



Electrical Cards

This chapter describes the Cisco ONS 15454 SDH electrical card features and functions. It includes descriptions, hardware specifications, and block diagrams for each card. For installation and card turn-up procedures, refer to the *Cisco ONS 15454 SDH Procedure Guide*.

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3.1 Electrical Card Overview

The cards for the ONS 15454 SDH include Front Mount Electrical Connection cards (FMECs), common control cards, electrical cards, optical cards, and Ethernet cards. Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 SDH shelf assembly. The cards are then installed into slots displaying the same symbols (refer to the *Cisco ONS 15454 SDH Procedure Guide* for a list of slots/symbols). The overview in this section provides a summary of the cards.

3.1.1 Electrical Cards

Table 3-1 shows available electrical cards for the ONS 15454 SDH.

Table 3-1 Electrical Cards

Card	Description
E1-N-14	Provides 14 E-1 ports and supports 1:0, 1:1, and 1:N protection. It operates in Slots 1 to 5 and Slots 13 to 17.
E1-42	Provides 42 E-1 ports and supports 1:3 protection. It operates in Slots 1 to 4 and Slots 14 to 17 (multispeed slots).
E3-12	Provides 12 E-3 ports and supports 1:0 and 1:1 protection. It operates in Slots 1 to 5 and Slots 13 to 17.
DS3i-N-12	Provides 12 DS-3 ports and supports 1:0, 1:1, and 1:N protection. It operates in Slots 1 to 5 and Slots 13 to 17.
STM1E-12	Provides 12 electrical STM-1 ports and supports 1:0, 1:1, and 1:3 protection. It operates in Slots 1 to 4 and Slots 14 to 17.
BLANK	Assures fulfillment of EMC requirements in case of empty interface card slots.
FMEC-E1	Provides electrical connection into the system for 14 pairs of 75-ohm 1.0/2.3 miniature coax connectors for unbalanced E1 ports from the E1-N-14 card.
FMEC-DS1/E1	Provides electrical connection into the system for 14 pairs of 120-ohm balanced E1 ports from the E1-N-14 card. It uses high-density 37-pin DB connectors.
FMEC E1-120NP	Provides electrical connection into the system for 42 pairs of 120-ohm balanced E1 ports from the E1-42 card. It uses Molex 96-pin LFH connectors.
FMEC E1-120PROA	Provides electrical connection into the system for 42 pairs of 120-ohm balanced E1 ports from the E1-42 card. It is for 1:3 protection from the A side (left side of the shelf). It is 4 slots wide. Its position is Slots 18 to 21. It uses Molex 96-pin LFH connectors.
FMEC E1-120PROB	Provides electrical connection into the system for 42 pairs of 120-ohm balanced E1 ports from the E1-42 card. It is for 1:3 protection from the B side (right side of the shelf). It is 4 slots wide. Its position is Slots 26 to 29. It uses Molex 96-pin LFH connectors.

Table 3-1 Electrical Cards (continued)

Card	Description
E1-75/120	Installed in the rack to provide a balanced 120-ohm connection for 42 E1 interfaces that have a 75 ohm unbalanced connection. It uses Molex 96-pin LFH connectors and 1.0/2.3 miniature coax connectors.
FMEC-E3/DS3	Provides electrical connection into the system for 12 pairs of 75-ohm 1.0/2.3 miniature coax connectors for unbalanced E3 or DS3 ports.
FMEC STM1E NP	Provides electrical connection into the system for 12 pairs of 75-ohm 1.0/2.3 miniature coax connectors for unbalanced electrical STM-1 ports from the STM1E-12 card.
FMEC STM1E 1:1	Provides electrical connection into the system for 2 x 12 pairs of 75-ohm 1.0/2.3 miniature coax connectors for unbalanced electrical STM-1 ports from two STM1E-12 cards in case of 1:1 protected operation. The FMEC STM1E 1:1 card is double slot width.
FMEC STM1E 1:3	Provides electrical connection into the system for 4 x 12 pairs of 75-ohm 1.0/2.3 miniature coax connectors for unbalanced electrical STM-1 ports from four STM1E-12 cards in case of 1:3 protected operation. The FMEC STM1E 1:3 card is 4 slots wide. Its position can be Slots 18 to 21 or Slots 26 to 29.
FMEC-BLANK	Assures fulfillment of EMC requirements in case of empty FMEC slots.
MIC-A/P	Provides connection for one of the two redundant inputs of system power and system connection for input and output alarms.
MIC-C/T/P	Provides connection for one of the two redundant inputs of system power and system connection for LAN ports and system timing input/output.

3.1.2 Card Power Consumption

Table 3-2 shows power consumption per card.

Table 3-2 Card Power Consumption

Card	Watts	Amperage at -48 V	Amperage at -40.5 V	BTU/hr
E1N-14	24.00	0.50	0.59	81.9
E1-42	38.10	0.79	0.94	130.1
E3-12	44.00	0.92	1.09	150.2
DS3i-N-12	30.00	0.63	0.74	102.4
STM1E-12	59.40	1.24	1.47	202.8
FMEC-E1	0.00	0.00	0.00	0.0
FMEC-DS1/E1	0.00	0.00	0.00	0.0
FMEC E1-120NP	0.00	0.00	0.00	0.0
FMEC E1-120PROA	(0.1)	via E1-42	—	—
FMEC E1-120PROB	(0.1)	via E1-42	—	—

Table 3-2 Card Power Consumption (continued)

Card	Watts	Amperage at -48 V	Amperage at -40.5 V	BTU/hr
E1-75/120	0.00	0.00	0.00	0.0
FMEC-E3/DS3	0.00	0.00	0.00	0.0
FMEC STM1E NP	(4.4)	via STM1E-12	—	—
FMEC STM1E 1:1	(8.8)	via STM1E-12	—	—
FMEC STM1E 1:3	(17.6)	via STM1E-12	—	—
MIC-A/P	(0.13)	via TCC2	—	—
MIC-C/T/P	(0.38)	via TCC2	—	—

**Note**

The ONS 15454 SDH is a flexible metro optical transport system supporting a wide variety of applications. The power consumption of the shelf assembly varies depending upon shelf configuration. Design your power distribution network based on your maximum ONS 15454 SDH system power draw, or the ONS 15454 SDH's maximum rated shelf power draw.

If you select to design your power plant to your maximum planned ONS 15454 SDH system configuration, the *Cisco ONS 15454 SDH Reference Manual* lists the power consumption for each card that can be used to determine your maximum ONS 15454 SDH system power draw. The general guideline for fuse selection is 20 percent above the maximum calculated system power draw.

If you design your power system to the ONS 15454 SDH's maximum rated shelf power draw, Cisco recommends that you select a power distribution system supporting a minimum capacity of 30 A for each A and B power feeder on each ONS 15454 SDH shelf assembly. Feeder lines should be fused at 30 A. This recommendation is based on the shelf assembly's current rated maximum power draw of 30 A at -48 VDC. The maximum power draw configuration on the ONS 15454 SDH, based on the hardware available with Release 4.0, requires 30 A at -48 VDC.

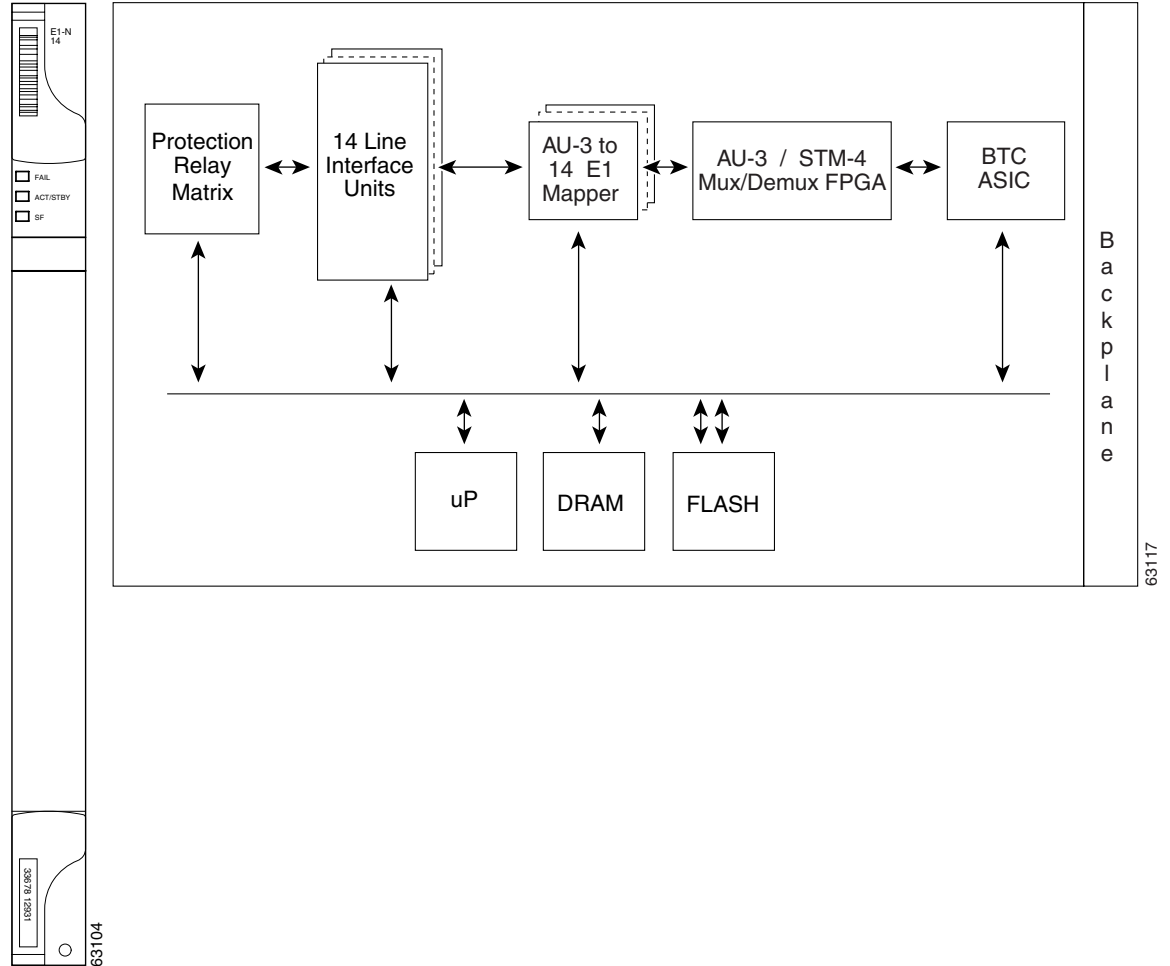
3.2 E1-N-14 Card

The fourteen-port ONS 15454 SDH E1-N-14 card provides fourteen ITU-compliant, G.703 E-1 ports. Each port of the E1-N-14 card operates at 2.048 Mbits/s (Mbps) over a 120-ohm, twisted-pair copper cable (with FMEC-DS1/E1) or over a 75-ohm unbalanced coaxial cable (with FMEC-E1). Figure 3-1 shows the E1-N-14 faceplate and block diagram.

**Caution**

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

Figure 3-1 E1-N-14 Faceplate and Block Diagram



Each E1-N-14 port features ITU-T G.703 compliant outputs and inputs supporting cable losses of up to 6 dB at 1024 kHz. The E1-N-14 card supports 1:N ($N \leq 4$) protection. You can also provision the E1-N-14 to monitor line and frame errors in both directions.

The E1-N-14 card can function as a working or protect card in 1:1 or 1:N protection schemes. If you use the E1-N-14 as a standard E-1 card in a 1:1 protection group, you can install the E1-N-14 card in Slots 1 to 6 and 12 to 17 on the ONS 15454 SDH (any high-speed or multispeed slot). If you use the card's 1:N functionality, you must install an E1-N-14 card in Slot 3 (for bank A) or Slot 15 (for bank B).

You can group and map E1-N-14 card traffic in VC-12 as per ITU-T G.707 to any other card in an ONS 15454 SDH node. For performance-monitoring purposes, you can gather bidirectional E-1 frame-level information (for example, loss of frame, parity errors, or cyclic redundancy check [CRC] errors).



Note

The lowest level cross-connect with the XC10G card is STM-1. Lower level signals, such as E-1, DS-3, or E-3, can be dropped. This might leave part of the bandwidth unused. The lowest level cross-connect with the XC-VXL-10G card and with the XC-VXL-2.5G card is VC-12 (2.048 Mbits/s [Mbps]).

3.2.1 E1-N-14 Card-Level Indicators

Table 3-3 describes the three E1-N-14 card faceplate LEDs.

Table 3-3 E1-N-14 Card-Level Indicators

Card-Level LEDs	Description
Red FAIL LED	Indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the FAIL LED persists in flashing.
ACT/STBY LED Green (Active) Yellow (Standby)	Indicates that the E1-N-14 card is operational and ready to carry traffic (green) or that the card is in Standby mode (yellow).
Yellow SF LED	Indicates a signal failure or condition such as loss of signal (LOS), loss of frame (LOF), or high BERs on one or more of the card's ports.

3.2.2 E1-N-14 Port-Level Indicators

You can obtain the status of the fourteen E-1 ports using the LCD screen on the ONS 15454 SDH fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. Refer to *Cisco ONS 15454 SDH Troubleshooting Guide* for a complete description of the alarm messages.

3.2.3 E1-N-14 Card Specifications

The E1-N-14 card has the following specifications:

- E1-N-14 input
 - Bit rate: 2.048 MBits/s (Mbps) +/-50 ppm
 - Frame format: Unframed, ITU-T G.704 framed
 - Line code: HDB-3
 - Termination: Via FMEC-E1 (for 75 ohms unbalanced) or FMEC-DS1/E1 (for 120 ohms balanced)
 - Input impedance: 75 ohms unbalanced or 120 ohms balanced
 - Cable loss: 0 to 6 dB at 1024 kHz (for cable length, see the specification of the cable that you are using)
 - AIS: ITU-T G.704 compliant
- E1-N-14 output
 - Bit rate: 2.048 MBits/s (Mbps) +/-50 ppm
 - Frame format: Unframed, ITU-T G.704 framed
 - Line code: HDB-3
 - Termination: Via FMEC-E1 (for 75 ohms unbalanced) or FMEC-DS1/E1 (for 120 ohms balanced)

- Output impedance: 75 ohms unbalanced or 120 ohms balanced
- Alarm indication signal (AIS): ITU-T G.704 compliant
- Pulse shape: ITU-T G.703, Figure 15
- Pulse amplitude: 2.37 V +/- 5% zero-peak at 75 ohms; 3 V +/-5% zero-peak at 120 ohms
- Loopback modes: terminal and facility
- Environmental
 - Overvoltage protection: As in ITU-T G.703 Annex B
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 24.00 W, 0.50 A at -48 V, 81.9 BTU/hr
- Dimensions
 - Height: 321.3 mm (12.650 in.)
 - Width: 18.2 mm (0.716 in.)
 - Depth: 228.6 mm (9.000 in.)
 - Depth with backplane connector: 235 mm (9.250 in.)
 - Weight not including clam shell: 0.8 kg (1.9 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.3 E1-42 Card

The 42-port ONS 15454 SDH E1-42 card provides 42 ITU-compliant, G.703 E-1 ports. Each port of the E1-42 card operates at 2.048 mbps over a 120-ohm, twisted-pair copper cable. Front mount electrical connection is done using the FMEC E1-120 NP card for unprotected operation, the FMEC E1-120PROA for 1:3 protection in the left side of the shelf, or the FMEC E1-120PROB for 1:3 protection in the right side of the shelf.



