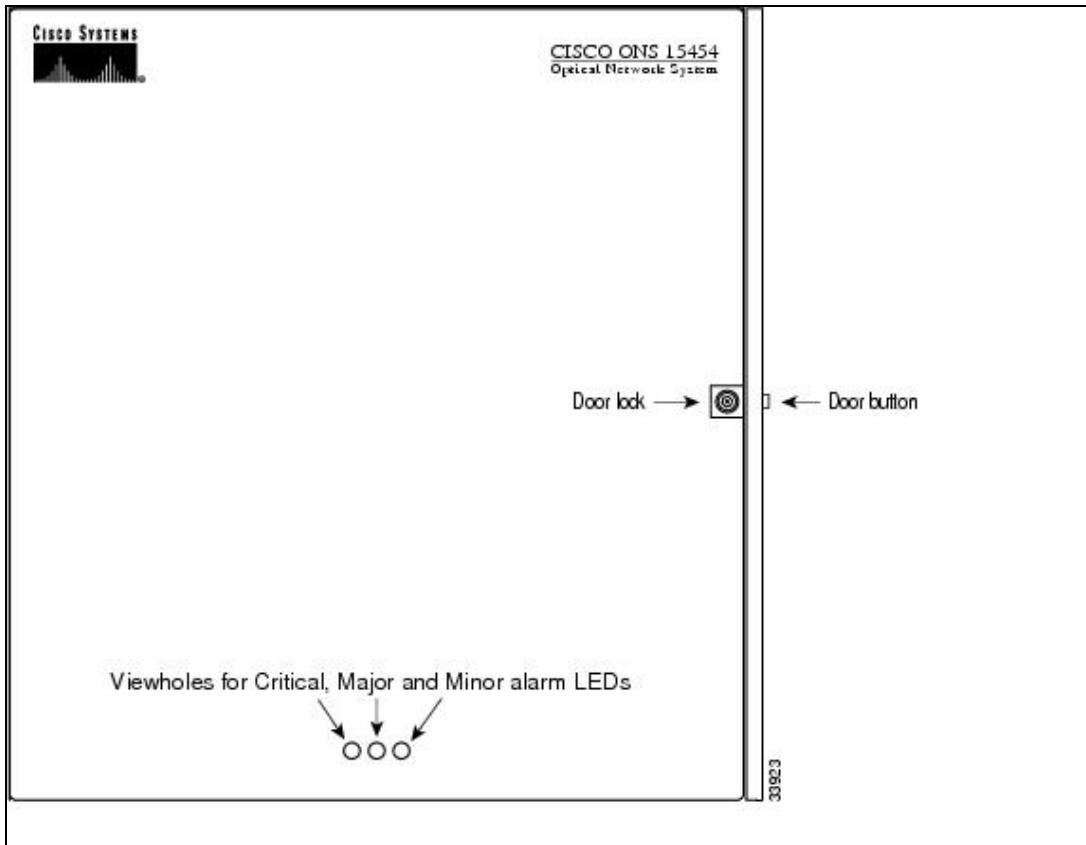


## Front Door

The Critical, Major, and Minor alarm LEDs visible through the front door indicate whether a critical, major, or minor alarm is present anywhere on the ONS 15454 SDH. These LEDs must be visible so technicians can quickly determine if any alarms are present. You can use the LCD to further isolate alarms.

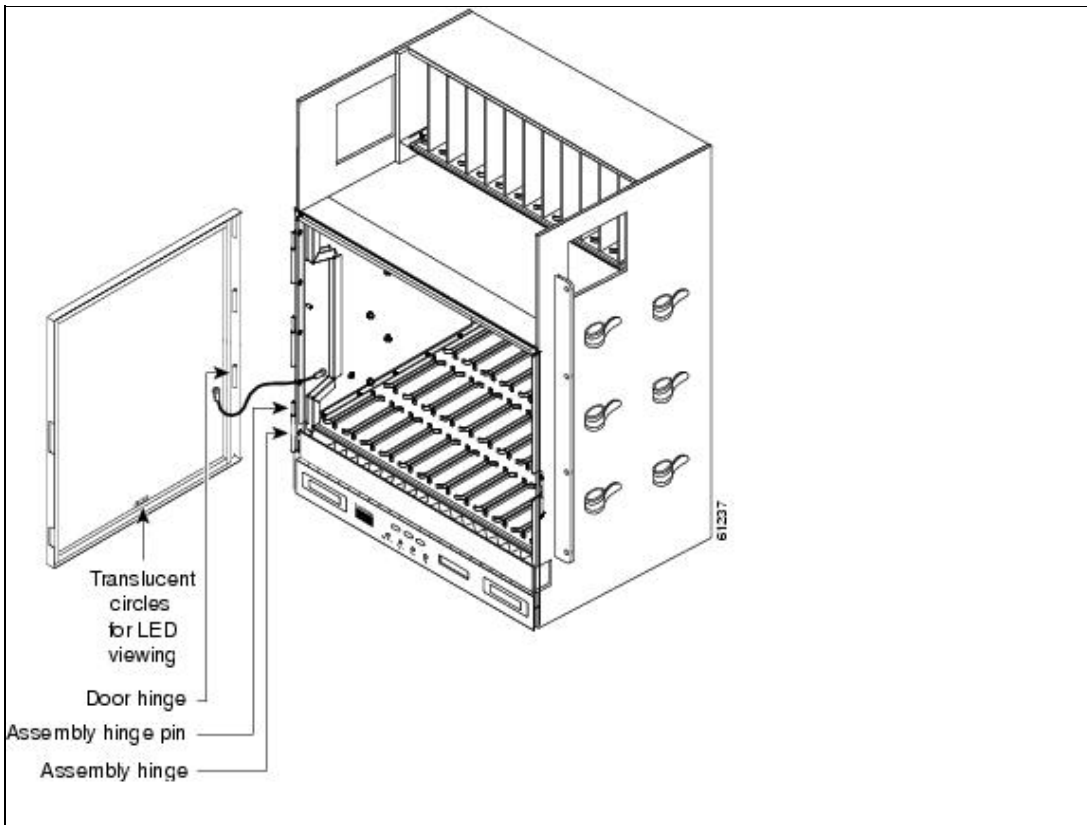
The ONS 15454 SDH features a locked door to the front compartment. A pinned hex key that unlocks the front door ships with the ONS 15454 SDH. A button on the right side of the shelf assembly releases the door. The front door provides access to the shelf assembly, cable-management tray, fan-tray assembly, and LCD screen (Figure 1-2).

Figure 1-2: The ONS 15454 SDH Front Door



You can remove the front door of the ONS 15454 SDH to provide unrestricted access to the front of the shelf assembly ([Figure 1-3](#)).

Figure 1-3: Removing the ONS 15454 SDH Front Door



An erasable label is pasted on the inside of the front door ([Figure 1-4](#)). You can use the label to record slot assignments, port assignments, card types, node ID, rack ID, and serial number for the ONS 15454 SDH.

**Figure 1-4: Front-Door Erasable Label**

| SHELF ID:   |   | RACK ID: |   |   |   |   | SERIAL #: |   |     |    | IP ADDRESS: |    |    |    | MAC ADDRESS: |    |    |  |
|-------------|---|----------|---|---|---|---|-----------|---|-----|----|-------------|----|----|----|--------------|----|----|--|
| SLOT NUMBER | 1 | 2        | 3 | 4 | 5 | 6 | 7         | 8 | 9   | 10 | 11          | 12 | 13 | 14 | 15           | 16 | 17 |  |
| CARD NAME   |   |          |   |   |   |   | TCC       |   | --- |    | TCC         |    |    |    |              |    |    |  |
| 1           |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 2           |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 3           |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 4           |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 5           |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 6           |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 7           |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 8           |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 9           |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 10          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 11          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 12          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 13          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 14          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 15          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 16          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 17          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 18          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 19          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 20          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 21          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 22          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 23          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 24          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 25          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 26          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 27          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 28          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 29          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 30          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 31          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 32          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 33          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 34          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 35          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 36          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 37          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 38          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 39          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 40          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 41          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |
| 42          |   |          |   |   |   |   |           |   |     |    |             |    |    |    |              |    |    |  |

**PORT ASSIGNMENTS**

**⚠ DANGER**  
**GEFAHR**  
**PELIGRO**  
**DANGER**  
**危險**

PRELUDE LASER RADIATION MAY RE-EMITTED FROM THE OPTICAL CARDS AT THE END OF THE TERMINALS IF NOT CORRECTLY CONNECTED. DO NOT STARE INTO THE BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. THIS EQUIPMENT IS A CLASS I (OR CLASS II) LASER PRODUCT. THIS PRODUCT COMPLIES WITH THE REGULATORY PERFORMANCE STANDARDS OF 21 CFR 1040.10 AND 1040.11, IEC 60825-1 AND IEC 60825-2.