Caution

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

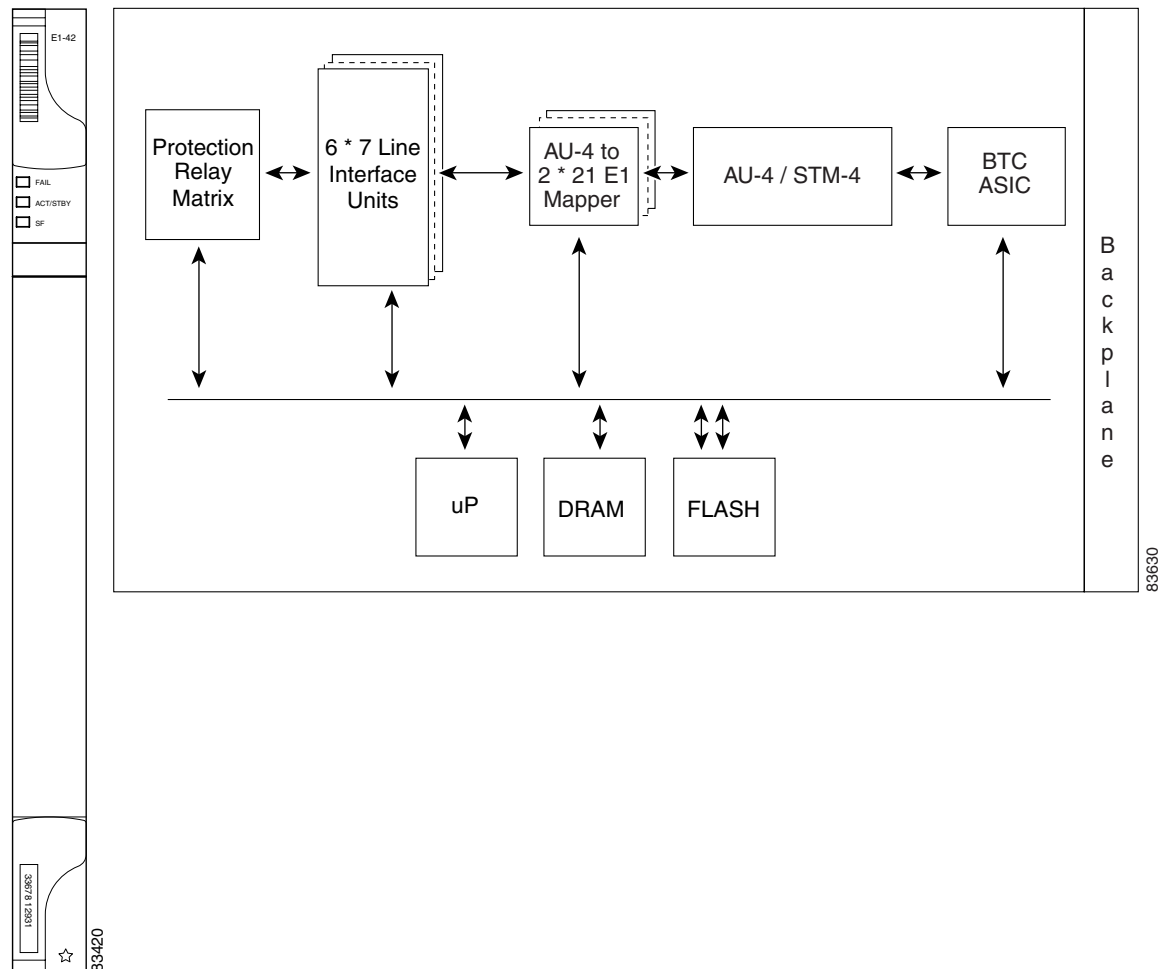


Note

If you need 75-ohm unbalanced interfaces, you must additionally use the E1-75/120 conversion panel.

Figure 3-2 shows the E1-42 faceplate and block diagram.

Figure 3-2 E1-42 Faceplate and Block Diagram



3.3.1 E1-42 Card Functionality

Each E1-42 port features ITU-T G.703 compliant outputs and inputs supporting cable losses of up to 6 dB at 1024 kHz. The E1-42 card supports 1:3 protection. You can also provision the E1-42 card to monitor line and frame errors in both directions.

The E1-42 card can function as a working or protect card in 1:3 protection schemes. If you use the E1-42 card as a standard E-1 card, you can install the E1-42 card in Slots 1 to 4 and 14 to 17 of the ONS 15454 SDH. If you use the card's 1:3 functionality, you must install an E1-42 card as the protect card in Slot 3 (for bank A) or in Slot 15 (for bank B).

You can group and map E1-42 card traffic in VC-12 as per ITU-T G.707 to any other card in an ONS 15454 SDH node. For performance-monitoring purposes, you can gather bidirectional E-1 frame-level information (for example, loss of frame, parity errors, or CRC errors).

**Note**

The lowest level cross-connect with the XC10G card is STM-1. Lower level signals, such as E-1, DS-3, or E-3, can be dropped. This might leave part of the bandwidth unused. The lowest level cross-connect with the XC-VXL-10G card and the XC-VXL-2.5G card is VC-12 (2.048 MBits/s [Mbps]).

3.3.2 E1-42 Card-Level Indicators

Table 3-4 describes the three LEDs on the E1-42 card faceplate.

Table 3-4 E1-42 Card-Level Indicators

Card-Level LEDs	Description
Red FAIL LED	Indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the FAIL LED persists in flashing.
ACT/STBY LED Green (Active) Yellow (Standby)	Indicates that the E1-42 card is operational and ready to carry traffic (green) or that the card is in Standby mode (yellow).
Yellow SF LED	Indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card's ports.

3.3.3 E1-42 Port-Level Indicators

You can obtain the status of the 42 E-1 ports using the LCD screen on the ONS 15454 SDH fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. Refer to the *Cisco ONS 15454 SDH Troubleshooting Guide* for a complete description of the alarm messages.

3.3.4 E1-42 Card Specifications

The E1-42 card has the following specifications:

- E1-42 input
 - Bit rate: 2.048 MBits/s (Mbps) +/-50 ppm
 - Frame format: Unframed, ITU-T G.704 framed
 - Line code: HDB-3
 - Termination: Via FMEC E1-120NP, FMEC E1-120PROA, or FMEC E1-120PROB
 - Input impedance: 120 ohms balanced (75 ohms unbalanced with additional E1-75/120)
 - Cable loss: 0 to 6 dB at 1024 kHz (for cable length, see the specification of the cable that you are using)
 - AIS: ITU-T G.704 compliant
- E1-42 output
 - Bit rate: 2.048 MBits/s (Mbps) +/-50 ppm

- Frame format: Unframed, ITU-T G.704 framed
- Line code: HDB-3
- Termination: Via FMEC E1-120NP, FMEC E1-120PROA, or FMEC E1-120PROB
- Output impedance: 120 ohms balanced (75 ohms unbalanced with additional E1-75/120)
- AIS: ITU-T G.704 compliant
- Pulse shape: ITU-T G.703, Figure 15
- Pulse amplitude: 3 V +/- 5% zero-peak at 120 ohms; 2.37 V +/-5% zero-peak at 75 ohms
- Loopback modes: terminal and facility
- Environmental
 - Overvoltage protection: As in ITU-T G.703 Annex B
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 38.10 W, 0.79 A at -48 V, 130.1 BTU/hr
- Dimensions
 - Height: 321.3 mm (12.650 in.)
 - Width: 18.2 mm (0.716 in.)
 - Depth: 228.6 mm (9.000 in.)
 - Depth with backplane connector: 235 mm (9.250 in.)
 - Weight not including clam shell: 0.8 kg (1.9 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.4 E3-12 Card

The twelve-port ONS 15454 SDH E3-12 card provides twelve ITU-compliant, G.703 E-3 ports per card. Each interface operates at 34.368 Mbits/s (Mbps) over a 75-ohm coaxial cable (with the FMEC-E3/DS3 card). The E3-12 card operates as a working or protect card in 1:1 protection schemes and as a working card in 1:N protection schemes.



Caution

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

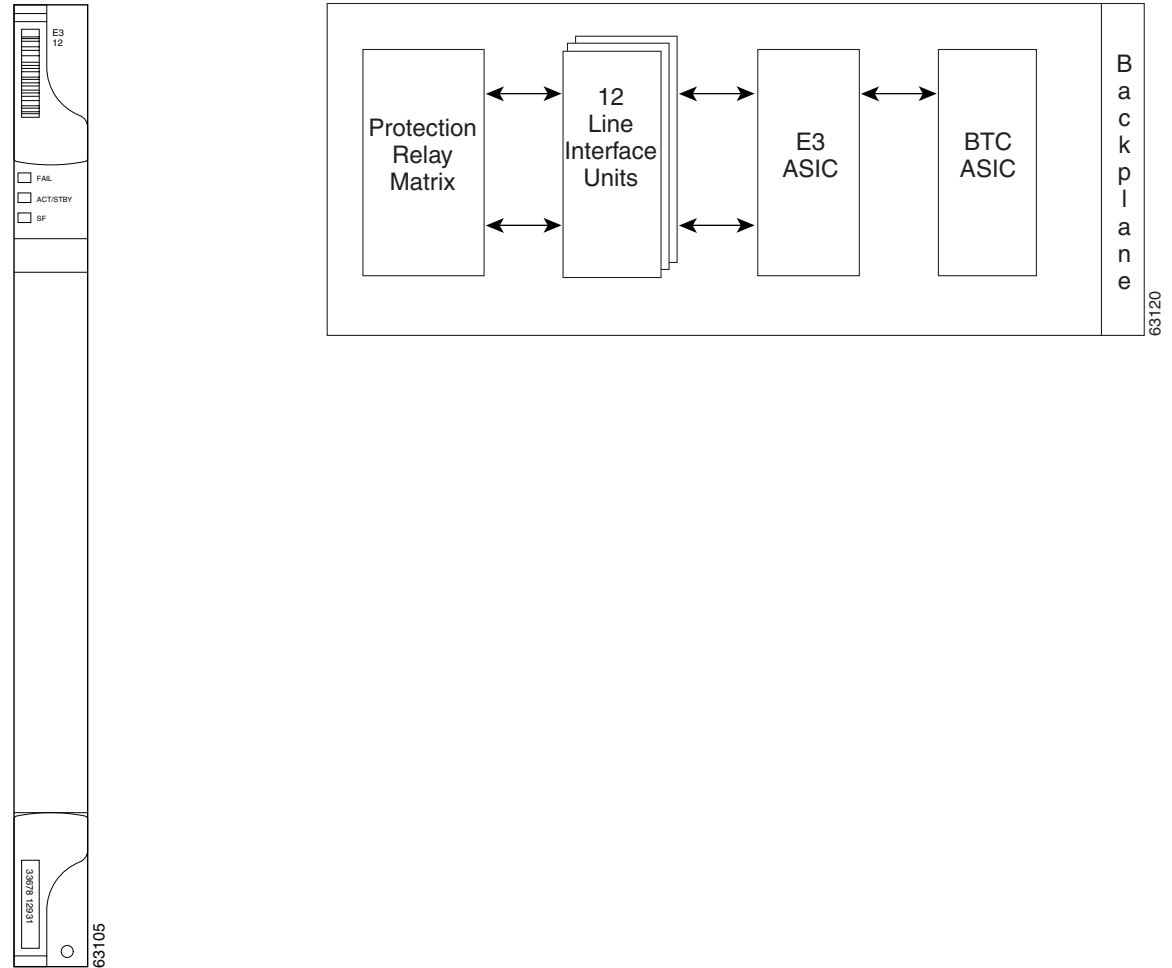


Note

The E3-12 card can be deployed in a central office or a carrier's exchange.

Figure 3-3 shows the E3-12 faceplate and block diagram.

Figure 3-3 E3-12 Faceplate and Block Diagram



You can install the E3-12 card in Slots 1 to 6 and 12 to 17 on the ONS 15454 SDH. Each E3-12 port features ITU-T G.703 compliant outputs supporting cable losses of up to 12 dB at 17184 kHz. The E3-12 card supports 1:1 protection.

**Note**

The lowest level cross-connect with the XC10G card is STM-1. Lower level signals, such as E-1, DS-3, or E-3, can be dropped. This might leave part of the bandwidth unused. The lowest level cross-connect with the XC-VXL-10G card and the XC-VXL-2.5G card is VC-12 (2.048 MBits/s [Mbps]).

**Note**

When a protection switch moves traffic from the E3-12 working/active card to the E3-12 protect/standby card, ports on the now active/standby card cannot be taken out of service. Lost traffic can result if you take a port out of service, even if the E3-12 active/standby card no longer carries traffic.

3.4.1 E3-12 Card-Level Indicators

Table 3-5 describes the three LEDs on the E3-12 card faceplate.

Table 3-5 E3-12 Card-Level Indicators

Card-Level LEDs	Description
Red FAIL LED	Indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the FAIL LED persists in flashing.
ACT/STBY LED Green (Active) Yellow (Standby)	When the ACT/STBY LED is green, the E3-12 card is operational and ready to carry traffic. When the ACT/STBY LED is yellow, the E3-12 card is operational and in Standby (protect) mode.
Yellow SF LED	Indicates a signal failure or condition such as port LOS.

3.4.2 E3-12 Port-Level Indicators

You can find the status of the twelve E3-12 card ports using the LCD screen on the ONS 15454 SDH fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. Refer to the *Cisco ONS 15454 SDH Troubleshooting Guide* for a complete description of the alarm messages.