DE OPTISCHEN KARTEN KÖNNEN NEBEN LASERSTRahlung AUCH NICHT ABGESCHLOSSENER FASERKABELN, SONDERN BESONDERER LASERSTRahlung EMITTERN. NICHT IN DEN STRAHLEN BLICKEN, AUCH NICHT DIREKT MIT OPTISCHEN INSTRUMENTEN. DIESE ANWENDUNG IST EIN LASERPRODUKT DER KLASSE I (ODER DER KLASSE II) DES LASERPRODUKTES. DIESES PRODUKT ENTSPICHT DEN STANDARDS FÜR STRAHLENGESTIRUNG 21 CFR 1040.10 UND 1040.11, IEC 60825-1 UND IEC 60825-2.

POUR UN PRÉCAUTION LASER INVISIBLE DE LAS DANGERS OPTIQUES EN EL EXTREMO DE LOS CABLES O DIRECTORES DE FIBRA OPTICA NO TERMINADOS. NO MIRAR DIRECTAMENTE AL RAYO NI VER DIRECTAMENTE CON INSTRUMENTOS OPTICOS. ESTE EQUIPO ES UN PRODUCTO DE LASER DE CLASE I (O DE CLASE II) DE ESTE PRODUCTO. CUMPLE CON LOS ESTANDARES DE DESEMPEÑO DE RADIACIÓN DE 21 CFR 1040.10 Y 1040.11, CEI 60825-1 Y CEI 60825-2.

ÉMISSION POSSIBLE DE RAYONS LASER À PARTIR DES CARTES OPTIQUES DE TROUS À L'EXTREMITÉ DES CONNECTEURS DES CÂBLES OPTIQUES NON RABOTÉS. NE PAS REGARDER LE FAISCEAU DIRECTEMENT NI LUMIÈRE À L'ŒIL À TRAVERS INSTRUMENTS OPTIQUES. CE T'APPAREIL EST UN PRODUIT LASER DE CLASSE I (OU DE CLASSE II) DE CE PRODUIT. ESTI CONFORME A LOS NORMAS DE PERFORMANCE DE RADIACION DE 21 CFR 1040.10 ET 1040.11, IEC 60825-1 ET IEC 60825-2.

本設備於光纖連接或線路光纖端之處，可能會放射出雷射光線，請勿直視雷射光線。  
 請勿直視雷射光線，亦勿透過光學儀器直視雷射光線。  
 本設備符合雷射產品之傳統性能標準 (FEDERAL PERFORMANCE STANDARDS) 21 CFR 1040.10 及 1040.11，IEC 60825-1 及 IEC 60825-2 之規定。

**⚠ CAUTION**  
 THIS UNIT MAY HAVE HOT SURFACES. PLEASE CONTACT THE SERVICE AGENT FOR ASSISTANCE TO PREVENT INJURY TO PERSONS OR TO DAMAGE TO PROPERTY.  
 NO OPERATE SURVEILLANCE PARTS WHEN SURVEILLANCE TO CONTROL PERSONNEL.  
 TO MAINTAIN FOR COMPLIANCE, REPLACE FRONT COVER AFTER SERVICE.  
 ⚠ ELECTRIC SHOCK HAZARD TO COVER.

**VORSICHT**  
 DIESE EINHEIT KANN HEIßE OBERFLÄCHEN HABEN. WENN SIE HILFE BENÖTIGEN, WENDEN SICH AN DEN SERVICEAGENTEN FÜR HILFE, UM VERLETZUNGEN AN MENSCHEN ODER SCHADEN AN EIGENTUM ZU VERMEIDEN.  
 FÜR DIE WARTUNG VON ÜBERWACHUNGSTEILEN WENN ÜBERWACHUNGSPERSONNEL ZU STEUERN.  
 FÜR DIE WARTUNG FÜR COMPLIANCE, ERSETZEN SIE DIE VORDERABDECKUNG NACH DEM SERVICE.  
 ⚠ ELEKTROSCHOCKGEFAHR FÜR DIE ABDECKUNG.

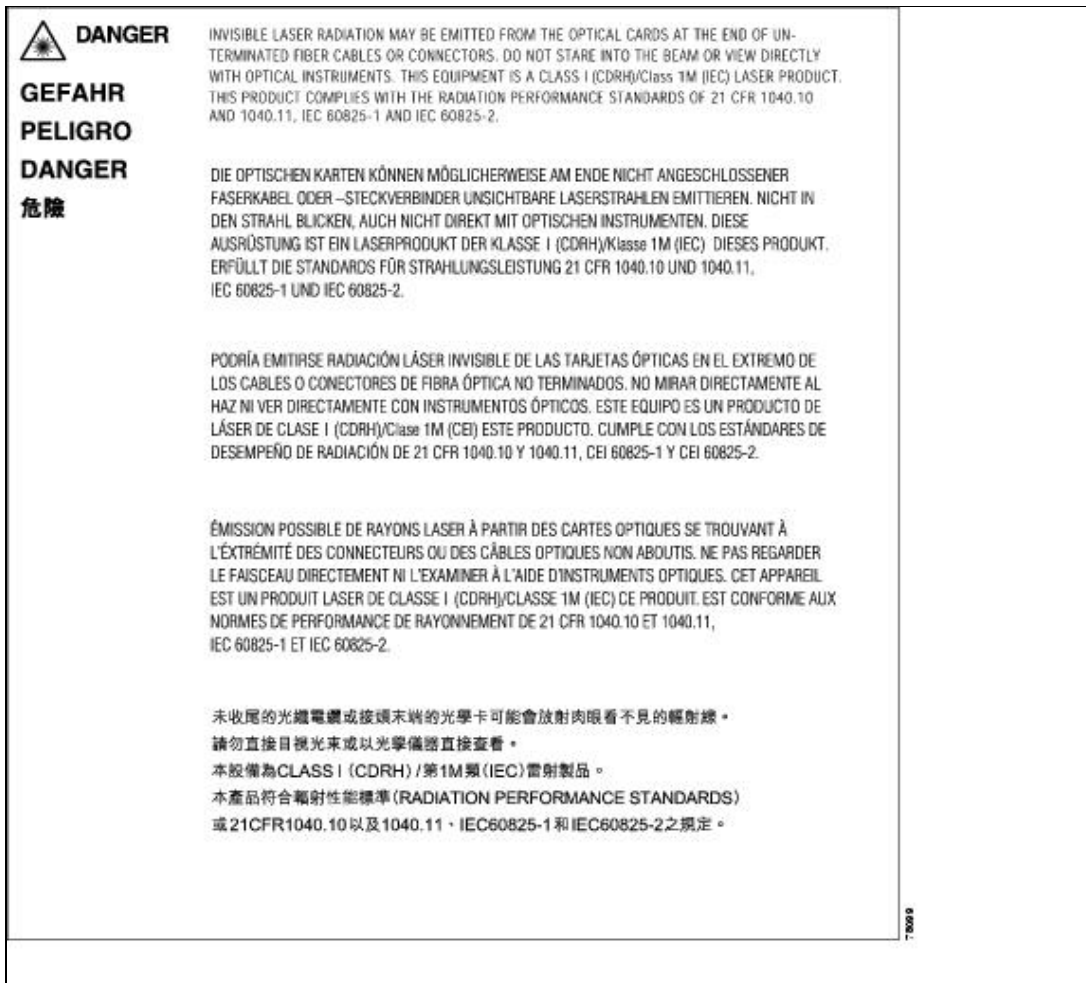
**PRECAUCIÓN**  
 ESTE EQUIPO PUEDE TENER SUPERFICIES CALIENTES. CONTACTE AL AGENTE DE SERVICIO PARA OBTENER AYUDA Y EVITAR LESIONES A PERSONAS O DAÑO A PROPIEDAD.  
 NO OPERAR LAS PARTES DE VIGILANCIA CUANDO SE OPERA PARA CONTROLAR AL PERSONAL.  
 PARA MANTENER EL CUMPLIMIENTO, REEMPLAZA LA CUBIERTA DEL FRENTE DESPUÉS DEL SERVICIO.  
 ⚠ PELIGRO DE GOLPE DE CORRIENTE AL COBERTOR.

**ATTENTION**  
 CETTE UNITÉ PEUT AVOIR DES SURFACES CHAUDES. CONTACTEZ L'AGENT DE SERVICE POUR OBTENIR DE L'AIDE ET ÉVITER LES BLESSURES À PERSONNES OU LES DOMMAGES À LA PROPRIÉTÉ.  
 L'OPÉRATION DES PARTIES DE SURVEILLANCE QUAND LE PERSONNEL EST CONTRÔLÉ.  
 POUR REMPLIR LES OBLIGATIONS DE CONFORMITÉ, REMPLACEZ LE COUVERTURE AVANT APRÈS LE SERVICE.  
 ⚠ DANGER DE CHOC ÉLECTRIQUE À LA COUVERTURE.

**注意**  
 この装置は熱い表面を持つ可能性があります。ヘルプが必要な場合は、サービスエージェントに連絡して、怪我や財産の損傷を防止してください。  
 監視部品を操作するときに監視操作を行うことは、監視操作を妨げます。  
 適合性を維持するために、サービス後に前面カバーを交換してください。  
 ⚠ カバーに電撃の危険があります。

The front door label also includes the Class I and Class 1M laser warning (Figure 1-5).

Figure 1-5: Laser Warning on the Front-Door Label



## Front Mount Electrical Connection

The positive and negative power terminals are located on FMEC cards in the Electrical Facility Connection Assembly (EFCA). The ground connection is the grounding receptacle on the side panel of the shelf.

The ONS 15454 SDH EFCA at the top of the shelf has 12 FMEC slots numbered sequentially from left to right (18 to 29). Slots 18 to 22 and 25 to 29 provide electrical connections. Slots 23 and 24 host the MIC-A/P and MIC-C/T/P cards, respectively.

**Caution!** The faceplate screws of the MIC-A/P and MIC-C/T/P cards must be tighten with 1.0Nm torque.

FMEC-E1, FMEC-DS1/E1, FMEC E1-120NP, and FMEC E1-120PROA cards can be installed in Slots 18 to 21; the FMEC E1-120PROB card can be installed in Slots 26 to 29; the FMEC-E3/DS3 and FMEC STM1E 1:1 cards can be installed in Slots 18 to 21 or Slots 26 to 29. FMEC electrical card assignment is as follows:

- FMEC Slot 18 supports an electrical card in Slot 1.
- FMEC Slot 19 supports an electrical card in Slot 2.
- FMEC Slot 20 supports an electrical card in Slot 3.
- FMEC Slot 21 supports an electrical card in Slot 4.
- FMEC Slot 22 supports an electrical card in Slot 5.
- FMEC Slot 23 hosts the MIC-A/P alarm and power FMEC.
- FMEC Slot 24 supports the MIC-C/T/P timing, craft, and power FMEC.
- FMEC Slot 25 supports an electrical card in Slot 13.
- FMEC Slot 26 supports an electrical card in Slot 14.

Figure 1-5: Laser Warning on the Front-Door Label

- FMEC Slot 27 supports an electrical card in Slot 15.
- FMEC Slot 28 supports an electrical card in Slot 16.
- FMEC Slot 29 supports an electrical card in Slot 17.

FMEC slots have symbols indicating the type of cards that you can install in the slots. Each ONS 15454 SDH FMEC has a corresponding symbol. The symbol on the FMEC must match the symbol on the slot. [Table 1-1](#) shows the slot-FMEC symbol definitions.

**Table 1-1: Slot and FMEC Symbols**

| Color/Shape            | Definition  |
|------------------------|---|
| Orange/Circle          | Electrical 75-ohm E-1 connection via 1.0/2.3 miniature coax connectors. Only install ONS 15454 SDH FMECs with a circle symbol on the faceplate.             |
|                        | Electrical 120-ohm E-1 connection via DB-37 connectors. Only install ONS 15454 SDH FMECs with a circle symbol on the faceplate.                             |
|                        | Electrical 75-ohm E3/DS3 connection via 1.0/2.3 miniature coax connectors. Only install ONS 15454 SDH FMECs with a circle symbol on the faceplate.          |
| Green/Star             | Electrical 75-ohm E1-42 and STM-1e connections via 1.0/2.3 miniature coax connectors. Only install ONS 15454 SDH FMECs with a star symbol on the faceplate. |
| Red/Vertical ellipse   | Node power and interface for environmental alarms. Only install ONS 15454 SDH FMECs with a vertical ellipse symbol on the faceplate.                        |
| Red/Horizontal ellipse | Node power and LAN timing. Only install ONS 15454 SDH FMECs with a horizontal ellipse symbol on the faceplate.  |

[Table 1-2](#) lists the number of ports, line rates, connector options, and connector locations for ONS 15454 SDH electrical FMECs.

**Table 1-2: FMEC, Ports, Line Rates, and Connectors**

| FMEC            | Ports                               | Line Rate per Port | Connector Type                   | Connector Location   |
|-----------------|-------------------------------------|--------------------|----------------------------------|----------------------|
| FMEC-E1         | 14                                  | 2.048 Mbps         | 1.0/2.3 miniature coax connector | EFCA                 |
| FMEC-DS1/E1     | 14                                  | 2.048 Mbps         | DB-37                            | EFCA                 |
| FMEC E1-120NP   | 42                                  | 2.048 Mbps         | Molex 96-pin LFH connector       | EFCA                 |
| FMEC E1-120PROA | 3 to 42                             | 2.048 Mbps         | Molex 96-pin LFH connector       | EFCA, Slots 18 to 21 |
| FMEC E1-120PROB | 3 to 42                             | 2.048 Mbps         | Molex 96-pin LFH connector       | EFCA, Slots 26 to 29 |
| FMEC-E3/DS3     | 12                                  | 34.368 Mbps        | 1.0/2.3 miniature coax connector | EFCA                 |
|                 |                                     | 44.736 Mbps        |                                  |                      |
| FMEC STM1E 1:1  | 12 (protected) or 24 (nonprotected) | 155.52 Mbps        | 1.0/2.3 miniature coax connector | EFCA                 |

**Note:** The E1-120NP FMEC can only be used in Slots 18-21 and Slots 26-29. The STM1E 1:1 FMEC can only be used in Slots 18 and 19, 20 and 21, 26 and 27, or 28 and 29.



Table 1-3 provides color coding details for the cable assembly used with the Cisco ONS 15454 SDH E1-42 FMEC modules.

**Note:** For each colored code, the first color is solid and the second color is a stripe (tracer). A white-blue wire is solid white with a blue tracer, the blue-white wire is solid blue with a white tracer.

**Table 1-3: Color Coding for Cisco ONS 15454 SDH E1-42 FMEC Modules**

| <b>Bundle</b>        | <b>Pair</b> | <b>1st Conductor</b> | <b>2nd Conductor</b> |
|----------------------|-------------|----------------------|----------------------|
| Group 1 white-blue   | 1           | white-blue           | blue-white           |
|                      | 2           | white-orange         | orange-white         |
|                      | 3           | white-green          | green-white          |
|                      | 4           | white-brown          | brown-white          |
|                      | 5           | white-slate          | slate-white          |
|                      | 6           | red-blue             | blue-red             |
|                      | 7           | red-orange           | orange-red           |
|                      | 8           | red-green            | green-red            |
|                      | 9           | red-brown            | brown-red            |
|                      | 10          | red-slate            | slate-red            |
|                      | 11          | black-blue           | blue-black           |
| Group 2 white-blue   | 12          | black-orange         | orange-black         |
|                      | 13          | black-green          | green-black          |
|                      | 14          | black-brown          | brown-black          |
|                      | 15          | black-slate          | slate-black          |
|                      | 16          | yellow-blue          | blue-yellow          |
|                      | 17          | yellow-orange        | orange-yellow        |
|                      | 18          | yellow-green         | green-yellow         |
|                      | 19          | yellow-brown         | brown-yellow         |
|                      | 20          | yellow-slate         | slate-yellow         |
|                      | 21          | violet-blue          | blue-violet          |
| Group 3 white-orange | 22          | white-blue           | blue-white           |
|                      | 23          | white-orange         | orange-white         |
|                      | 24          | white-green          | green-white          |
|                      | 25          | white-brown          | brown-white          |
|                      | 26          | white-slate          | slate-white          |
|                      | 27          | red-blue             | blue-red             |
|                      | 28          | red-orange           | orange-red           |
|                      | 29          | red-green            | green-red            |
|                      | 30          | red-brown            | brown-red            |
|                      | 31          | red-slate            | slate-red            |
|                      | 32          | black-blue           | blue-black           |
| Group 4 white-orange | 33          | black-orange         | orange-black         |
|                      | 34          | black-green          | green-black          |
|                      | 35          | black-brown          | brown-black          |
|                      | 36          | black-slate          | slate-black          |

|  |    |               |               |
|--|----|---------------|---------------|
|  | 37 | yellow-blue   | blue-yellow   |
|  | 38 | yellow-orange | orange-yellow |
|  | 39 | yellow-green  | green-yellow  |
|  | 40 | yellow-brown  | brown-yellow  |
|  | 41 | yellow-slate  | slate-yellow  |
|  | 42 | violet-blue   | blue-violet   |

Table 1-4 details cable signal and pin matrix for the cable assembly used with the Cisco ONS 15454 SDH E1-42 FMEC modules.