3.4.3 E3-12 Card Specifications

The E1-12 card has the following specifications:

- E3-12 input
 - Bit rate: 34.368 Mbits/s (Mbps) +/-20 ppm
 - Line code: HDB-3
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/-5%
 - Cable loss: Up to 12 dB at 17184 kHz (for cable length, see the specification of the cable that you are using)
 - AIS: ITU-T G.704 compliant
- E3-12 output
 - Bit rate: 34.368 Mbits/s (Mbps) +/- 20 ppm
 - Line code: HDB-3
 - Termination: Unbalanced coaxial cable
 - Output impedance: 75 ohms +/-5%
 - AIS: ITU-T G.704 compliant
 - Power level: -1.8 to +5.7 dBm
 - Pulse shape: ITU-T G.703, Figure 17
 - Pulse amplitude: 0.36 to 0.85 V peak-to-peak
 - Loopback modes: terminal and facility

- E3-12 electrical interface
 - Connectors: 1.0/2.3 miniature coax connectors in the FMEC-E3/DS3 card
- Environmental
 - Overvoltage protection: As in ITU-T G.703 Annex B
 - Operating temperature: –5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 38.20 W, 0.80 A at –48 V, 130.4 BTU/hr
- Dimensions
 - Height: 321.3 mm (12.650 in.)
 - Width: 18.2 mm (0.716 in.)
 - Depth: 228.6 mm (9.000 in.)
 - Depth with backplane connector: 235 mm (9.250 in.)
 - Weight not including clam shell: 0.7 kg (1.7 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

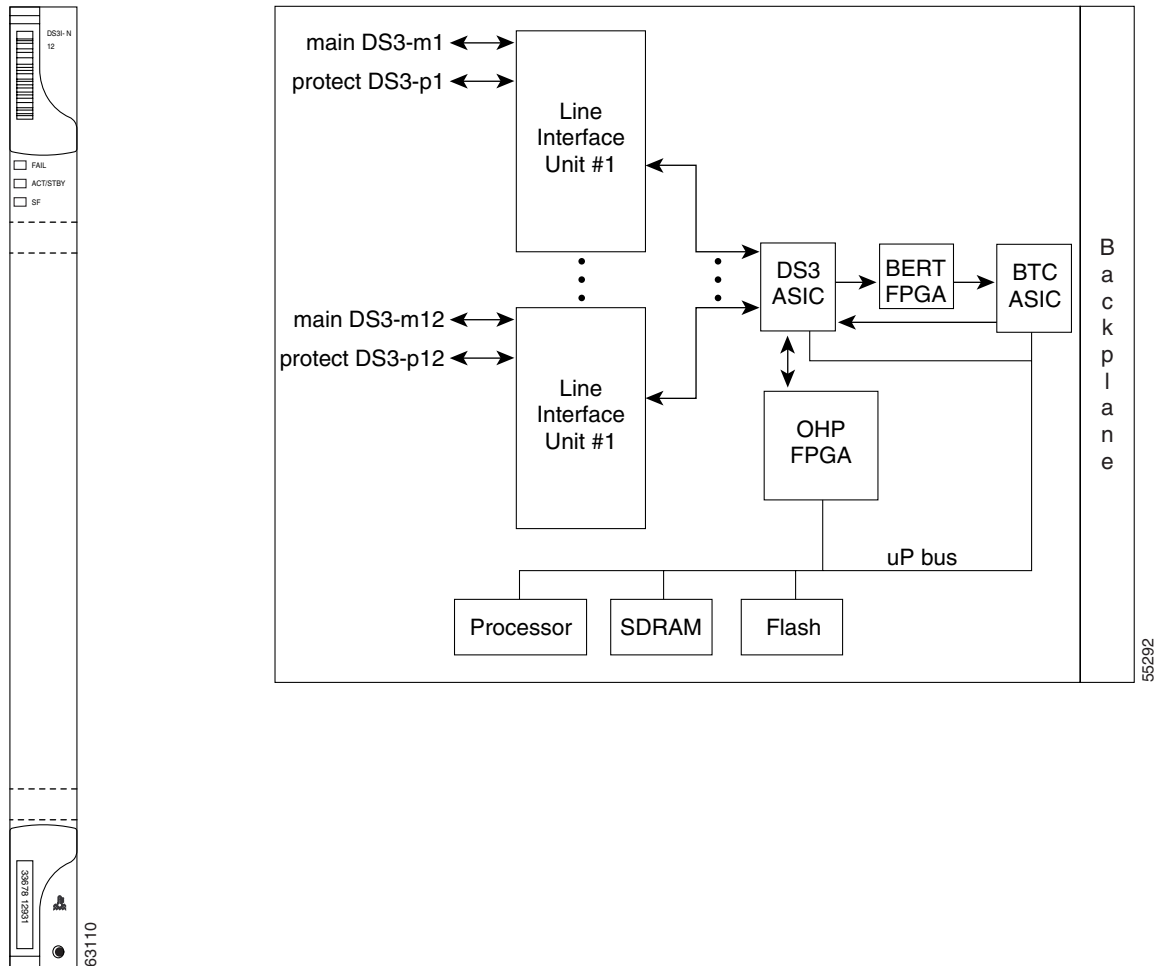
 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.5 DS3i-N-12 Card

The twelve-port ONS 15454 SDH DS3i-N-12 card provides twelve ITU-T G.703, ITU-T G.704, and Telcordia GR-499-CORE compliant DS-3 ports per card. Each port operates at 44.736 Mbits/s (Mbps) over a 75-ohm coaxial cable (with the FMEC-E3/DS3 card). The DS3i-N-12 can detect several different errored logic bits within a DS-3 frame. This function lets the ONS 15454 SDH identify a degrading DS-3 facility caused by upstream electronics (DS-3 Framer). In addition, DS-3 frame format auto detection and J1 path trace are supported. By monitoring additional overhead in the DS-3 frame, subtle network degradations can be detected.

Figure 3-4 shows the DS3i-N-12 faceplate and block diagram.

Figure 3-4 DS3i-N-12 Faceplate and Block Diagram



The following list summarizes the DS3i-N-12 card features:

- Provisionable framing format (M23, C-bit, or unframed)
- Auto-recognition and provisioning of incoming framing
- VC-3 payload mapping as per ITU-T G.707
- Idle signal (“1100”) monitoring as per Telcordia GR-499-CORE
- P-bit monitoring
- C-bit parity monitoring
- X-bit monitoring
- M-bit monitoring
- F-bit monitoring
- Far-end block error (FEBE) monitoring
- Far-end alarm and control (FEAC) status and loop code detection
- Path trace byte support with TIM-P alarm generation

You can install the DS3i-N-12 card in Slots 1 to 5 and 13 to 17. Each DS3i-N-12 port features DSX-level outputs supporting distances up to 137 m (450 ft). With FMEC-E3/DS3, the card supports 1.0/2.3 miniature coax nonbalanced connectors.

The DS3i-N-12 can operate as the protect card in a 1:N (N <= 4) DS-3 protection group. It has circuitry that allows it to protect up to four working DS3i-N-12 cards.

**Note**

The lowest level cross-connect with the XC10G card is STM-1. Lower level signals, such as E-1, DS-3, or E-3, can be dropped. This might leave part of the bandwidth unused. The lowest level cross-connect with the XC-VXL-10G card and the XC-VXL-2.5G card is VC-12 (2.048 MBits/s [Mbps]).

3.5.1 DS3i-N-12 Card-Level Indicators

Table 3-6 describes the three LEDs on the DS3i-N-12 card faceplate.

Table 3-6 DS3i-N-12 Card-Level Indicators

Card-Level LEDs	Description
Red FAIL LED	Indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists in flashing.
ACT/STBY LED Green (Active) Yellow (Standby)	When the ACT/STBY LED is green, the DS3i-N-12 card is operational and ready to carry traffic. When the ACT/STBY LED is yellow, the DS3i-N-12 card is operational and in Standby (protect) mode.
Yellow SF LED	Indicates a signal failure or condition such as LOS or LOF on one or more of the card's ports.

3.5.2 DS3i-N-12 Port-Level Indicators

You can find the status of the DS3i-N-12 card ports using the LCD screen on the ONS 15454 SDH fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. Refer to the *Cisco ONS 15454 SDH Troubleshooting Guide* for a complete description of the alarm messages.

3.5.3 DS3i-N-12 Card Specifications

The DS3i-N-12 card has the following specifications:

- DS3i-N-12 input
 - Bit rate: 44.736 MBits/s (Mbps) +/-20 ppm
 - Frame format: ITU-T G.704, ITU-T G.752/DS-3 ANSI T1.107-1988
 - Line code: B3ZS
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/- 5%

- Cable loss:
 - Maximum 137 m (450 ft): 734A, RG59, 728A
 - Maximum 24 m (79 ft): RG179
- AIS: ITU-T G.704 compliant
- DS3i-N-12 output
 - Bit rate: 44.736 Mbits/s (Mbps) +/- 20 ppm
 - Frame format: ITU-T G.704 , ITU-T G.752/DS-3 ANSI T1.107-1988
 - Line code: B3ZS
 - Termination: Unbalanced coaxial cable
 - Output impedance: 75 ohms +/-5%
 - AIS: ITU-T G.704 compliant
 - Power level: -1.8 to +5.7 dBm (The power level is for a signal of all ones and is measured at a center frequency of 22.368 MHz (3 +/-1 kHz) bandwidth.)
 - Pulse shape: ITU-T G.703, Figure 14/ANSI T1.102-1988, Figure 8
 - Pulse amplitude: 0.36 to 0.85 V peak-to-peak
 - Loopback modes: terminal and facility
 - Line build out: 0 to 69 m (0 to 225 ft); 69 to 137 m (226 to 450 ft)
- DS3i-N-12 electrical interface
 - Connectors: 1.0/2.3 miniature coax connectors via the FMEC-E3/DS3 card
- Environmental
 - Overvoltage protection: As in ITU-T G.703 Annex B
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 26.80 W, 0.56 A at -48 V, 91.5 BTU/hr
- Dimensions
 - Height: 321.3 mm (12.650 in.)
 - Width: 18.2 mm (0.716 in.)
 - Depth: 228.6 mm (9.000 in.)
 - Depth with backplane connector: 235 mm (9.250 in.)
 - Weight not including clam shell: 0.8 kg (1.9 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

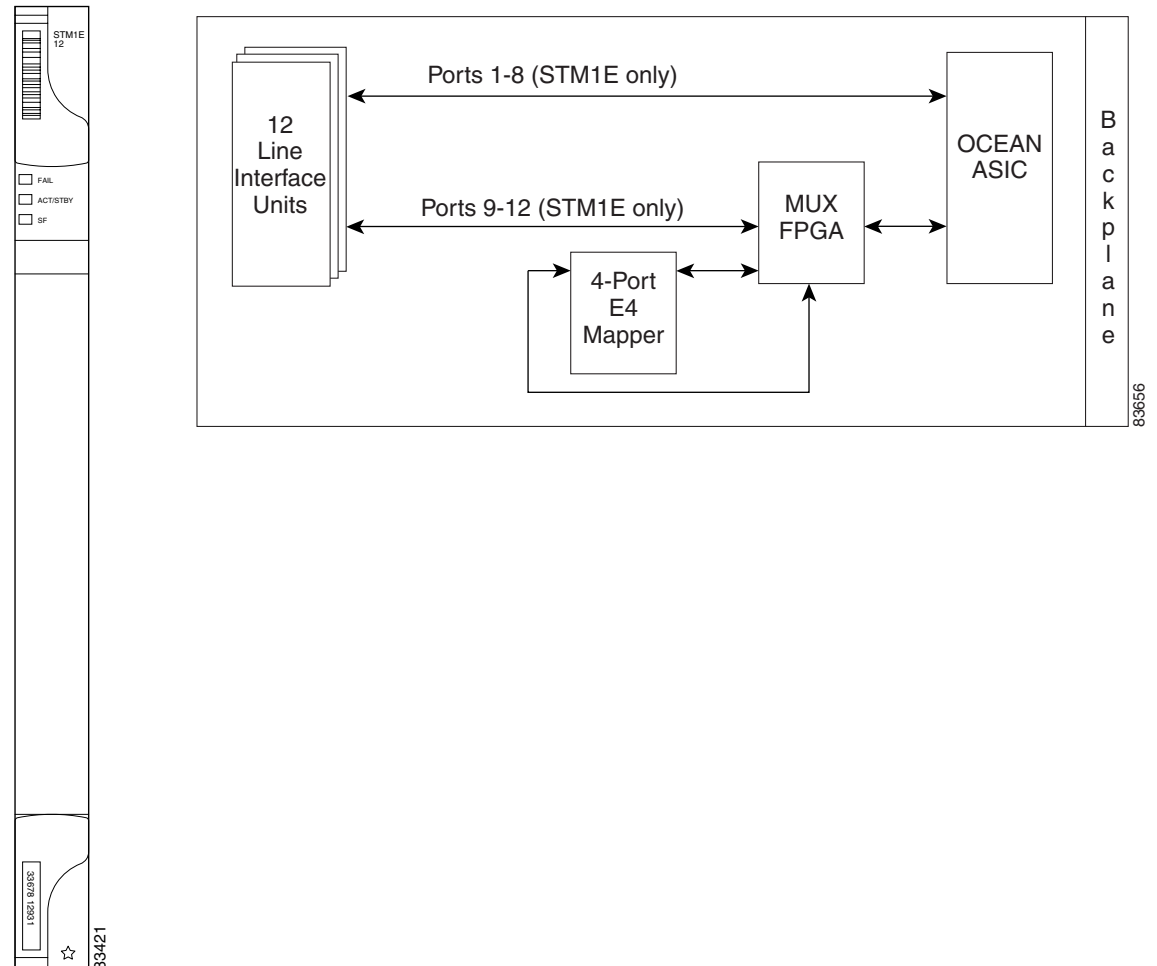
 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.6 STM1E-12 Card

The twelve-port ONS 15454 SDH STM1E-12 card provides twelve ITU-compliant, G.703 STM-1 ports per card. Ports 9 to 12 can be switched to E-4 instead of STM-1. Each interface operates at 155.52 Mbits/s (Mbps) for STM-1 or 139.264 Mbits/s (Mbps) for E-4 over a 75-ohm coaxial cable (with

the FMEC STM1E NP card, the FMEC STM1E 1:1 card, or the FMEC STM1E 1:3 card). In E-4 mode, framed or unframed signal operation is possible. The STM1E-12 card operates as a working or protect card in 1:1 and in 1:3 protection schemes. Figure 3-5 shows the STM1E-12 faceplate and block diagram.

Figure 3-5 STM1E-12 Faceplate and Block Diagram



You can install the STM1E-12 card in Slots 1 to 4 and 14 to 17 on the ONS 15454 SDH. Each STM1E-12 port features ITU-T G.703 compliant outputs supporting cable losses of up to 12.7 dB at 78 MHz. The STM1E-12 card supports 1:1 protection and 1:3 protection.



Note

When a protection switch moves traffic from the STM1E-12 working/active card to the STM1E-12 protect/standby card, ports on the now active/standby card cannot be taken out of service. Lost traffic can result if you take a port out of service, even if the STM1E-12 active/standby card no longer carries traffic.

3.6.1 STM1E-12 Card-Level Indicators

Table 3-7 describes the three LEDs on the STM1E-12 card faceplate.