**Table 1-4: Cable Signal and Pin Matrix for Cisco ONS 15454 SDH E1-42 FMEC Modules**

| Pin | Signal Connection | Bundle       | Conductor Color |
|-----|-------------------|--------------|-----------------|
| 1   | TX11-/TX32-       | white-blue   | white-blue      |
| 2   | TX11+/TX32+       |              | blue-white      |
| 3   | TX10-/TX31-       |              | white-orange    |
| 4   | TX10+/TX31+       |              | orange-white    |
| 5   | TX9-/TX30-        |              | white-green     |
| 6   | TX9+/TX30+        |              | green-white     |
| 7   | TX8-/TX29-        |              | white-brown     |
| 8   | TX8+/TX29+        |              | brown-white     |
| 9   | TX7-/TX28-        |              | white-slate     |
| 10  | TX7+/TX28+        |              | slate-white     |
| 11  | TX6-/TX27-        |              | red-blue        |
| 12  | TX6+/TX27+        |              | blue-red        |
| 13  | TX5-/TX26-        |              | red-orange      |
| 14  | TX5+/TX26+        |              | orange-red      |
| 15  | TX4-/TX25-        |              | red-green       |
| 16  | TX4+/TX25+        |              | green-red       |
| 17  | TX3-/TX24-        |              | red-brown       |
| 18  | TX3+/TX24+        |              | brown-red       |
| 19  | TX2-/TX23-        |              | red-slate       |
| 20  | TX2+/TX23+        |              | slate-red       |
| 21  | TX1-/TX22-        |              | black-blue      |
| 22  | TX1+/TX22+        |              | blue-black      |
| 23  | unused            | -            | -               |
| 24  | unused            | -            | -               |
| 25  | RX11-/RX32-       | white-orange | white-blue      |
| 26  | RX11+/RX32+       |              | blue-white      |
| 27  | RX10-/RX31-       |              | white-orange    |
| 28  | RX10+/RX31+       |              | orange-white    |
| 29  | RX9-/RX30-        |              | white-green     |
| 30  | RX9+/RX30+        |              | green-white     |
| 31  | RX8-/RX29-        |              | white-brown     |
| 32  | RX8+/RX29+        |              | brown-white     |
| 33  | RX7-/RX28-        |              | white-slate     |

Table 1-3: Color Coding for Cisco ONS 15454 SDH E1-42 FMEC Modules

|    |             |              |               |
|----|-------------|--------------|---------------|
| 34 | RX7+/RX28+  |              | slate-white   |
| 35 | RX6-/RX27-  |              | red-blue      |
| 36 | RX6+/RX27+  |              | blue-red      |
| 37 | RX5-/RX26-  |              | red-orange    |
| 38 | RX5+/RX26+  |              | orange-red    |
| 39 | RX4-/RX25-  |              | red-green     |
| 40 | RX4+/RX25+  |              | green-red     |
| 41 | RX3-/RX24-  |              | red-brown     |
| 42 | RX3+/RX24+  |              | brown-red     |
| 43 | RX2-/RX23-  |              | red-slate     |
| 44 | RX2+/RX23+  |              | slate-red     |
| 45 | RX1-/RX22-  |              | black-blue    |
| 46 | RX1+/RX22+  |              | blue-black    |
| 47 | unused      | -            | -             |
| 48 | unused      | -            | -             |
| 49 | TX21-/TX42- | white-blue   | black-orange  |
| 50 | TX21+/TX42+ |              | orange-black  |
| 51 | TX20-/TX41- |              | black-green   |
| 52 | TX20+/TX41+ |              | green-black   |
| 53 | TX19-/TX40- |              | black-brown   |
| 54 | TX19+/TX40+ |              | brown-black   |
| 55 | TX18-/TX39- |              | black-slate   |
| 56 | TX18+/TX39+ |              | slate-black   |
| 57 | TX17-/TX38- |              | yellow-blue   |
| 58 | TX17+/TX38+ |              | blue-yellow   |
| 59 | TX16-/TX37- |              | yellow-orange |
| 60 | TX16+/TX37+ |              | orange-yellow |
| 61 | TX15-/TX36- |              | yellow-green  |
| 62 | TX15+/TX36+ |              | green-yellow  |
| 63 | TX14-/TX35- |              | yellow-brown  |
| 64 | TX14+/TX35+ |              | brown-yellow  |
| 65 | TX13-/TX34- |              | yellow-slate  |
| 66 | TX13+/TX34+ |              | slate-yellow  |
| 67 | TX12-/TX33- |              | violet-blue   |
| 68 | TX12+/TX33+ |              | blue-violet   |
| 69 | unused      | -            | -             |
| 70 | unused      | -            | -             |
| 71 | unused      | -            | -             |
| 72 | unused      | -            | -             |
| 73 | RX21-/RX42- | white-orange | black-orange  |
| 74 | RX21+/RX42+ |              | orange-black  |
| 75 | RX20-/RX41- |              | black-green   |
| 76 | RX20+/RX41+ |              | green-black   |
| 77 | RX19-/RX40- |              | black-brown   |

Table 1-4: Cable Signal and Pin Matrix for Cisco ONS 15454 SDH E1-42 FMEC Modules

|    |             |   |               |
|----|-------------|---|---------------|
| 78 | RX19+/RX40+ |   | brown-black   |
| 79 | RX18-/RX39- |   | black-slate   |
| 80 | RX18+/RX39+ |   | slate-black   |
| 81 | RX17-/RX38- |   | yellow-blue   |
| 82 | RX17+/RX38+ |   | blue-yellow   |
| 83 | RX16-/RX37- |   | yellow-orange |
| 84 | RX16+/RX37+ |   | orange-yellow |
| 85 | RX15-/RX36- |   | yellow-green  |
| 86 | RX15+/RX36+ |   | green-yellow  |
| 87 | RX14-/RX35- |   | yellow-brown  |
| 88 | RX14+/RX35+ |   | brown-yellow  |
| 89 | RX13-/RX34- |   | yellow-slate  |
| 90 | RX13+/RX34+ |   | slate-yellow  |
| 91 | RX12-/RX33- |   | violet-blue   |
| 92 | RX12+/RX33+ |   | blue-violet   |
| 93 | unused      | - | -             |
| 94 | unused      | - | -             |
| 95 | unused      | - | -             |
| 96 | unused      | - | -             |

## E1-75/120 Conversion Panel

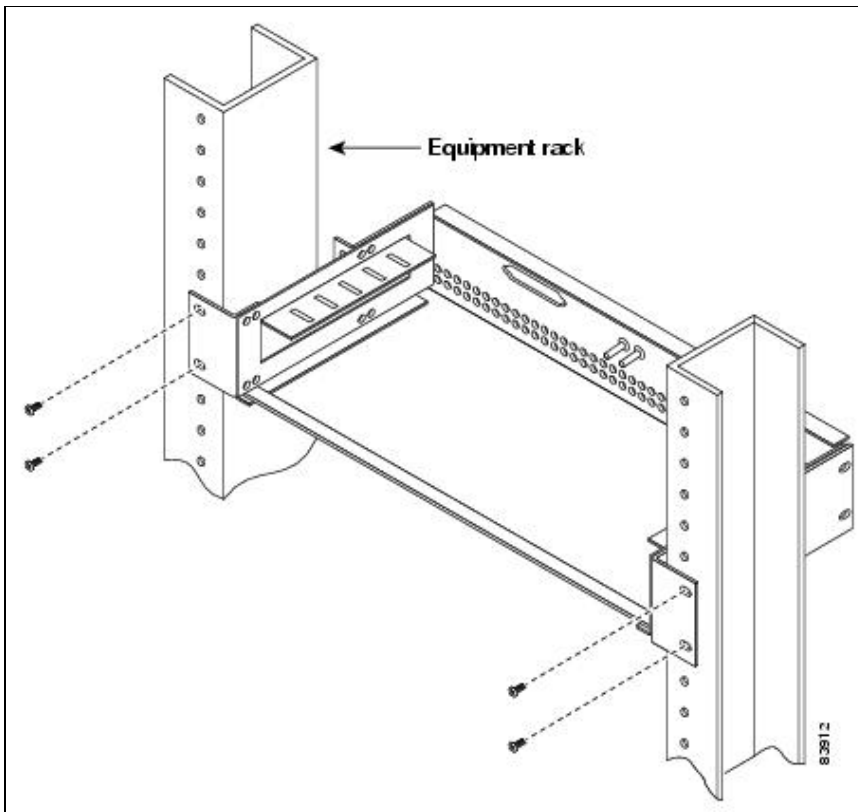
You need an E1-75/120 conversion panel if you want to convert the balanced 120-ohm interfaces of the E1-42 card and the corresponding FMECs to unbalanced 75-ohm interfaces.

The E1-75/120 contains eighty-four 1.0/2.3 miniature coax connectors (42 for transmit, 42 for receive) to the customer side and two Molex 96-pin LFH connectors to the E1-42 FMEC 120-ohm side. Each of the Molex 96-pin LFH connectors connects 21 inputs and 21 outputs. The E1-75/120 conversion panel is intended to be used in digital distribution frames (DDFs), ETSI racks, and ANSI racks.

You can install the E1-75/120 conversion panel in the rack of your ONS 15454 SDH or in a nearby rack. If you install the E1-75/120 conversion panel in a place where a longer cable is required, make sure that the total cable loss of the balanced 120-ohm cable and the unbalanced 75-ohm cable does not exceed the maximum allowed value. To ensure that the E1-75/120 conversion panel is secure, use one or two M6 mounting screws for each side of the shelf assembly. [Figure 1-6](#) shows the rack-mounting for the E1-75/120 conversion panel.

**Note:** If required, the mounting brackets of the E1-75/120 conversion panel can be uninstalled, rotated 90 degrees, and reinstalled to enable 19-inch (482.6 mm) rack mounting.

**Figure 1-6: Mounting the E1-75/120 Conversion Panel in a Rack**



## Coaxial Cable

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

All interfaces that are listed in [Table 1-2](#) with 1.0/2.3 miniature coax connectors (E-1, E-3, DS-3, and STM-1E) must be connected using a 75-ohm coaxial cable.

The electromagnetic compatibility (EMC) performance of the node depends on good-quality coaxial cables, such as Shuner Type G 03233 D or the equivalent.