Table 3-7 STM1E-12 Card-Level Indicators

Card-Level LEDs	Description
Red FAIL LED	Indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the FAIL LED persists in flashing.
ACT/STBY LED Green (Active) Yellow (Standby)	When the ACT/STBY LED is green, the STM1E-12 card is operational and ready to carry traffic. When the ACT/STBY LED is yellow, the STM1E-12 card is operational and in Standby (protect) mode.
Yellow SF LED	Indicates a signal failure or condition such as port loss of service (LOS).

3.6.2 STM1E-12 Port-Level Indicators

You can find the status of the twelve STM1E-12 card ports using the LCD screen on the ONS 15454 SDH fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. Refer to the *Cisco ONS 15454 SDH Troubleshooting Guide* for a complete description of the alarm messages.

3.6.3 STM1E-12 Card Specifications

The STM1E-12 card has the following specifications:

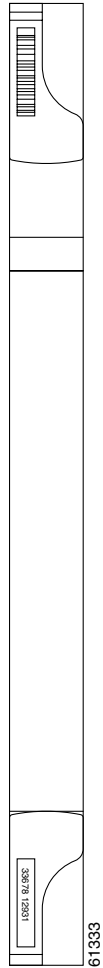
- STM1E-12 input
 - Bit rate: 155.52 MBits/s (Mbps) +/-5 ppm for STM-1 or 139.264 MBits/s (Mbps) +/-15 ppm for E-4
 - Line code: CMI (coded mark inversion)
 - E-4 can be framed or unframed
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/-5%
 - Cable loss: Up to 12.7 dB at 78 MHz (for cable length, see the specification of the cable that you are using)
 - AIS: ITU-T G.704 compliant
- STM1E-12 output
 - Bit rate: 155.52 MBits/s (Mbps) +/-5 ppm for STM-1 or 139.264 MBits/s (Mbps) +/-15 ppm for E-4
 - Line code: CMI
 - E-4 can be framed or unframed
 - Termination: Unbalanced coaxial cable
 - Output impedance: 75 ohms +/-5%
 - AIS: ITU-T G.704 compliant
 - Pulse shape: ITU-T G.703, Figure 18 and 19 for E-4, Figure 22 and 23 for STM-1
 - Pulse amplitude: 1 V +/- 0.1 V peak-to-peak

- Loopback modes: terminal and facility
- STM1E-12 electrical interface
 - Connectors: 1.0/2.3 miniature coax connectors in the FMEC STM1E NP card, the FMEC STM1E 1:1 card, or the FMEC STM1E 1:3 card
- Environmental
 - Overvoltage protection: As in ITU-T G.703 Annex B
 - Operating temperature: –5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 59.40 W, 1.24 A at –48 V, 202.8 BTU/hr
- Dimensions
 - Height: 321.3 mm (12.650 in.)
 - Width: 18.2 mm (0.716 in.)
 - Depth: 228.6 mm (9.000 in.)
 - Depth with backplane connector: 235 mm (9.250 in.)
 - Weight not including clam shell: 0.7 kg (1.7 lb)
- Compliance
 - ONS 15454 SDH cards, when installed in a system, comply with these standards:
 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.7 BLANK Card

The BLANK card provides EMC emission control for empty interface card slots. It also provides a way to close off the subrack front area, thus allowing air flow and convection to be maintained through the subrack. [Figure 3-6](#) shows the BLANK card faceplate.

You must install the BLANK card in every empty interface card slot to maintain EMC requirements of the system and proper air flow.

Figure 3-6 BLANK Faceplate

The BLANK card has the following specifications:

- Environmental
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: Not applicable
- Dimensions
 - Height: 321.3 mm (12.650 in.)
 - Width: 18.2 mm (0.716 in.)
 - Weight not including clam shell: 0.2 kg (0.4 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.8 FMEC-E1 Card

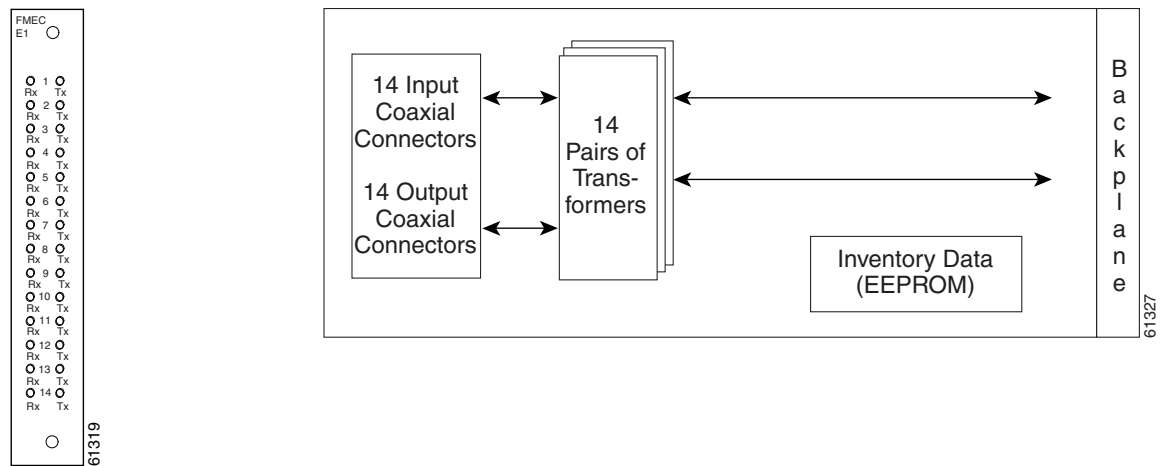
The ONS 15454 SDH FMEC-E1 card provides front mount electrical connection for fourteen ITU-compliant, G.703 E-1 ports. With the FMEC-E1 card, each E1-N-14 port operates at 2.048 Mbits/s (Mbps) over a 75-ohm unbalanced coaxial 1.0/2.3 miniature coax connector. Figure 3-7 shows the FMEC-E1 faceplate and block diagram.



Caution

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

Figure 3-7 FMEC-E1 Faceplate and Block Diagram



You can install the FMEC-E1 card in any Electrical Facility Connection Assembly (EFCA) slot from Slot 18 to 22 or Slot 25 to 29 on the ONS 15454 SDH. Each FMEC-E1 card port features E1-level inputs and outputs supporting cable losses of up to 6 dB at 1024 kHz.

The FMEC-E1 card has the following specifications:

- FMEC-E1 input
 - Bit rate: 2.048 Mbits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/-5%
 - Cable loss: Up to 6 dB at 1024 kHz
- FMEC-E1 output
 - Bit rate: 2.048 Mbits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
 - Termination: Unbalanced coaxial cable
 - Output impedance: 75 ohms +/-5%
 - Pulse shape: ITU-T G.703, Figure 15 and Table 7

- Pulse amplitude: ITU-T G.703, Figure 15 and Table 7
- FMEC-E1 electrical interface
 - Connectors: 1.0/2.3 miniature coax connectors
- Environmental
 - Operating temperature: –5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 0.00 W, 0.00 A at –48 V, 0.0 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.3 kg (0.7 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.9 FMEC-DS1/E1 Card

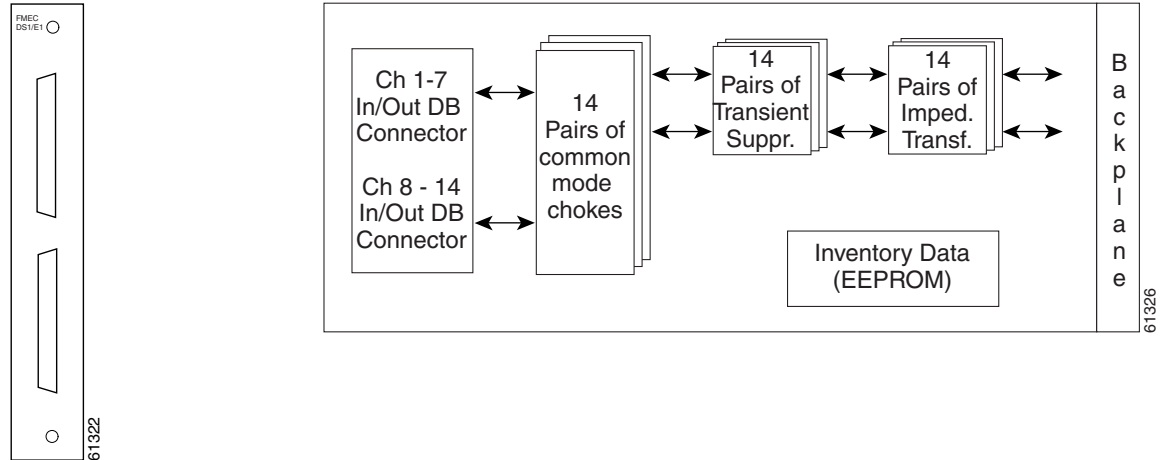
The ONS 15454 SDH FMEC-DS1/E1 card provides front mount electrical connection for 14 ITU-compliant, G.703 E-1 ports. With the FMEC-DS1/E1 card, each E1-N-14 port operates at 2.048 Mbits/s (Mbps) over a 120-ohm balanced cable via two 37-pin DB connectors. [Figure 3-8](#) shows the FMEC-DS1/E1 faceplate and block diagram.



Caution

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

Figure 3-8 FMEC-DS1/E1 Faceplate and Block Diagram



You can install the FMEC-DS1/E1 card in any EFCA slot from Slot 18 to 22 or Slot 25 to 29 on the ONS 15454 SDH. Each FMEC-DS1/E1 card interface features E1-level inputs and outputs supporting cable losses of up to 6 dB at 1024 kHz.

3.9.1 FMEC-DS1/E1 Card Connector Pinout

The connection from the E-1 37-pin DB connector for ports 1 to 7 to the external balanced 120-ohm E-1 interfaces must be made according to [Table 3-8](#).

Table 3-8 E-1 Interface Pinouts on Ports 1 to 7

Pin No.	Signal Name	Pin No.	Signal Name
1	GND	20	RX 7 P
2	TX 7 P	21	RX 7 N
3	TX 7 N	22	GND
4	TX 6 P	23	RX 6 P
5	TX 6 N	24	RX 6 N
6	GND	25	RX 5 P
7	TX 5 P	26	RX 5 N
8	TX 5 N	27	GND
9	TX 4 P	28	RX 4 P
10	TX 4 N	29	RX 4 N
11	GND	30	RX 3 P
12	TX 3 P	31	RX 3 N
13	TX 3 N	32	GND
14	TX 2 P	33	RX 2 P
15	TX 2 N	34	RX 2 N

Table 3-8 E-1 Interface Pinouts on Ports 1 to 7 (continued)

Pin No.	Signal Name	Pin No.	Signal Name
16	GND	35	RX 1 P
17	TX 1 P	36	RX 1 N
18	TX 1 N	37	GND
19	GND	—	—

The connection from the E-1 37-pin DB connector for ports 8 to 14 to the external balanced 120-ohm E-1 interfaces must be made according to [Table 3-9](#).

Table 3-9 E-1 Interface Pinouts on Ports 8 to 14

Pin No.	Signal Name	Pin No.	Signal Name
1	GND	20	RX 14 P
2	TX 14 P	21	RX 14 N
3	TX 14 N	22	GND
4	TX 13 P	23	RX 13 P
5	TX 13 N	24	RX 13 N
6	GND	25	RX 12 P
7	TX 12 P	26	RX 12 N
8	TX 12 N	27	GND
9	TX 11 P	28	RX 11 P
10	TX 11 N	29	RX 11 N
11	GND	30	RX 10 P
12	TX 10 P	31	RX 10 N
13	TX 10 N	32	GND
14	TX 9 P	33	RX 9 P
15	TX 9 N	34	RX 9 N
16	GND	35	RX 8 P
17	TX 8 P	36	RX 8 N
18	TX 8 N	37	GND
19	GND	—	—

3.9.2 FMEC-DS1/E1 Card Specifications

The FMEC-DS1/E1 card has the following specifications:

- FMEC-DS1/E1 input
 - Bit rate: 2.048 Mbits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
 - Termination: Balanced twisted-pair cable

- Input impedance: 120 ohms $\pm 5\%$
- Cable loss: Up to 6 dB at 1024 kHz
- FMEC-DS1/E1 output
 - Bit rate: 2.048 Mbits/s (Mbps) ± 50 ppm
 - Line code: HDB-3
 - Termination: Balanced twisted-pair cable
 - Output impedance: 120 ohms $\pm 5\%$
 - Pulse shape: ITU-T G.703, Figure 15 and Table 7
 - Pulse amplitude: ITU-T G.703, Figure 15 and Table 7
- FMEC-DS1/E1 electrical interface
 - Connectors: 37-pin DB connectors
- Environmental
 - Operating temperature: -5 to $+45$ degrees Celsius ($+23$ to $+113$ degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 0.00 W, 0.00 A at -48 V, 0.0 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.3 kg (0.6 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.10 FMEC E1-120NP Card

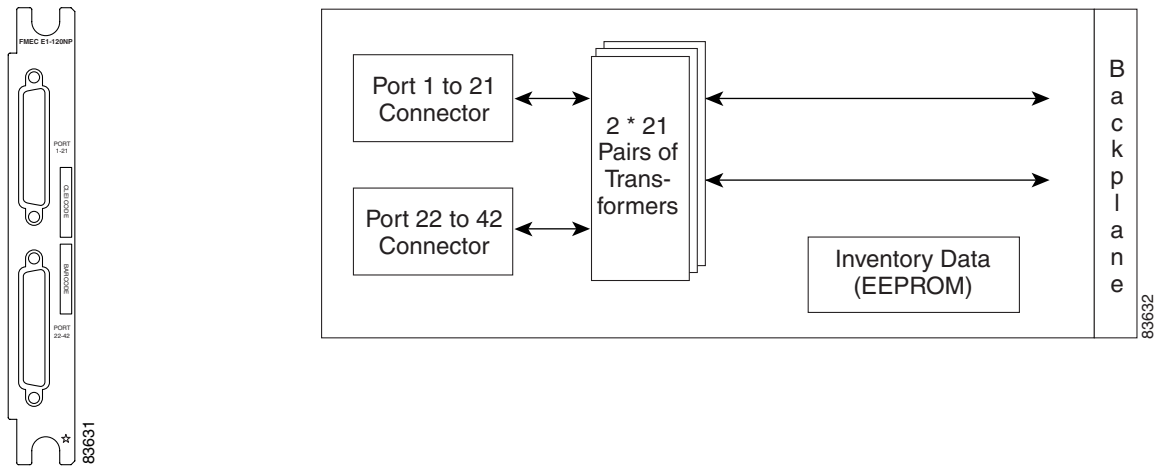
The ONS 15454 SDH FMEC E1-120NP card provides front mount electrical connection for 42 ITU-compliant, G.703 E-1 ports. With the FMEC E1-120NP card, each E1-42 port operates at 2.048 Mbits/s (Mbps) over a 120-ohm balanced interface. Twenty-one interfaces are led through one common Molex 96-pin LFH connector. [Figure 3-9](#) shows the FMEC E1-120NP faceplate and block diagram.