## Twisted-Pair Balanced Cable

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

All E-1 interfaces that are listed in [Table 1-2](#) with DB-37 or with Molex 96-pin LFH connectors must be connected using a 120-ohm twisted-pair balanced cable. For the interfaces that use Molex 96-pin LFH connectors Cisco offers ready-made cables.

## Ethernet Cables

Ethernet cables use RJ-45 connectors, and are straight-through or crossover, depending on what is connected to them.

[Table 1-5](#) shows 100Base-TX connector pin assignments, used with E100 Ethernet cards in the ONS 15454.

**Table 1-5: E100-TX Connector Pinout**

| Pin | Cable Port |
|-----|------------|
| 1   | RD+        |
| 2   | RD-        |
| 3   | TD+        |
| 4   | NC         |
| 5   | NC         |
| 6   | TD-        |
| 7   | NC         |
| 8   | NC         |

Figure 1-7 shows the pin locations on 100BaseT connector.

**Figure 1-7: 100BaseT Connector Pins**

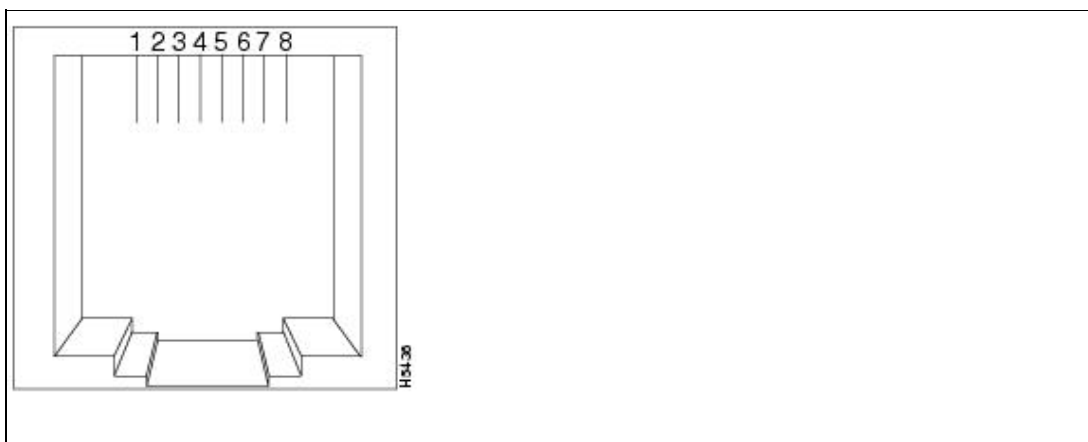


Figure 1-8 shows the straight-through Ethernet cable schematic. Use a straight-through cable when connecting to a router or a PC.

**Figure 1-8: Straight-Through Cable**

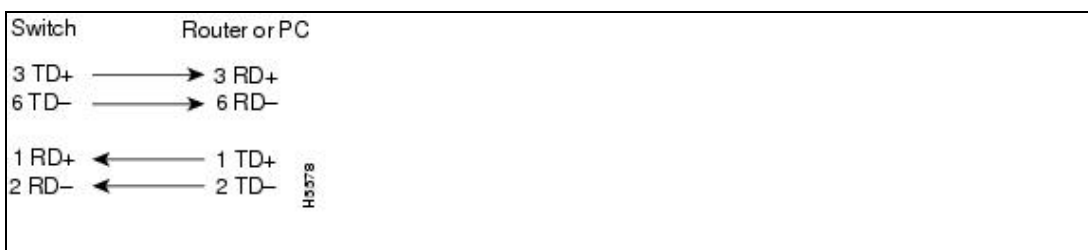
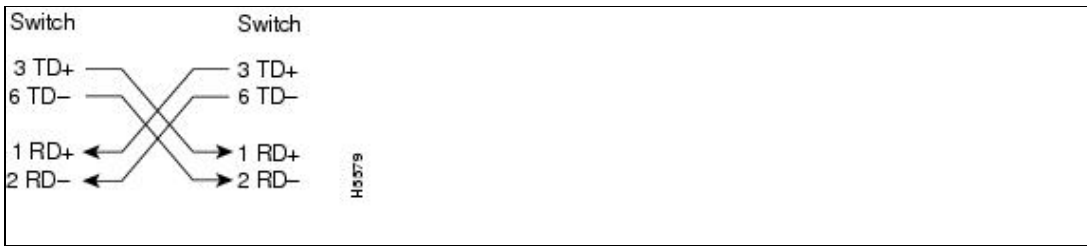


Figure 1-9 shows the crossover Ethernet cable schematic. Use a crossover cable when connecting to a switch or hub.

**Figure 1-9: Crossover Cable**



## Cable Routing and Management

The ONS 15454 SDH cable management facilities include the following:

- A cable-routing channel (behind the fold-down door) that runs the width of the shelf assembly, [Figure 1-10](#)
- Plastic horseshoe-shaped fiber guides at each side opening of the cable-routing channel that ensure the proper bend radius is maintained in the fibers, [Figure 1-11](#)

**Note:** You can remove the fiber guide if necessary to create a larger opening (if you need to route CAT-5 Ethernet cables out the side, for example). To remove the fiber guide, take out the three screws that anchor it to the side of the shelf assembly.

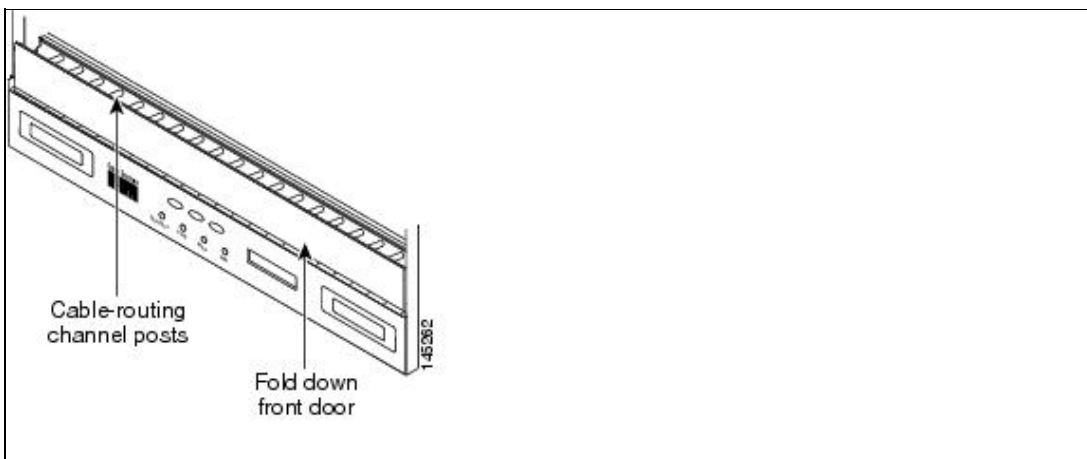
- A fold-down door that provides access to the cable-management tray
- Cable routing channel that enables you to route cables out either side

**Note:** To remove the jumper slack storage reels, take out the screw in the center of each reel.

- Optional fiber management tray (recommended for DWDM nodes)

[Figure 1-10](#) shows the cable management facilities that you can access through the fold-down front door, including the cable-routing channel and cable-routing channel posts.

**Figure 1-10: Managing Cables on the Front Panel**



## Fiber Management

The jumper routing fins are designed to route fiber jumpers out of both sides of the shelf. Slots 1 to 6 exit to the left, and Slots 12 to 17 exit to the right. [Figure 1-11](#) shows fibers routed from cards in the left slots, down through the fins, then exiting out the fiber channel to the left. The maximum capacity of the fiber routing

channel depends on the size of the fiber jumpers.

**Figure 1-11: Fiber Capacity**

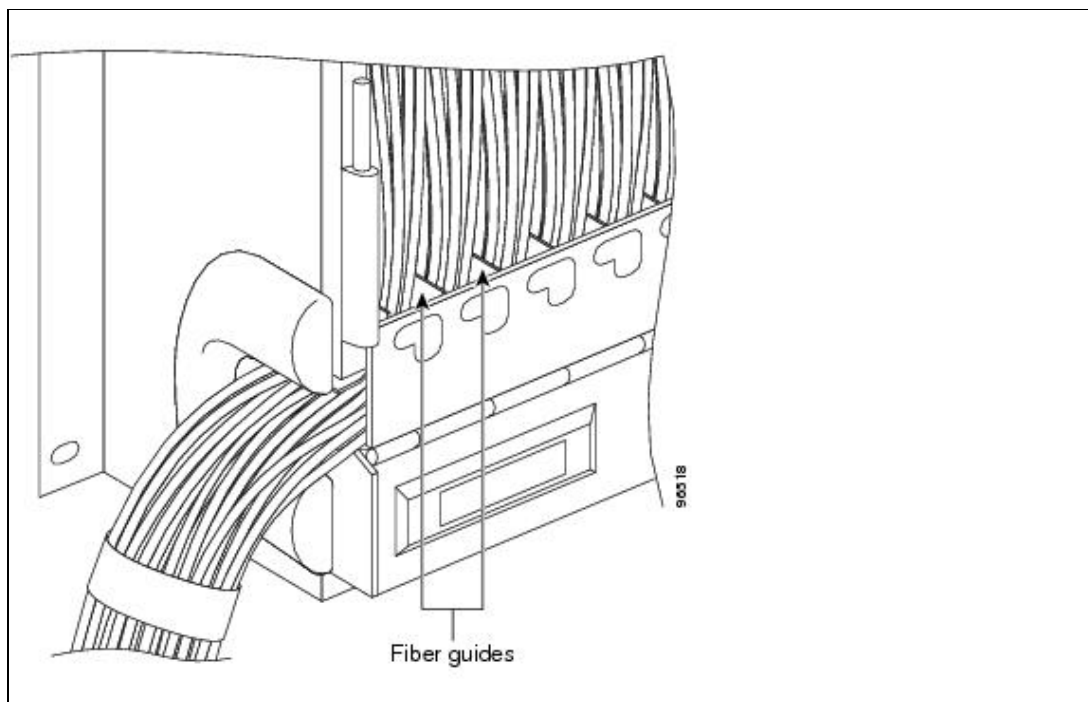


Table 1-6 provides the maximum capacity of the fiber channel for one side of a shelf, depending on fiber size and number of Ethernet cables running through that fiber channel.