Caution

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

Figure 3-9 FMEC E1-120NP Faceplate and Block Diagram



You can install the FMEC E1-120NP card in any EFCA slot from Slot 18 to 22 or Slot 25 to 29 on the ONS 15454 SDH. Each FMEC E1-120NP card port features E1-level inputs and outputs supporting cable losses of up to 6 dB at 1024 kHz.

3.10.1 FMEC E1-120NP Connector Pinout

The connection from the E-1 96-pin connector for ports 1 to 21 to the external balanced 120-ohm E-1 interfaces must be made according to [Table 3-10](#).

Table 3-10 E-1 Interface Pinouts on Ports 1 to 21

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
1	TX 11 N	25	RX 11 N	49	TX 21 N	73	RX 21 N
2	TX 11 P	26	RX 11 P	50	TX 21 P	74	RX 21 P
3	TX 10 N	27	RX 10 N	51	TX 20 N	75	RX 20 N
4	TX 10 P	28	RX 10 P	52	TX 20 P	76	RX 20 P
5	TX 9 N	29	RX 9 N	53	TX 19 N	77	RX 19 N
6	TX 9 P	30	RX 9 P	54	TX 19 P	78	RX 19 P
7	TX 8 N	31	RX 8 N	55	TX 18 N	79	RX 18 N
8	TX 8 P	32	RX 8 P	56	TX 18 P	80	RX 18 P
9	TX 7 N	33	RX 7 N	57	TX 17 N	81	RX 17 N
10	TX 7 P	34	RX 7 P	58	TX 17 P	82	RX 17 P
11	TX 6 N	35	RX 6 N	59	TX 16 N	83	RX 16 N
12	TX 6 P	36	RX 6 P	60	TX 16 P	84	RX 16 P
13	TX 5 N	37	RX 5 N	61	TX 15 N	85	RX 15 N
14	TX 5 P	38	RX 5 P	62	TX 15 P	86	RX 15 P
15	TX 4 N	39	RX 4 N	63	TX 14 N	87	RX 14 N

Table 3-10 E-1 Interface Pinouts on Ports 1 to 21 (continued)

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
16	TX 4 P	40	RX 4 P	64	TX 14 P	88	RX 14 P
17	TX 3 N	41	RX 3 N	65	TX 13 N	89	RX 13 N
18	TX 3 P	42	RX 3 P	66	TX 13 P	90	RX 13 P
19	TX 2 N	43	RX 2 N	67	TX 12 N	91	RX 12 N
20	TX 2 P	44	RX 2 P	68	TX 12 P	92	RX 12 P
21	TX 1 N	45	RX 1 N	69	NC	93	NC
22	TX 1 P	46	RX 1 P	70	NC	94	NC
23	NC	47	NC	71	NC	95	NC
24	NC	48	NC	72	NC	96	NC

The connection from the E-1 96-pin connector for ports 22 to 42 to the external balanced 120-ohm E-1 interfaces must be made according to [Table 3-11](#).

Table 3-11 E-1 Interface Pinouts on Ports 22 to 42

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
1	TX 32 N	25	RX 32 N	49	TX 42 N	73	RX 42 N
2	TX 32 P	26	RX 32 P	50	TX 42 P	74	RX 42 P
3	TX 31 N	27	RX 31 N	51	TX 41 N	75	RX 41 N
4	TX 31 P	28	RX 31 P	52	TX 41 P	76	RX 41 P
5	TX 30 N	29	RX 30 N	53	TX 40 N	77	RX 40 N
6	TX 30 P	30	RX 30 P	54	TX 40 P	78	RX 40 P
7	TX 29 N	31	RX 29 N	55	TX 39 N	79	RX 39 N
8	TX 29 P	32	RX 29 P	56	TX 39 P	80	RX 39 P
9	TX 28 N	33	RX 28 N	57	TX 38 N	81	RX 38 N
10	TX 28 P	34	RX 28 P	58	TX 38 P	82	RX 38 P
11	TX 27 N	35	RX 27 N	59	TX 37 N	83	RX 37 N
12	TX 27 P	36	RX 27 P	60	TX 37 P	84	RX 37 P
13	TX 26 N	37	RX 26 N	61	TX 36 N	85	RX 36 N
14	TX 26 P	38	RX 26 P	62	TX 36 P	86	RX 36 P
15	TX 25 N	39	RX 25 N	63	TX 35 N	87	RX 35 N
16	TX 25 P	40	RX 25 P	64	TX 35 P	88	RX 35 P
17	TX 24 N	41	RX 24 N	65	TX 34 N	89	RX 34 N
18	TX 24 P	42	RX 24 P	66	TX 34 P	90	RX 34 P
19	TX 23 N	43	RX 23 N	67	TX 33 N	91	RX 33 N
20	TX 23 P	44	RX 23 P	68	TX 33 P	92	RX 33 P

Table 3-11 E-1 Interface Pinouts on Ports 22 to 42 (continued)

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
21	TX 22 N	45	RX 22 N	69	NC	93	NC
22	TX 22 P	46	RX 22 P	70	NC	94	NC
23	NC	47	NC	71	NC	95	NC
24	NC	48	NC	72	NC	96	NC

3.10.2 FMEC E1-120NP Card Specifications

The FMEC E1-120NP card has the following specifications:

- FMEC E1-120NP input
 - Bit rate: 2.048 Mbits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
 - Termination: Balanced twisted-pair cable
 - Input impedance: 120 ohms +/-5%
 - Cable loss: Up to 6 dB at 1024 kHz
- FMEC E1-120NP output
 - Bit rate: 2.048 Mbits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
 - Termination: Balanced twisted-pair cable
 - Input impedance: 120 ohms +/-5%
 - Pulse shape: ITU-T G.703, Figure 15 and Table 7
 - Pulse amplitude: ITU-T G.703, Figure 15 and Table 7
- FMEC E1-120NP electrical interface
 - Connectors: Molex 96-pin LFH connectors (21 ports per connector)
- Environmental
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 0.00 W, 0.00 A at -48 V, 0.0 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.3 kg (0.7 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

- Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.11 FMEC E1-120PROA Card

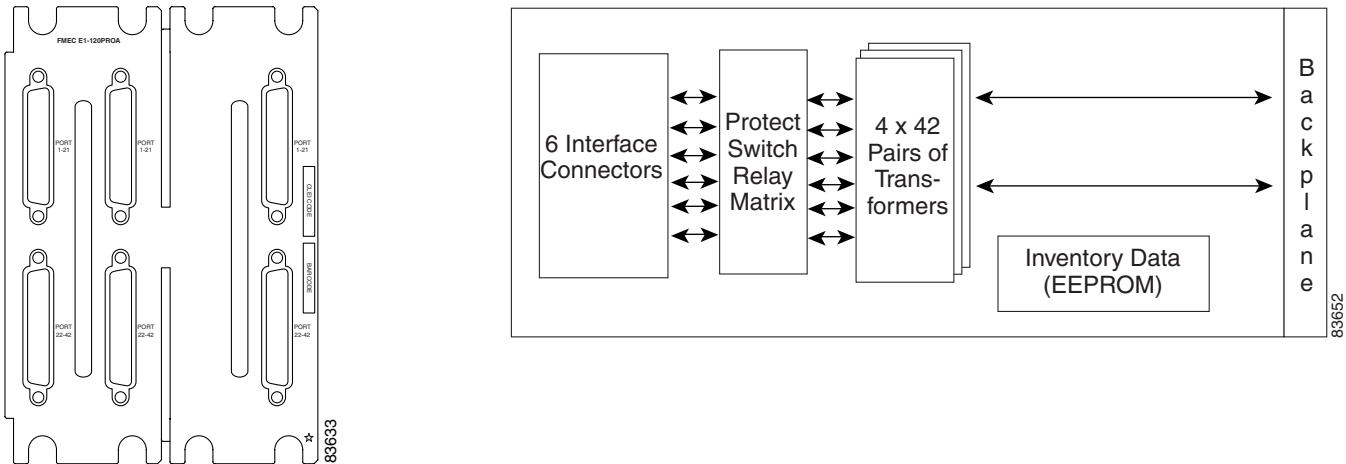
The ONS 15454 SDH FMEC E1-120PROA card provides front mount electrical connection for 42 ITU-compliant, G.703 E-1 ports. With the FMEC E1-120PROA card, each E1-42 port operates at 2.048 MBits/s (Mbps) over a 120-ohm balanced interface. Twenty-one interfaces are led through one common Molex 96-pin LFH connector. Figure 3-10 shows the FMEC E1-120PROA faceplate and block diagram.



Caution

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

Figure 3-10 FMEC E1-120PROA Faceplate and Block Diagram



You can install the FMEC E1-120PROA card in the EFCA in the four far left slots (Slots 18 to 21) on the ONS 15454 SDH. Each FMEC E1-120PROA card port features E1-level inputs and outputs supporting cable losses of up to 6 dB at 1024 kHz.

3.11.1 FMEC E1-120PROA Connector Pinout

The connection from the E-1 96-pin connector for ports 1 to 21 to the external balanced 120-ohm E-1 interfaces must be made according to Table 3-12.

Table 3-12 E-1 Interface Pinouts on Ports 1 to 21

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
1	TX 11 N	25	RX 11 N	49	TX 21 N	73	RX 21 N
2	TX 11 P	26	RX 11 P	50	TX 21 P	74	RX 21 P
3	TX 10 N	27	RX 10 N	51	TX 20 N	75	RX 20 N

Table 3-12 E-1 Interface Pinouts on Ports 1 to 21 (continued)

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
4	TX 10 P	28	RX 10 P	52	TX 20 P	76	RX 20 P
5	TX 9 N	29	RX 9 N	53	TX 19 N	77	RX 19 N
6	TX 9 P	30	RX 9 P	54	TX 19 P	78	RX 19 P
7	TX 8 N	31	RX 8 N	55	TX 18 N	79	RX 18 N
8	TX 8 P	32	RX 8 P	56	TX 18 P	80	RX 18 P
9	TX 7 N	33	RX 7 N	57	TX 17 N	81	RX 17 N
10	TX 7 P	34	RX 7 P	58	TX 17 P	82	RX 17 P
11	TX 6 N	35	RX 6 N	59	TX 16 N	83	RX 16 N
12	TX 6 P	36	RX 6 P	60	TX 16 P	84	RX 16 P
13	TX 5 N	37	RX 5 N	61	TX 15 N	85	RX 15 N
14	TX 5 P	38	RX 5 P	62	TX 15 P	86	RX 15 P
15	TX 4 N	39	RX 4 N	63	TX 14 N	87	RX 14 N
16	TX 4 P	40	RX 4 P	64	TX 14 P	88	RX 14 P
17	TX 3 N	41	RX 3 N	65	TX 13 N	89	RX 13 N
18	TX 3 P	42	RX 3 P	66	TX 13 P	90	RX 13 P
19	TX 2 N	43	RX 2 N	67	TX 12 N	91	RX 12 N
20	TX 2 P	44	RX 2 P	68	TX 12 P	92	RX 12 P
21	TX 1 N	45	RX 1 N	69	NC	93	NC
22	TX 1 P	46	RX 1 P	70	NC	94	NC
23	NC	47	NC	71	NC	95	NC
24	NC	48	NC	72	NC	96	NC

The connection from the E-1 96-pin connector for ports 22 to 42 to the external balanced 120-ohm E-1 interfaces must be made according to [Table 3-13](#).

Table 3-13 E-1 Interface Pinouts on Ports 22 to 42

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
1	TX 32 N	25	RX 32 N	49	TX 42 N	73	RX 42 N
2	TX 32 P	26	RX 32 P	50	TX 42 P	74	RX 42 P
3	TX 31 N	27	RX 31 N	51	TX 41 N	75	RX 41 N
4	TX 31 P	28	RX 31 P	52	TX 41 P	76	RX 41 P
5	TX 30 N	29	RX 30 N	53	TX 40 N	77	RX 40 N
6	TX 30 P	30	RX 30 P	54	TX 40 P	78	RX 40 P
7	TX 29 N	31	RX 29 N	55	TX 39 N	79	RX 39 N
8	TX 29 P	32	RX 29 P	56	TX 39 P	80	RX 39 P

Table 3-13 E-1 Interface Pinouts on Ports 22 to 42 (continued)

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
9	TX 28 N	33	RX 28 N	57	TX 38 N	81	RX 38 N
10	TX 28 P	34	RX 28 P	58	TX 38 P	82	RX 38 P
11	TX 27 N	35	RX 27 N	59	TX 37 N	83	RX 37 N
12	TX 27 P	36	RX 27 P	60	TX 37 P	84	RX 37 P
13	TX 26 N	37	RX 26 N	61	TX 36 N	85	RX 36 N
14	TX 26 P	38	RX 26 P	62	TX 36 P	86	RX 36 P
15	TX 25 N	39	RX 25 N	63	TX 35 N	87	RX 35 N
16	TX 25 P	40	RX 25 P	64	TX 35 P	88	RX 35 P
17	TX 24 N	41	RX 24 N	65	TX 34 N	89	RX 34 N
18	TX 24 P	42	RX 24 P	66	TX 34 P	90	RX 34 P
19	TX 23 N	43	RX 23 N	67	TX 33 N	91	RX 33 N
20	TX 23 P	44	RX 23 P	68	TX 33 P	92	RX 33 P
21	TX 22 N	45	RX 22 N	69	NC	93	NC
22	TX 22 P	46	RX 22 P	70	NC	94	NC
23	NC	47	NC	71	NC	95	NC
24	NC	48	NC	72	NC	96	NC

3.11.2 FMEC E1-120PROA Card Specifications

The FMEC E1-120PROA card has the following specifications:

- FMEC E1-120PROA input
 - Bit rate: 2.048 Mbits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
 - Termination: Balanced twisted-pair cable
 - Input impedance: 120 ohms +/-5%
 - Cable loss: Up to 6 dB at 1024 kHz
- FMEC E1-120PROA output
 - Bit rate: 2.048 Mbits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
 - Termination: Balanced twisted-pair cable
 - Input impedance: 120 ohms +/-5%
 - Pulse shape: ITU-T G.703, Figure 15 and Table 7
 - Pulse amplitude: ITU-T G.703, Figure 15 and Table 7
- FMEC E1-120PROA electrical interface
 - Connectors: Molex 96-pin LFH connectors (21 ports per connector)

- Environmental
 - Operating temperature: –5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 0.1 W (provided by the E1-42 card), 0.34 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.3 kg (0.7 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.12 FMEC E1-120PROB Card

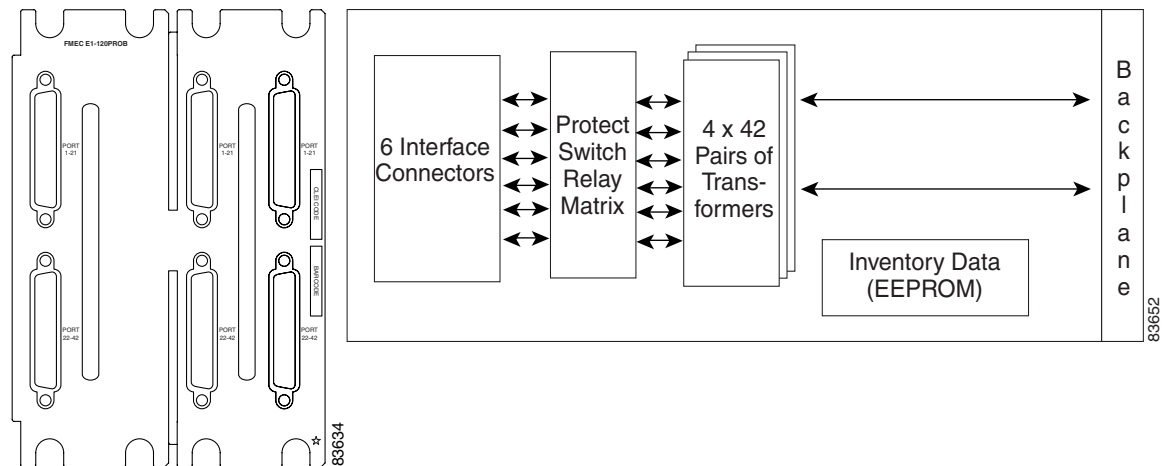
The ONS 15454 SDH FMEC E1-120PROB card provides front mount electrical connection for 42 ITU-compliant, G.703 E-1 ports. With the FMEC E1-120PROB card, each E1-42 port operates at 2.048 Mbits/s (Mbps) over a 120-ohm balanced interface. Twenty-one interfaces are led through one common Molex 96-pin LFH connector. Figure 3-11 shows the FMEC E1-120PROB faceplate and block diagram.



Caution

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

Figure 3-11 FMEC E1-120PROB Faceplate and Block Diagram



You can install the FMEC E1-120PROB card in any EFCA slot from Slot 18 to 22 or Slot 25 to 29 on the ONS 15454 SDH. Each FMEC E1-120PROB card port features E1-level inputs and outputs supporting cable losses of up to 6 dB at 1024 kHz.

3.12.1 FMEC E1-120PROB Connector Pinout

The connection from the E-1 96-pin connector for ports 1 to 21 to the external balanced 120-ohm E-1 interfaces must be made according to [Table 3-14](#).

Table 3-14 E-1 Interface Pinouts on Ports 1 to 21

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
1	TX 11 N	25	RX 11 N	49	TX 21 N	73	RX 21 N
2	TX 11 P	26	RX 11 P	50	TX 21 P	74	RX 21 P
3	TX 10 N	27	RX 10 N	51	TX 20 N	75	RX 20 N
4	TX 10 P	28	RX 10 P	52	TX 20 P	76	RX 20 P
5	TX 9 N	29	RX 9 N	53	TX 19 N	77	RX 19 N
6	TX 9 P	30	RX 9 P	54	TX 19 P	78	RX 19 P
7	TX 8 N	31	RX 8 N	55	TX 18 N	79	RX 18 N
8	TX 8 P	32	RX 8 P	56	TX 18 P	80	RX 18 P
9	TX 7 N	33	RX 7 N	57	TX 17 N	81	RX 17 N
10	TX 7 P	34	RX 7 P	58	TX 17 P	82	RX 17 P
11	TX 6 N	35	RX 6 N	59	TX 16 N	83	RX 16 N
12	TX 6 P	36	RX 6 P	60	TX 16 P	84	RX 16 P
13	TX 5 N	37	RX 5 N	61	TX 15 N	85	RX 15 N
14	TX 5 P	38	RX 5 P	62	TX 15 P	86	RX 15 P
15	TX 4 N	39	RX 4 N	63	TX 14 N	87	RX 14 N
16	TX 4 P	40	RX 4 P	64	TX 14 P	88	RX 14 P
17	TX 3 N	41	RX 3 N	65	TX 13 N	89	RX 13 N
18	TX 3 P	42	RX 3 P	66	TX 13 P	90	RX 13 P
19	TX 2 N	43	RX 2 N	67	TX 12 N	91	RX 12 N
20	TX 2 P	44	RX 2 P	68	TX 12 P	92	RX 12 P
21	TX 1 N	45	RX 1 N	69	NC	93	NC
22	TX 1 P	46	RX 1 P	70	NC	94	NC
23	NC	47	NC	71	NC	95	NC
24	NC	48	NC	72	NC	96	NC

The connection from the E-1 96-pin connector for ports 22 to 42 to the external balanced 120-ohm E-1 interfaces must be made according to [Table 3-15](#).

Table 3-15 E-1 Interface Pinouts on Ports 22 to 42

Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
1	TX 32 N	25	RX 32 N	49	TX 42 N	73	RX 42 N
2	TX 32 P	26	RX 32 P	50	TX 42 P	74	RX 42 P
3	TX 31 N	27	RX 31 N	51	TX 41 N	75	RX 41 N
4	TX 31 P	28	RX 31 P	52	TX 41 P	76	RX 41 P
5	TX 30 N	29	RX 30 N	53	TX 40 N	77	RX 40 N
6	TX 30 P	30	RX 30 P	54	TX 40 P	78	RX 40 P
7	TX 29 N	31	RX 29 N	55	TX 39 N	79	RX 39 N
8	TX 29 P	32	RX 29 P	56	TX 39 P	80	RX 39 P
9	TX 28 N	33	RX 28 N	57	TX 38 N	81	RX 38 N
10	TX 28 P	34	RX 28 P	58	TX 38 P	82	RX 38 P
11	TX 27 N	35	RX 27 N	59	TX 37 N	83	RX 37 N
12	TX 27 P	36	RX 27 P	60	TX 37 P	84	RX 37 P
13	TX 26 N	37	RX 26 N	61	TX 36 N	85	RX 36 N
14	TX 26 P	38	RX 26 P	62	TX 36 P	86	RX 36 P
15	TX 25 N	39	RX 25 N	63	TX 35 N	87	RX 35 N
16	TX 25 P	40	RX 25 P	64	TX 35 P	88	RX 35 P
17	TX 24 N	41	RX 24 N	65	TX 34 N	89	RX 34 N
18	TX 24 P	42	RX 24 P	66	TX 34 P	90	RX 34 P
19	TX 23 N	43	RX 23 N	67	TX 33 N	91	RX 33 N
20	TX 23 P	44	RX 23 P	68	TX 33 P	92	RX 33 P
21	TX 22 N	45	RX 22 N	69	NC	93	NC
22	TX 22 P	46	RX 22 P	70	NC	94	NC
23	NC	47	NC	71	NC	95	NC
24	NC	48	NC	72	NC	96	NC

3.12.2 FMEC E1-120PROB Card Specifications

The FMEC E1-120PROB card has the following specifications:

- FMEC E1-120PROB input
 - Bit rate: 2.048 Mbits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
 - Termination: Balanced twisted-pair cable
 - Input impedance: 120 ohms +/-5%

- Cable loss: Up to 6 dB at 1024 kHz
- FMEC E1-120PROB output
 - Bit rate: 2.048 Mbits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
 - Termination: Balanced twisted-pair cable
 - Input impedance: 120 ohms +/-5%
 - Pulse shape: ITU-T G.703, Figure 15 and Table 7
 - Pulse amplitude: ITU-T G.703, Figure 15 and Table 7
- FMEC E1-120PROB electrical interface
 - Connectors: Molex 96-pin LFH connectors (21 ports per connector)
- Environmental
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 0.1 W (provided by the E1-42 card), 0.34 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.3 kg (0.7 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.13 E1-75/120 Impedance Conversion Panel

The ONS 15454 SDH E1-75/120 impedance conversion panel provides front mount electrical connection for 42 ITU-compliant, G.703 E-1 ports. With the E1-75/120 conversion panel, each E1-42 port operates at 2.048 Mbits/s (Mbps) over a 75-ohm unbalanced coaxial 1.0/2.3 miniature coax connector. [Figure 3-12](#) shows the E1-75/120 faceplate.



Caution

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

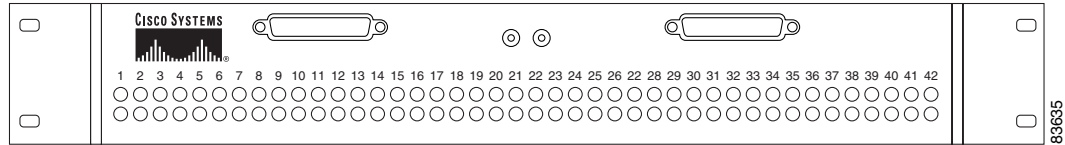
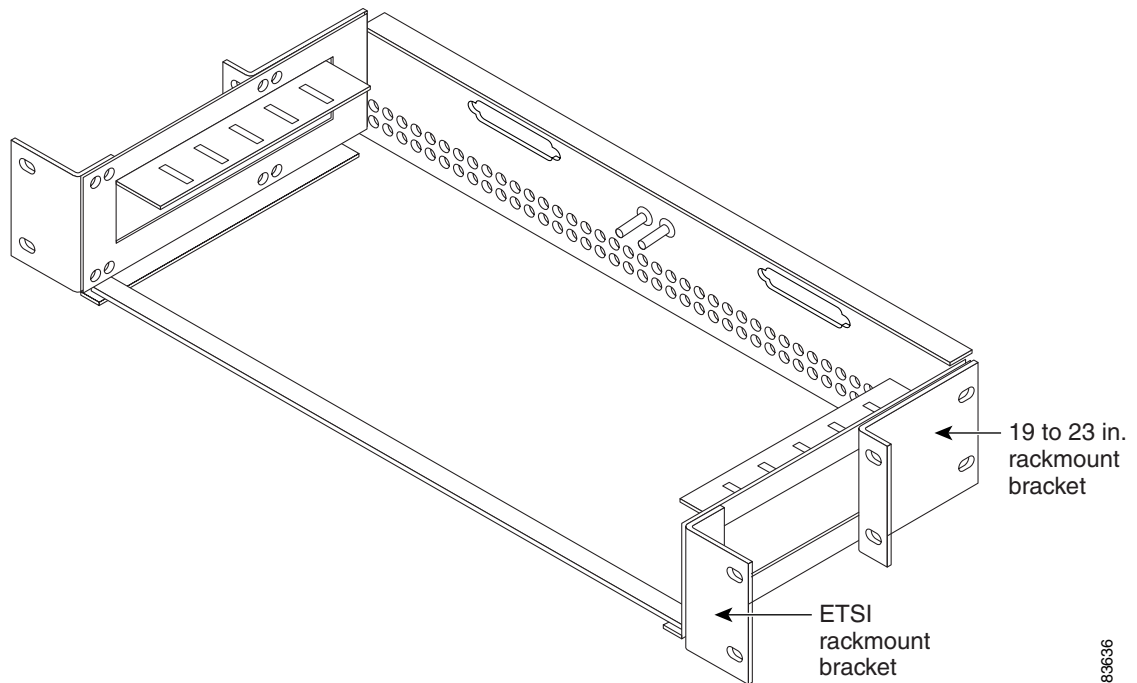
Figure 3-12 E1-75/120 Impedance Conversion Panel Faceplate

Figure 3-13 shows the E1-75/120 with optional rackmount brackets installed.

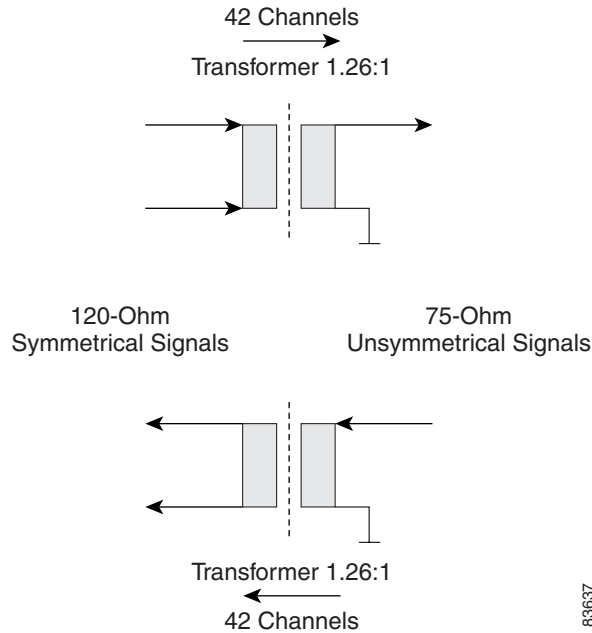
Figure 3-13 E1-75/120 with Optional Rackmount Brackets

You can install the E1-75/120 conversion panel in the ANSI or ETSI rack containing the ONS 15454 SDH shelf 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. The E1-75/120 conversion panel enables the use of 75-ohm interfaces on client side with the E1-42 card that has 120-ohm interfaces.

Before you can install the E1-75/120 in the rack, install the type of rackmount brackets that is required for the rack that you are using.

Figure 3-14 shows a block diagram of the impedance conversion panel.

Figure 3-14 E1-75/120 Impedance Conversion Panel Block Diagram



The E1-75/120 conversion panel has the following specifications:

- E1-75/120 input
 - Bit rate: 2.048 MBits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
- E1-75/120 output
 - Bit rate: 2.048 MBits/s (Mbps) +/-50 ppm
 - Line code: HDB-3
- E1-75/120 electrical interface
 - Connectors:
 - 1.0/2.3 miniature coax connectors on 75-ohm side
 - Molex 96-pin LFH connectors on 120-ohm side
 - Impedance tolerance: +/-5%
- Environmental
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: Not applicable; the E1-75/120 is a passive device.
- Dimensions
 - Height: 75 mm (2.95 in.)
 - Width: 535 mm (21.06 in.)
 - Depth: 221 mm (8.7 in.)
 - Weight: 2.15 kg (4.74 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

- Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.14 FMEC-E3/DS3 Card

The ONS 15454 SDH FMEC-E3/DS3 card provides front mount electrical connection for 12 ITU-compliant, G.703 E-3 or DS-3 ports. With the FMEC-E3/DS3 card, each interface of an E3-12 card operates at 34.368 Mbits/s (Mbps). Each interface of a DS3i-N-12 card operates at 44.736 Mbits/s (Mbps) over a 75-ohm unbalanced coaxial 1.0/2.3 miniature coax connector.