**Table 1-6: Fiber Channel Capacity (One Side of the Shelf)**

| Fiber Diameter   | Maximum Number of Fibers Exiting Each Side |     |     |    |
|------------------|--|-----|-----|----|
|                  | 1.6 mm (0.6 inch)                          | 126 | 110 | 94 |
| 2 mm (0.7 inch)  | 80   | 70  | 60  |    |
| 3 mm (0.11 inch) | 36   | 31  | 26  |    |

Plan your fiber size according to the number of cards/ports installed in each side of the shelf. For example, if your port combination requires 36 fibers, 3 mm (0.11 inch) fiber is adequate. If your port combination requires 68 fibers, you must use 2 mm (0.07 inch) or smaller fibers.

## Fan-Tray Assembly

The fan-tray assembly is located at the bottom of the ONS 15454 SDH. After you install the fan-tray assembly, you only need to open the drawer if a fan fails, or if you need to replace or clean the fan-tray air filter. Do not operate an ONS 15454 SDH without a fan-tray air filter. Refer to the "Maintain the Node" chapter in the *Cisco ONS 15454 SDH Procedure Guide* for information about cleaning and maintaining the fan-tray air filter.

The fan-tray assembly is a removable drawer that holds fans and fan-control circuitry for the ONS 15454 SDH. Cisco recommends removing the front door of the chassis when removing or installing the fan-tray assembly. The front of the fan-tray assembly has an LCD screen that provides slot and port-level information for all ONS 15454 SDH card slots, including the number of critical, major, and minor alarms. For STM-N cards, you can use the LCD to determine if a port is in working or protect mode and is active or standby. It

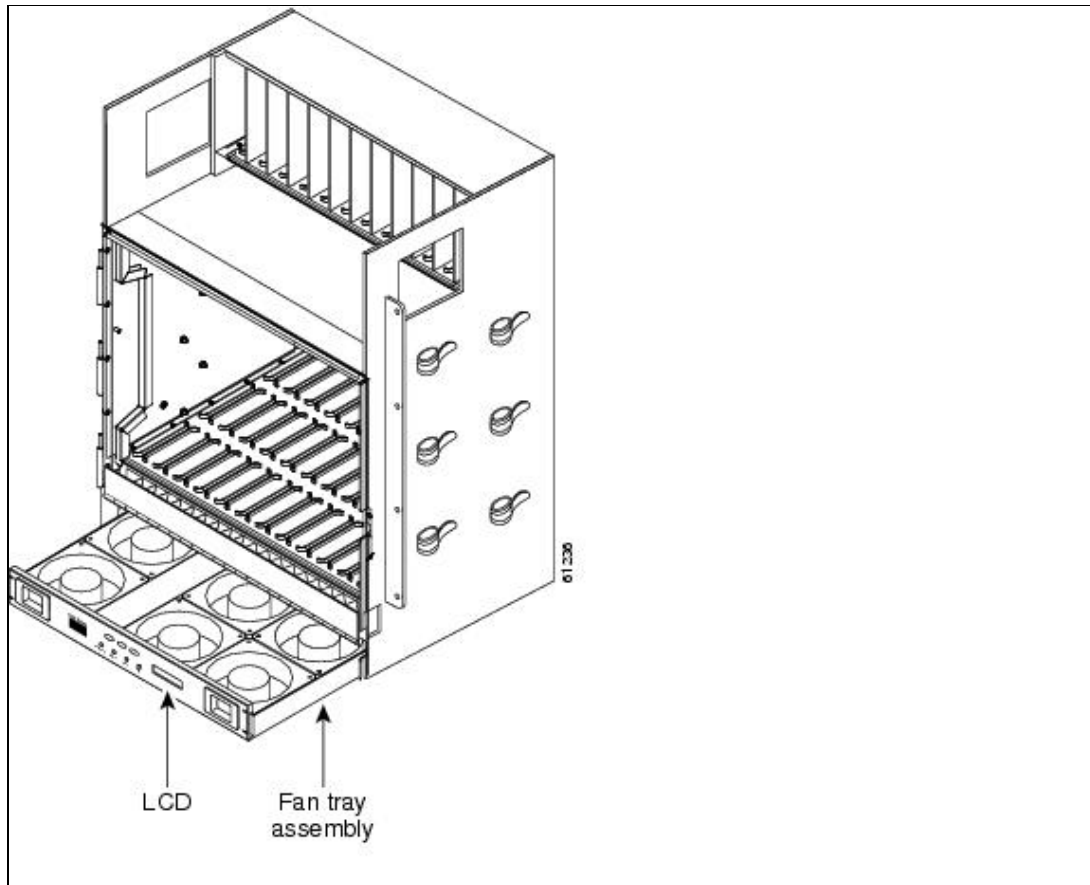


also displays whether the software load is SONET or SDH and the software version number.

The temperature measured by the TCC2/TCC2P sensors is displayed on the LCD screen.

See [Figure 1-12](#) for the position of the fan-tray assembly.

**Figure 1-12: Position of the Fan-Tray Assembly**



**Note:** 15454E-CC-FTA is compatible with Software Release 4.0 and greater and shelf assembly 15454-SA-ETSI.

## Fan Speed

If one or more fans fail on the fan-tray assembly, replace the entire assembly. You cannot replace individual fans. The red Fan Fail LED on the front of the fan tray illuminates when one or more fans fail. For fan tray replacement instructions, refer to the *Cisco ONS 15454 SDH Troubleshooting Guide*. The red Fan Fail LED clears after you install a working fan-tray assembly.

Fan speed is controlled by TCC2/TCC2P card temperature sensors. The sensors measure the input air temperature at the fan-tray assembly. Fan speed options are low, medium, and high. If the TCC2 card fails, the fans automatically shift to high speed. The temperature measured by the TCC2 sensors is displayed on the LCD screen.

**Caution!** As with the older fan-tray assemblies, the 15454E-CC-FTA Fan Fail LED on the front of the fan-tray assembly illuminates when one or more fans fail to indicate that a fan-tray assembly or AIP replacement is required. But the Fan Fail LED on the 15454E-CC-FTA will also illuminate when only one power source is connected to the chassis, and or any fuse blows. In such conditions, the Fan Alarm is

triggered and the fans run at maximum speed.

## Air Filter

The ONS 15454 SDH contains a reusable air filter that is installed beneath the fan-tray assembly.

The reusable filter is made of a gray, open-cell, polyurethane foam that is specially coated to provide fire and fungi resistance. Spare filters should be kept in stock. Clean the filter every three to six months. Replace the air filter every two to three years. Avoid cleaning the air filter with harsh cleaning agents or solvents.

**Caution!** Do not operate an ONS 15454 SDH without a fan-tray air filter. A fan-tray air filter is mandatory.

## Pilot Fuse

The Pilot Fuse in the Fan tray assembly allows you to blow a low rate fuse when the main fuse of the lower power battery is not installed in the equipment.

CC-FTAs 15454-CC-FTA 800-27558-01 and 15454-CC-FTA 800-27561-01 can automatically generate an electrical pulse (without external commands) at power on and about every 25-35 minutes in order to drain extra current from both the batteries. The amount of current and the duration of the pulse that the CC-FTA can generate, is suitable to blow the fuses listed in the [Table 1-7](#). Similar to CC-FTA, 15454-FTA3-T 800-23907-01 and 800-23907-05 can also operate the pilot fuses mentioned in [Table 1-7](#) when the main fuse is missing. Unlike CC-FTA, FTA3-T alternatively drains the current from the two batteries every 50-100 msec to feed the fans.

**Table 1-7: Pilot Fuse Ratings**

| Type of Fuse         | Current rating |
|----------------------|----------------|
| Bussmann GMT-18/100A | 18/100A        |
| Bussmann GMT-1/4A    | 1/4A           |
| Bussmann 70E         | 18/100A        |
| Bussmann 70F         | 1/4A           |

This is accomplished in the I-temp range (-40°C to +65°C) in either of these conditions:

- When the lower power battery is in the 43.0V to 60.0V range and the higher power battery is more than 1V greater than the lower power battery (or)
- When the lower power battery is in the 40.0V to 60.0V range and the difference between the two batteries does not exceed 0.5V.