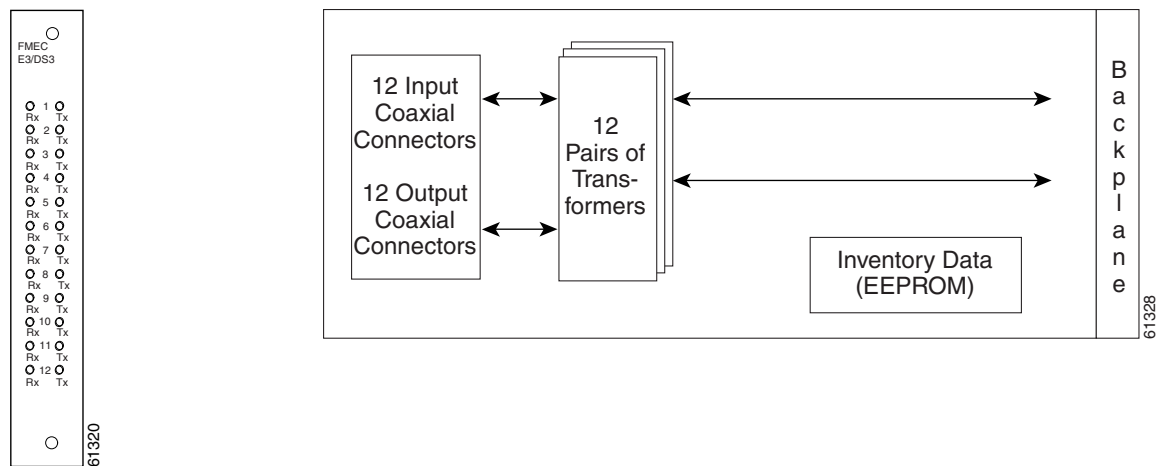
Figure 3-15 shows the FMEC-E3/DS3 faceplate and block diagram.



Caution

This interface can only be connected to Safety Extreme Low Voltage (SELV) circuits. The interface is not intended for connection to any Australian telecommunications network without the written consent of the network manager.

Figure 3-15 FMEC-E3/DS3 Faceplate and Block Diagram



You can install the FMEC-E3/DS3 card in any EFCA slot from Slot 18 to 22 or Slot 25 to 29 on the ONS 15454 SDH. Each FMEC-E3/DS3 card interface features E3-level or DS3-level inputs and outputs supporting cable losses:

- E3 signals
 - up to 12 dB at 17184 kHz
- DS3 signals
 - up to 137 m (450 ft) 734A, RG59, or 728A, or
 - up to 24 m (79 ft) RG179.

The FMEC-E3/DS3 card has the following specifications:

- FMEC-E3/DS3 input (for E3 signals)
 - Bit rate: 34.368 Mbits/s (Mbps) +/-20 ppm
 - Line code: HDB-3

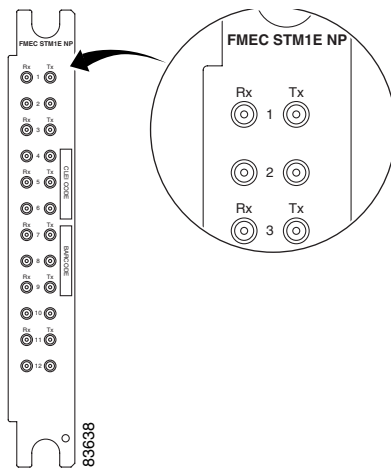
- Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/-5%
 - Cable loss: Up to 12 dB at 17184 kHz
- FMEC-E3/DS3 output (for E3 signals)
 - Bit rate: 34.368 MBits/s (Mbps) +/-20 ppm
 - Line code: HDB-3
 - Termination: Unbalanced coaxial cable
 - Output impedance: 75 ohms +/-5%
 - Pulse shape: ITU-T G.703, Figure 17
 - Pulse amplitude: ITU-T G.703, Figure 17 and Table 9
- FMEC-E3/DS3 Input (for DS3 signals)
 - Bit rate: 44.736 MBits/s (Mbps) +/- 20 ppm
 - Line code: B3ZS
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/-5%
 - Cable loss:
 - Maximum 137 m (450 ft): 734A, RG59, 728A
 - Max 24 m (79 ft): RG179
- FMEC-E3/DS3 output (for DS3 signals)
 - Bit rate: 44.736 MBits/s (Mbps) +/-20 ppm
 - Line code: B3ZS
 - Termination: Unbalanced coaxial cable
 - Output impedance: 75 ohms +/-5%
 - AIS: TR-TSY-000191 compliant
 - Power level: ITU-T G.703, Table 6; -1.8 to +5.7 dBm
 - Pulse shape: ITU-T G.703, Table 6 and Figure 14; ANSI T1.102-1988, Figure 8
 - Pulse amplitude: ITU-T G.703, Table 6; 0.36 to 0.85 V peak-to-peak
 - Line build out: 0 to 225 ft; 226 to 450 ft
- FMEC-E3/DS3 electrical interface
 - Connectors: 1.0/2.3 miniature coax connectors
- Environmental
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 0.00 W, 0.00 A at -48 V, 0.0 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)

- Depth with backplane connector: 98 mm (3.87 in.)
- Weight not including clam shell: 0.3 kg (0.7 lb)
- Compliance
 - ONS 15454 SDH cards, when installed in a system, comply with these standards:
 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.15 FMEC STM1E NP Card

The ONS 15454 SDH FMEC STM1E NP card provides front mount electrical connection for 12 ITU-compliant, G.703 STM1E ports. Ports 9 to 12 can be switched to E-4 instead of STM-1 (via Cisco Transport Controller [CTC] on the STM1E-12 card). With FMEC STM1E NP, each interface of an STM1E-12 card operates at 155.52 Mbits/s (Mbps) for STM-1 or 139.264 Mbits/s (Mbps) for E-4 over a 75-ohm unbalanced coaxial 1.0/2.3 miniature coax connector. [Figure 3-16](#) shows the FMEC STM1E NP faceplate.

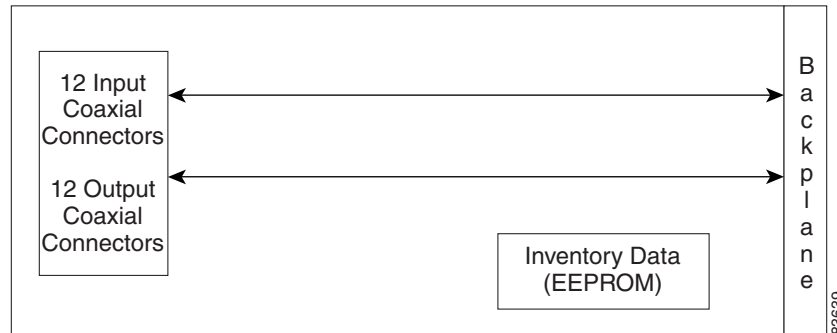
Figure 3-16 FMEC STM1E NP Faceplate



You can install the FMEC STM1E NP card in any EFCA slot from Slot 18 to 22 or Slot 25 to 29 on the ONS 15454 SDH. Each FMEC STM1E NP card interface features STM1-level inputs and outputs supporting cable losses of up to 12.7 dB at 78 MHz.

[Figure 3-17](#) shows a block diagram of the card.

Figure 3-17 FMEC STM1E NP Block Diagram



3.15.1 FMEC STM1E NP Card Specifications

The FMEC STM1E NP card has the following specifications:

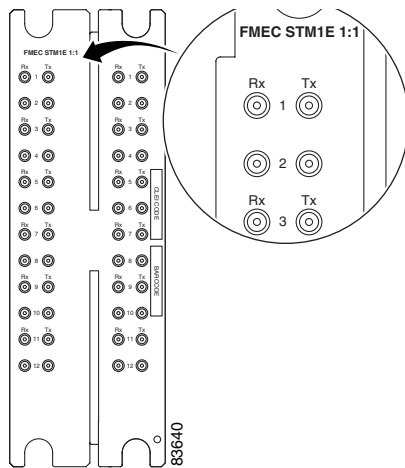
- FMEC STM1E NP input
 - Bit rate: 155.52 MBits/s (Mbps) \pm 20 ppm
 - Line code: CMI
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms \pm 5%
 - Cable loss: Up to 12.7 dB at 78 MHz
- FMEC STM1E NP output
 - Bit rate: 155.52 MBits/s (Mbps) \pm 20 ppm
 - Line code: CMI
 - Termination: Unbalanced coaxial cable
 - Output impedance: 75 ohms \pm 5%
 - Pulse shape: ITU-T G.703, Figure 18 and 19 for E-4, Figure 22 and 23 for STM-1
 - Pulse amplitude: 1 V \pm 0.1 V peak-to-peak
- FMEC STM1E NP electrical interface
 - Connectors: 1.0/2.3 miniature coax connectors
- Environmental
 - Operating temperature: -5 to $+45$ degrees Celsius ($+23$ to $+113$ degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 4.4 W (provided by the STM1E-12 card), 15.0 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)

- Weight not including clam shell: 0.3 kg (0.7 lb)
- Compliance
 - ONS 15454 SDH cards, when installed in a system, comply with these standards:
 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.16 FMEC STM1E 1:1 Card

The ONS 15454 SDH FMEC STM1E 1:1 card provides front mount electrical connection for 2 x 12 ITU-compliant, G.703 STM1E ports. Ports 9 to 12 can be switched to E-4 instead of STM-1 (via CTC, on the STM1E-12 card). With the FMEC STM1E 1:1 card, each interface of an STM1E-12 card operates at 155.52 Mbits/s (Mbps) for STM-1 or 139.264 Mbits/s (Mbps) for E-4 over a 75-ohm unbalanced coaxial 1.0/2.3 miniature coax connector. The FMEC STM1E 1:1 card is required if you want to use the 1:1 protection feature of the STM1E-12 card. You can also use the FMEC STM1E 1:1 for connection to two unprotected STM1E-12 cards. In a future release it will support secondary priority traffic. [Figure 3-18](#) shows the FMEC STM1E 1:1 faceplate.

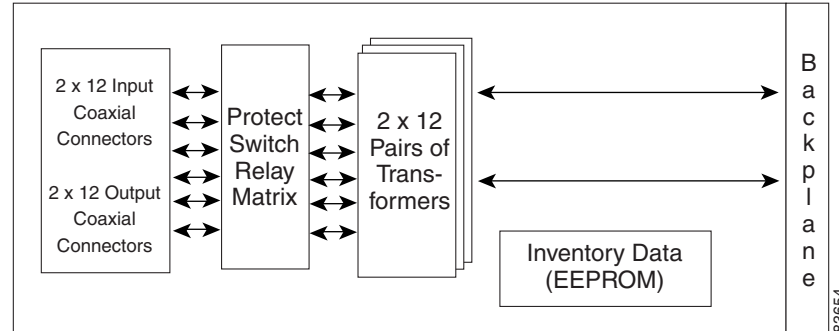
Figure 3-18 FMEC STM1E 1:1 Faceplate



You can install the FMEC STM1E 1:1 card in any EFCA slot pair (18/19, 20/21, 26/27, or 28/29) on the ONS 15454 SDH. Each FMEC STM1E 1:1 card interface features STM1-level inputs and outputs supporting cable losses of up to 12.7 dB at 78 MHz.

[Figure 3-19](#) shows a block diagram of the card.

Figure 3-19 FMEC STM1E 1:1 Block Diagram



The FMEC STM1E 1:1 card has the following specifications:

- FMEC STM1E 1:1 input
 - Bit rate: 155.52 MBits/s (Mbps) +/-20 ppm
 - Line code: CMI
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/-5%
 - Cable loss: Up to 12.7 dB at 78 MHz
- FMEC STM1E 1:1 output
 - Bit rate: 155.52 MBits/s (Mbps) +/-20 ppm
 - Line code: CMI
 - Termination: Unbalanced coaxial cable
 - Output impedance: 75 ohms +/-5%
 - Pulse shape: ITU-T G.703, Figure 18 and 19 for E-4, Figure 22 and 23 for STM-1
 - Pulse amplitude: 1 V +/- 0.1 V peak-to-peak
- FMEC STM1E 1:1 electrical interface
 - Connectors: 1.0/2.3 miniature coax connectors
- Environmental
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 8.8 W (provided by the STM1E-12 card), 30.0 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.3 kg (0.7 lb)
- Compliance

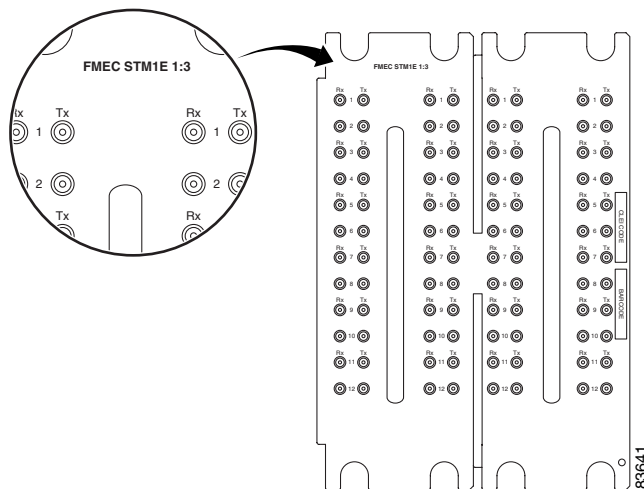
ONS 15454 SDH cards, when installed in a system, comply with these standards:

- Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.17 FMEC STM1E 1:3 Card

The ONS 15454 SDH FMEC STM1E 1:3 card provides front mount electrical connection for 4 x 12 ITU-compliant, G.703 STM1E ports. Ports 9 to 12 can be switched to E-4 instead of STM-1 (via CTC on the STM1E-12 card). With the FMEC STM1E 1:3 card, each interface of an STM1E-12 card operates at 155.52 Mbits/s (Mbps) for STM-1 or 139.264 Mbits/s (Mbps) for E-4 over a 75-ohm unbalanced coaxial 1.0/2.3 miniature coax connector. The FMEC STM1E 1:3 card is required if you want to use the 1:3 protection feature of the STM1E-12 card. You can also use the FMEC STM1E 1:3 for connection to four unprotected STM1E-12 cards. In a future release it will support secondary priority traffic. The FMEC STM1E 1:3 card must be installed in Slots 18 to 21 for use with STM1E-12 cards in Slots 1 to 4. The FMEC STM1E 1:3 card must be installed in Slots 26 to 29 for use with STM1E-12 cards in Slots 14 to 17. [Figure 3-20](#) shows the FMEC STM1E 1:3 faceplate.

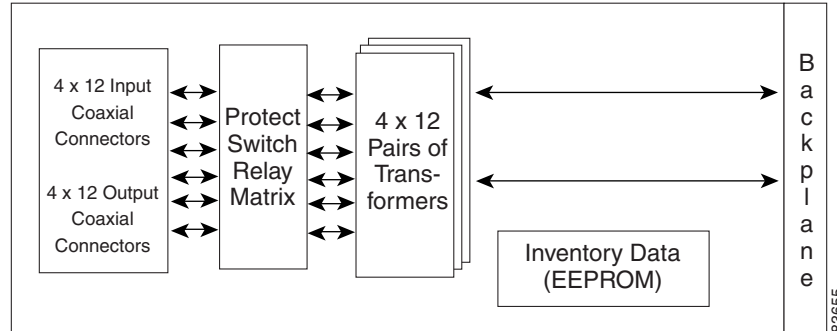
Figure 3-20 FMEC STM1E 1:3 Faceplate



You can install the FMEC STM1E 1:3 card in any EFCA slot from Slot 18 to 22 or Slot 25 to 29 on the ONS 15454 SDH. Each FMEC STM1E 1:3 card interface features STM1-level inputs and outputs supporting cable losses of up to 12.7 dB at 78 MHz.

[Figure 3-21](#) shows a block diagram of the card

Figure 3-21 FMEC STM1E 1:3 Block Diagram



The FMEC STM1E 1:3 card has the following specifications:

- FMEC STM1E 1:3 input
 - Bit rate: 155.52 MBits/s (Mbps) +/-20 ppm
 - Line code: CMI
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/-5%
 - Cable loss: Up to 12.7 dB at 78 MHz
- FMEC STM1E 1:3 output
 - Bit rate: 155.52 MBits/s (Mbps) +/-20 ppm
 - Line code: CMI
 - Termination: Unbalanced coaxial cable
 - Output impedance: 75 ohms +/-5%
 - Pulse shape: ITU-T G.703, Figure 18 and 19 for E-4, Figure 22 and 23 for STM-1
 - Pulse amplitude: 1 V +/- 0.1 V peak-to-peak
- FMEC STM1E 1:3 electrical interface
 - Connectors: 1.0/2.3 miniature coax connectors
- Environmental
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 17.6 W (provided by the STM1E-12 card), 60.1 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.3 kg (0.7 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

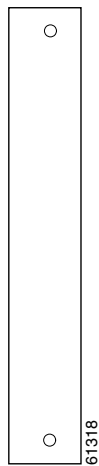
- Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.18 FMEC-BLANK Card

The FMEC-BLANK card provides EMC emission control for empty FMEC slots. It also provides a way to close off the EFCA area, thus allowing air flow and convection to be maintained through the EFCA. [Figure 3-22](#) shows the FMEC-BLANK card faceplate.

You have to install the BLANK FMEC in every empty FMEC slot to maintain EMC requirements of the system and proper air flow.

Figure 3-22 FMEC-BLANK Faceplate



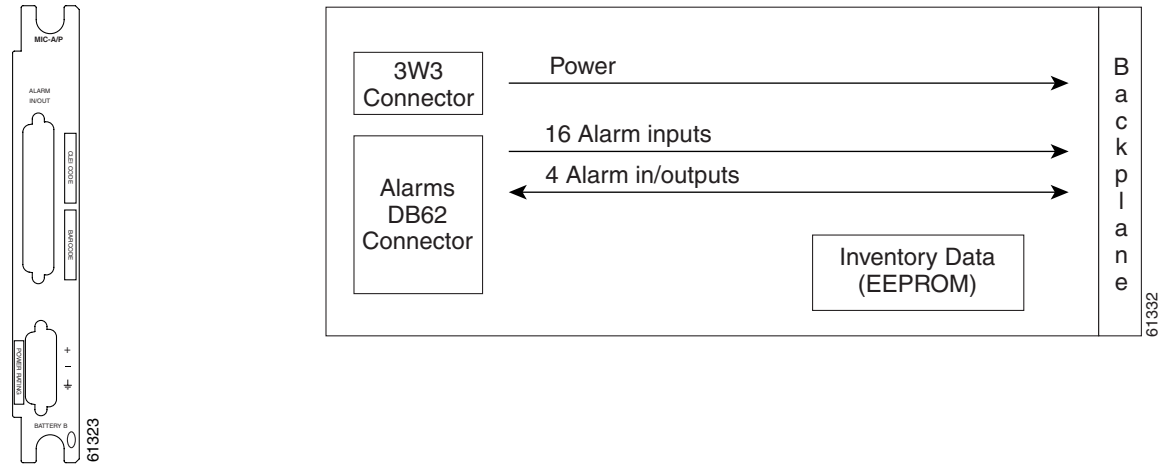
The FMEC-BLANK card has the following specifications:

- Environmental
 - Operating temperature: -5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: Not applicable
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Weight not including clam shell: 0.2 kg (0.4 lb)

3.19 MIC-A/P Card

The MIC-A/P card provides connection for the BATTERY B input, one of the two possible redundant power supply inputs. It also provides connection for eight alarm outputs (coming from the TCC2 card), sixteen alarm inputs, and four configurable alarm inputs/outputs. Its position is in Slot 23 in the center of the subrack EFCA area. [Figure 3-23](#) shows the MIC-A/P faceplate and block diagram.

Figure 3-23 MIC-A/P Faceplate and Block Diagram



The following list summarizes MIC-A/P card features:

- Connection for one of the two possible redundant power supply inputs
- Connection for eight alarm outputs (coming from the TCC2 card)
- Connection for four configurable alarm inputs/outputs
- Connection for sixteen alarm inputs
- Storage of manufacturing and inventory data



Note

For proper system operation, both the MIC-A/P card and the MIC-C/T/P card must be installed in the shelf.

3.19.1 MIC-A/P Connector Pinouts

Table 3-16 shows the Alarm Interface Pinouts on the MIC-A/P DB-62 connector.

Table 3-16 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector

Pin No.	Signal Name	Signal Description
1	ALMCUTOFF N	Alarm cutoff, normally open ACO pair
2	ALMCUTOFF P	Alarm cutoff, normally open ACO pair
3	ALMINP0 N	Alarm input pair # 1, reports closure on connected wires
4	ALMINP0 P	Alarm input pair # 1, reports closure on connected wires
5	ALMINP1 N	Alarm input pair # 2, reports closure on connected wires
6	ALMINP1 P	Alarm input pair # 2, reports closure on connected wires
7	ALMINP2 N	Alarm input pair # 3, reports closure on connected wires
8	ALMINP2 P	Alarm input pair # 3, reports closure on connected wires
9	ALMINP3 N	Alarm input pair # 4, reports closure on connected wires
10	ALMINP3 P	Alarm input pair # 4, reports closure on connected wires

Table 3-16 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector (continued)

Pin No.	Signal Name	Signal Description
11	EXALM0 N	External customer alarm # 1
12	EXALM0 P	External customer alarm # 1
13	GND	Ground
14	EXALM1 N	External customer alarm # 2
15	EXALM1 P	External customer alarm # 2
16	EXALM2 N	External customer alarm # 3
17	EXALM2 P	External customer alarm # 3
18	EXALM3 N	External customer alarm # 4
19	EXALM3 P	External customer alarm # 4
20	EXALM4 N	External customer alarm # 5
21	EXALM4 P	External customer alarm # 5
22	EXALM5 N	External customer alarm # 6
23	EXALM5 P	External customer alarm # 6
24	EXALM6 N	External customer alarm # 7
25	EXALM6 P	External customer alarm # 7
26	GND	Ground
27	EXALM7 N	External customer alarm # 8
28	EXALM7 P	External customer alarm # 8
29	EXALM8 N	External customer alarm # 9
30	EXALM8 P	External customer alarm # 9
31	EXALM9 N	External customer alarm # 10
32	EXALM9 P	External customer alarm # 10
33	EXALM10 N	External customer alarm # 11
34	EXALM10 P	External customer alarm # 11
35	EXALM11 N	External customer alarm # 12
36	EXALM11 P	External customer alarm # 12
37	ALMOUP0 N	Normally open output pair # 1
38	ALMOUP0 P	Normally open output pair # 1
39	GND	Ground
40	ALMOUP1 N	Normally open output pair # 2
41	ALMOUP1 P	Normally open output pair # 2
42	ALMOUP2 N	Normally open output pair # 3
43	ALMOUP2 P	Normally open output pair # 3
44	ALMOUP3 N	Normally open output pair # 4
45	ALMOUP3 P	Normally open output pair # 4
46	AUDALM0 N	Normally open Minor audible alarm

Table 3-16 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector (continued)

Pin No.	Signal Name	Signal Description
47	AUDALM0 P	Normally open Minor audible alarm
48	AUDALM1 N	Normally open Major audible alarm
49	AUDALM1 P	Normally open Major audible alarm
50	AUDALM2 N	Normally open Critical audible alarm
51	AUDALM2 P	Normally open Critical audible alarm
52	GND	Ground
53	AUDALM3 N	Normally open Remote audible alarm
54	AUDALM3 P	Normally open Remote audible alarm
55	VISALM0 N	Normally open Minor visual alarm
56	VISALM0 P	Normally open Minor visual alarm
57	VISALM1 N	Normally open Major visual alarm
58	VISALM1 P	Normally open Major visual alarm
59	VISALM2 N	Normally open Critical visual alarm
60	VISALM2 P	Normally open Critical visual alarm
61	VISALM3 N	Normally open Remote visual alarm
62	VISALM3 P	Normally open Remote visual alarm

3.19.2 MIC-A/P Card Specifications

The MIC-A/P card has the following specifications:

- MIC-A/P power supply input BATTERY B
 - System supply voltage: Nominal –48 VDC
Tolerance limits: –40.5 to –57.0 VDC
 - Connector: 3WK3 Combo-D power cable connector
- MIC-A/P alarm outputs
 - Voltage (open contact): Maximum 60 VDC
 - Current (closed contact): Maximum 250 mA
 - Connector: 62-pin DB connector (common for inputs/outputs)
- MIC-A/P alarm inputs
 - Voltage (open contact): Maximum 60 VDC
 - Current (closed contact): Maximum 2 mA
 - Connector: 62-pin DB connector (common for inputs/outputs)
- Environmental
 - Operating temperature: –5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)
 - Operating humidity: 5 to 95%, noncondensing
 - Power consumption: 0.13 W (provided by +5 V from the TCC2 card), 0.44 BTU/hr

- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.2 kg (0.5 lb)
- Compliance

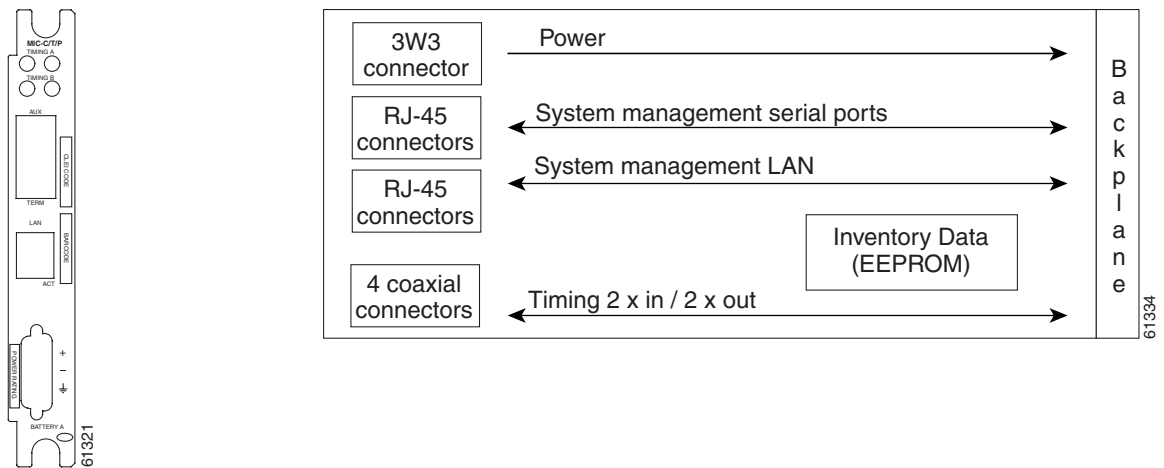
ONS 15454 SDH cards, when installed in a node, comply with these standards:

 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260

3.20 MIC-C/T/P Card

The MIC-C/T/P card provides connection for the BATTERY A input, one of the two possible redundant power supply inputs. It also provides connection for system management serial port, system management LAN port, modem port (for future use), and system timing inputs and outputs. Place the MIC-C/T/P in Slot 24. [Figure 3-24](#) shows the MIC-C/T/P card faceplate and block diagram.

Figure 3-24 MIC-C/T/P Faceplate



The following list summarizes MIC-C/T/P card features:

- Connection for one of the two possible redundant power supply inputs
- Connection for two serial ports for local craft/modem (for future use)
- Connection for one LAN port
- Connection for two system timing inputs
- Connection for two system timing outputs
- Storage of manufacturing and inventory data

**Note**

For proper system operation, both the MIC-A/P card and the MIC-C/T/P card must be installed in the shelf.

3.20.1 MIC-C/T/P Port-Level Indicators

The MIC-C/T/P card has one pair of LEDs, located on the RJ45 LAN connector. The green LED is illuminated when a link is present, and the yellow LED is illuminated when data is being transferred.

3.20.2 MIC-C/T/P Card Specifications

The MIC-C/T/P card has the following specifications:

- MIC-C/T/P power supply input BATTERY A
 - System supply voltage: Nominal –48 VDC
Tolerance limits: –40.5 to –57.0 VDC
 - Connector: 3WK3 Combo-D power cable connector
- MIC-C/T/P timing connector
 - Frequency: 2.048 MHz +/-10 ppm
 - Signal level: 0.75 to 1.5 V
 - Impedance: 75 ohms +/-5% (switchable by jumper to high impedance > 3 kohms)
(120 ohms balanced impedance is possible with external matching cable)
 - Cable attenuation: Up to 6 dB at 2 MHz
 - Connectors: 1.0/2.3 miniature coax connector
- MIC-C/T/P system management serial port:
 - System management serial port craft interface
 - Modem port (for future use)
 - Connectors: 8-pin RJ-45
- MIC-C/T/P system management LAN port connectors:
 - Signal: IEEE 802.3 10BaseT
 - Connectors: 8-pin RJ-45
- Environmental
 - Operating temperature: –5 to +45 degrees Celsius (+23 to +113 degrees Fahrenheit)

- Operating humidity: 5 to 95%, noncondensing
- Power consumption: 0.38 W (provided by +5 V from the TCC2 card), 1.37 BTU/hr
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 32 mm (1.25 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.2 kg (0.5 lb)
- Compliance

ONS 15454 SDH cards, when installed in a system, comply with these standards:

 - Safety: IEC 60950, EN 60950, UL 60950, CSA C22.2 No. 60950, TS 001, AS/NZS 3260