## Power and Ground Description

Ground the equipment according to standards or local practices.

The ONS 15454 SDH has redundant -48 VDC power connectors on the MIC-A/P and MIC-C/T/P faceplates. To install redundant power feeds, use the two power cables shipped with the ONS 15454 SDH and one ground cable. For details, see the [MIC-A/P FMEC](#) and the [MIC-C/T/P FMEC](#).

**Caution!** Only use the power cables shipped with the ONS 15454 SDH.

## Alarm, Timing, LAN, and Craft Pin Connections

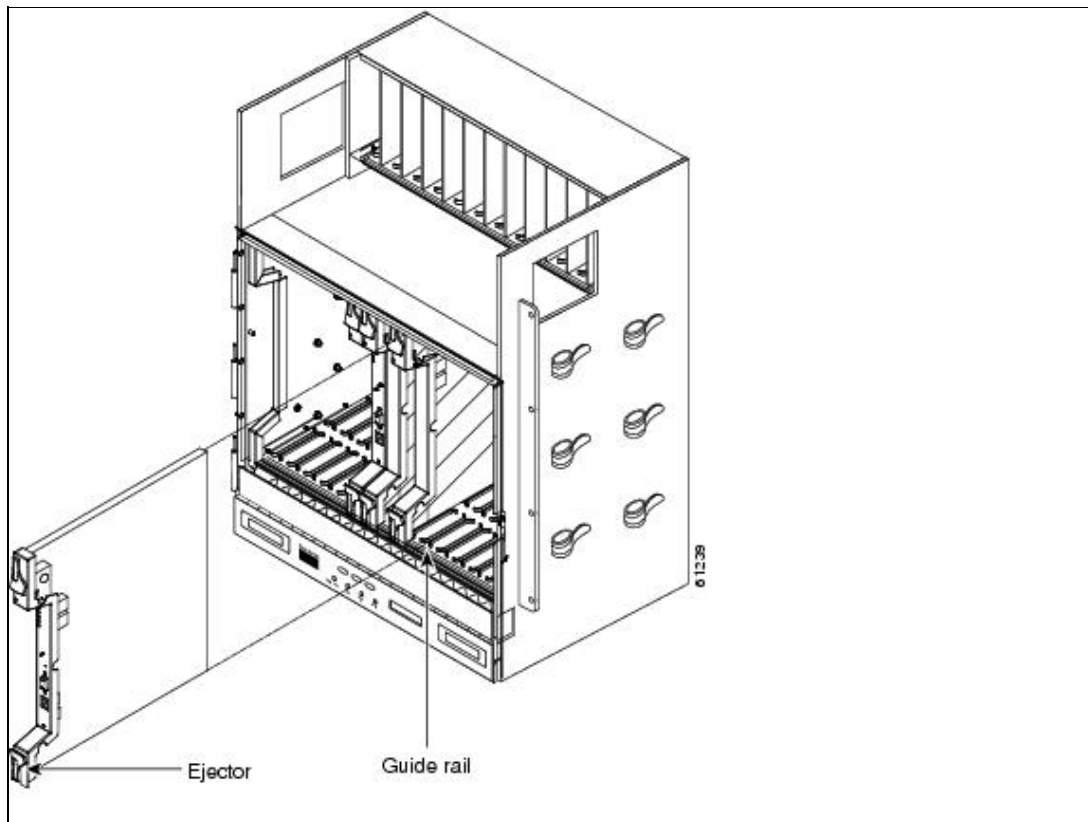
**Caution!** Always use the supplied ESD wristband when working with a powered ONS 15454 SDH. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.

The MIC-A/P and the MIC-C/T/P FMECs in the EFCA area at the top of the ONS 15454 SDH shelf are used for enabling external alarms, timing input and output, and craft interface terminals to the ONS 15454 SDH. For details, see the [MIC-A/P FMEC](#) and the [MIC-C/T/P FMEC](#).

## Cards and Slots

ONS 15454 SDH cards have electrical plugs at the back that plug into electrical connectors on the shelf assembly backplane. When the ejectors are fully closed, the card plugs into the assembly backplane [Figure 1-13](#) shows card installation.

**Figure 1-13: Installing Cards in the ONS 15454 SDH**



## Card Slot Requirements

The ONS 15454 SDH shelf assembly has 17 card slots numbered sequentially from left to right. Slots 1 through 6 and 12 through 17 are for traffic-bearing cards.

Slots 7 and 11 are dedicated to TCC2/TCC2P cards. Slots 8 and 10 are dedicated to cross-connect (XC-VXL-2.5G, XC-VXL-10G, XC-VXC-10G) cards. Slot 9 is reserved for the optional AIC-I card. Slots 3 and 15 can also host electrical protect cards that are used in 1:N protection.

**Caution!** Do not operate the ONS 15454 SDH with a single TCC2/TCC2P card or a single XC-VXL-2.5G/XC-VXL-10G/XC-VXC-10G card installed. Always operate the shelf assembly with one

working and one protect card of the same type.

Shelf assembly slots have symbols indicating the type of cards that you can install in them. Each ONS 15454 SDH card has a corresponding symbol. The symbol on the card must match the symbol on the slot.

Table 1-8 shows the slot and card symbol definitions.

**Table 1-8: Slot and Card Symbols**

| Symbol Color/Shape | Definition   |
|--------------------|--|
| Orange/Circle      | Slots 1 to 6 and 12 to 17. Only install ONS 15454 SDH cards with a circle symbol on the faceplate.   |
| Blue/Triangle      | Slots 5, 6, 12, and 13. Only install ONS 15454 SDH cards with circle or a triangle symbol on the faceplate.                                  |
| Purple/Square      | TCC2/TCC2P slot, Slots 7 and 11. Only install ONS 15454 SDH cards with a square symbol on the faceplate.                                     |
| Green/Cross        | Cross-connect (XC-VXL-2.5G/XC-VXL-10G) slot, that is, Slots 8 and 10. Only install ONS 15454 SDH cards with a cross symbol on the faceplate. |
| Red/P              | Protection slot in 1:N protection schemes.   |
| Red/Diamond        | AIC-I slot, that is, Slot 9. Only install ONS 15454 SDH cards with a diamond symbol on the faceplate.  |
| Gold/Star          | Slots 1 to 4 and 14 to 17. Only install ONS 15454 SDH cards with a star symbol on the faceplate.   |

Table 1-9 lists the number of ports, line rates, connector options, and connector locations for ONS 15454 SDH optical and electrical cards.

**Table 1-9: Card Ports, Line Rates, and Connectors**

| Card      | Ports | Line Rate per Port                       | Connector Types  | Connector Location |
|-----------|-------|--|--|--------------------|
| CE-100T-8 | 8     | 100 Mbps                                 | RJ-45  | Faceplate          |
| E1-N-14   | 14    | 2.048 Mbps                               | 1.0/2.3 miniature coax connector or DB-37                      | EFCA               |
| E1-42     | 14    | 2.048 Mbps                               | 1.0/2.3 miniature coax connector or Molex 96-pin LFH connector | EFCA               |
| E3-12     | 12    | 34.386 Mbps                              | 1.0/2.3 miniature coax connector                               | EFCA               |
| DS3i-N-12 | 12    | 44.736 Mbps                              | 1.0/2.3 miniature coax connector                               | EFCA               |
| STM1E-12  | 12    | Configurable 155.52 Mbps or 139.264 Mbps | 1.0/2.3 miniature coax connector                               | EFCA               |
| E100T-G   | 12    | 100 Mbps                                 | RJ-45  | Faceplate          |
| E1000-2-G | 2     | 1 Gbps                                   | SC (GBIC)  | Faceplate          |
| G1K-4     | 4     | 1 Gbps                                   | SC (GBIC)  | Faceplate          |
| ML100T-12 | 12    | 100 Mbps                                 | RJ-45  | Faceplate          |
| ML100X-8  | 8     | 100 Mbps                                 | SC (SFP)   | Faceplate          |
| ML1000-2  | 2     | 1 Gbps                                   | LC (SFP)   | Faceplate          |

|  |    |   |    |           |
|--|----|---|----|-----------|
| OC3 IR 4/STM1 SH 1310  | 4  | 155.52 Mbps (STM-1)                           | SC | Faceplate |
| OC3IR/STM1SH 1310-8  | 8  | 155.52 Mbps (STM-1)                           | LC | Faceplate |
| OC12 IR/STM4 SH 1310   | 1  | 622.08 Mbps (STM-4)                           | SC | Faceplate |
| OC12 LR/STM4 LH 1310   | 1  | 622.08 Mbps (STM-4)                           | SC | Faceplate |
| OC12 LR/STM4 LH 1550   | 1  | 622.08 Mbps (STM-4)                           | SC | Faceplate |
| OC12 IR/STM4 SH 1310-4   | 4  | 622.08 Mbps (STM-4)                           | SC | Faceplate |
| OC48 IR/STM16 SH AS 1310   | 1  | 2488.32 Mbps (STM-16)                         | SC | Faceplate |
| OC48 LR/STM16 LH AS 1550   | 1  | 2488.32 Mbps (STM-16)                         | SC | Faceplate |
| OC48 ELR/STM16 EH 100 GHz  | 1  | 2488.32 Mbps (STM-16)                         | SC | Faceplate |
| OC192 SR/STM64 IO 1310   | 1  | 9.95 Gbps (STM-64)                            | SC | Faceplate |
| OC192 IR/STM64 SH 1550   | 1  | 9.95 Gbps (STM-64)                            | SC | Faceplate |
| OC192 LR/STM64 LH 1550   | 1  | 9.95 Gbps (STM-64)                            | SC | Faceplate |
| OC192 LR/STM64 LH ITU 15xx.xx                                    | 1  | 9.95 Gbps (STM-64)                            | SC | Faceplate |
| FC_MR-4  | 4  | 1.0625 Gbps                                   | SC | Faceplate |
| 15454_MRC-12   | 12 | Up to 2488.32 Mbps (STM-16), depending on SFP | LC | Faceplate |
| MRC-2.5G-12  | 12 | Up to 2488.32 Mbps (STM-16), depending on SFP | LC | Faceplate |
| OC192SR1/STM64IO Short Reach, OC192/STM64 Any Reach <sup>1</sup> | 1  | 9.95 Gbps (STM-64)                            | LC | Faceplate |

1. These cards are designated as STM64-XFP in CTC.

## Card Replacement

To replace an ONS 15454 SDH card with another card of the same type, you do not need to make any changes to the database; remove the old card and replace it with a new card. To replace a card with a card of a different type, physically remove the card and replace it with the new card, then delete the original card from CTC. For specifics, refer to the *Cisco ONS 15454 SDH Procedure Guide*.

**Caution!** Removing any active card from the ONS 15454 SDH can result in traffic interruption. Use caution when replacing cards and verify that only inactive or standby cards are being replaced. If the active card needs to be replaced, switch it to standby prior to removing the card from the node. For traffic switching procedures, refer to the *Cisco ONS 15454 SDH Procedure Guide*.

**Note:** An improper removal (IMPROPRMVL) alarm is raised whenever a card pull (reseat) is performed, unless the card is deleted in CTC first. The alarm clears after the card replacement is complete.

**Note:** In a subnetwork connection protection (SNCP), pulling the active cross-connect card without a lockout causes SNCP circuits to switch.

## Software and Hardware Compatibility

Table 1-10 shows ONS 15454 SDH software and hardware compatibility for systems configured with XC-VXL-2.5G cards for Releases 4.6, 5.0, 6.0, 7.0, 7.2, 8.0, and 8.5.

**Table 1-10: ONS 15454 SDH Software Release/Hardware Compatibility-XC-VXL-2.5G Configurations**

| <b>Hardware</b> | <b>4.6.0x (4.6)</b> | <b>5.0.0x (5.0)</b> | <b>6.0.0x (6.0)</b> | <b>7.0.0x (7.0)</b> | <b>7.2.0 (7.0)</b> | <b>8.0.0x(8.0)</b> | <b>8.5.0x(8.5)</b> |
|-----------------|---------------------|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|
| XC-VXL-2.5G     | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| TCC2            | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| TCC2P           | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| AIC-I           | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| E1N-14          | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| E1-42           | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| E3-12           | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| DS3i-N-12       | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| STM1E-12        | Not supported       | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| E100T-G         | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| E1000-2-G       | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| G1000-4         | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| G1K-4           | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| ML100T-12       | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| ML-100X-8       | Not supported       | Not supported       | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| ML1000-2        | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| ML-MR-10        | Not supported       | Not supported       | Not supported       | Not supported       | Not supported      | Not supported      | Fully compatible   |
| CE-MR-10        | Not supported       | Not supported       | Not supported       | Not supported       | Not supported      | Not supported      | Fully compatible   |
| CE-100T-8       | Not supported       | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |
| CE-1000-4       | Not supported       | Not supported       | Not supported       | Fully compatible    | Fully compatible   | Fully compatible   | Fully compatible   |

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|  |                  |                  |                  |                  |                  |                  |                  |
|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| OC3 IR 4/STM1 SH 1310  | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC3IR/STM1SH 1310-8  | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC12 IR/STM4 SH 1310   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC12 LR/STM4 LH 1310   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC12 LR/STM4 LH 1550   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC12 IR/STM4 SH 1310-4   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC48 IR/STM16 SH AS 1310   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC48 LR/STM16 LH AS 1550   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC48 ELR/STM16 EH 100 GHz  | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC192 SR/STM64 IO 1310   | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    |
| OC192 IR/STM64 SH 1550   | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    |
| OC192 LR/STM64 LH 1550   | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    |
| OC192 LR/STM64 LH ITU 15xx.xx                                    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    |
| OC192SR1/STM64IO Short Reach, OC192/STM64 Any Reach <sup>1</sup> | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    |
| MRC-12 <sup>2</sup>  | Not supported    | Not supported    | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| MRC-2.5G-12  | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Fully compatible | Fully compatible |
| FC_MR-4  | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |

1. These cards are designated as STM64-XFP in CTC.

2. Slots 1 to 4 and 14 to 17 give a total bandwidth of up to 622 Mb/s. Slots 5, 6, 12, and 13 give a total bandwidth of up to 2.5 Gb/s

Table 1-11 shows ONS 15454 SDH software and hardware compatibility for systems configured with the XC10G, XC-VXC-10G, and XC-VXL-10G cards for Releases 4.6, 5.0, 6.0, 7.0, 7.2, 8.0, and 8.5. Release 4.5 is not supported on the XC10G and XC-VXL-10G cards. XC-VXC-10G is only supported from Release 6.0.

**Note:** XC-10G is not supported in Lower Order circuits.

**Table 1-11: ONS 15454 SDH Software Release/Hardware Compatibility-XC10G, XC-VXC-10G, and XC-VXL-10G Configuration**

| <b>Hardware</b>       | <b>4.6.0x (4.6)</b> | <b>5.0.0x (5.0)</b> | <b>6.0.0x (6.0)</b> | <b>7.0.0x (7.0)</b> | <b>7.2.0x (7.2)</b> | <b>8.0.0x (8.0)</b> | <b>8.5.0x(8.5)</b> |
|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
| TCC2/TCC2P            | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| AIC-I                 | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| E1N-14                | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| E1-42                 | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| E3-12                 | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| DS3i-N-12             | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| STM1E-12              | Not supported       | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| RAN-SVC               | Not supported       | Not supported       | Not supported       | Not supported       | Fully compatible    | Not supported       | Not supported      |
| E100T-G               | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Not supported      |
| E1000-2-G             | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| G1000-4               | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| G1K-4                 | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| ML100T-12             | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| ML-100X-8             | Not supported       | Not supported       | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| ML1000-2              | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| ML-MR-10              | Not supported       | Not supported       | Not supported       | Not supported       | Not supported       | Not supported       | Fully compatible   |
| CE-MR-10              | Not supported       | Not supported       | Not supported       | Not supported       | Not supported       | Not supported       | Fully compatible   |
| CE-100T-8             | Not supported       | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| CE-1000-4             | Not supported       | Not supported       | Not supported       | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| OC3 IR 4/STM1 SH 1310 | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| OC3IR/STM1SH 1310-8   | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible    | Fully compatible   |
| OC12 IR/STM4 SH       | Fully               | Fully               | Fully               | Fully               | Fully               | Fully               | Fully              |

Table 1-11: ONS 15454 SDH Software Release/Hardware Compatibility-XC10G, XC-VXC-10G, and XC-VXL-10G



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|  |                  |                  |                  |                  |                  |                  |                  |
|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 1310   | compatible       | compatible       | compatible       | compatible       | compatible       | compatible       | compatible       |
| OC12 LR/STM4 LH 1310   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC12 LR/STM4 LH 1550   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC12 IR/STM4 SH 1310-4   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC48 IR/STM16 SH AS 1310   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC48 LR/STM16 LH AS 1550   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC48 ELR/STM16 EH 100 GHz  | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC192 SR/STM64 IO 1310   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC192 IR/STM64 SH 1550   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC192 LR/ STM64 LH 1550  | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC192 LR/ STM64 LH ITU 15xx.xx                                   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| OC192SR1/STM64IO Short Reach, OC192/STM64 Any Reach <sup>1</sup> | Not supported    | Not supported    | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| MRC-12 <sup>2</sup>  | Not supported    | Not supported    | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| MRC-2.5G-12  | Not supported    | Not supported    | Not supported    | Not supported    | Not supported    | Fully compatible | Fully compatible |
| TXP_MR_10G   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| MXP_2.5G_10G   | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |
| FC_MR-4  | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible | Fully compatible |

1. These cards are designated as STM64-XFP in CTC.

2. Slots 1 to 4 and 14 to 17 give a total bandwidth of up to 2.5Gb/s. Slots 5, 6, 12, and 13 give a total bandwidth of up to 10Gb/s

**Note:** For compatibility information of DWDM cards, see the Cisco ONS 15454 DWDM Reference Manual.

If an upgrade is required for compatibility, go to the Cisco Technical Assistance Center (Cisco TAC) website at <http://www.cisco.com/tac>.