



CHAPTER 2

Card Reference

This chapter describes the Cisco ONS 15310-MA SDH cards. It includes descriptions and block diagrams for each card. For specifications, see [Appendix A, “Specifications.”](#) For card installation and turn-up procedures, refer to the *Cisco ONS 15310-MA SDH Procedure Guide*.

Chapter topics include:

- [2.1 Card Summary and Compatibility, page 2-1](#)
- [2.2 15310E-CTX-K9 Card, page 2-4](#)
- [2.3 CE-100T-8 Card, page 2-6](#)
- [2.4 CE-MR-6 Card, page 2-9](#)
- [2.5 ML-100T-8 Card, page 2-12](#)
- [2.6 E1_21_E3_DS3_3 and E1_63_E3_DS3_3 Cards, page 2-16](#)
- [2.7 Filler Cards, page 2-18](#)
- [2.8 SFP Modules, page 2-19](#)



Note

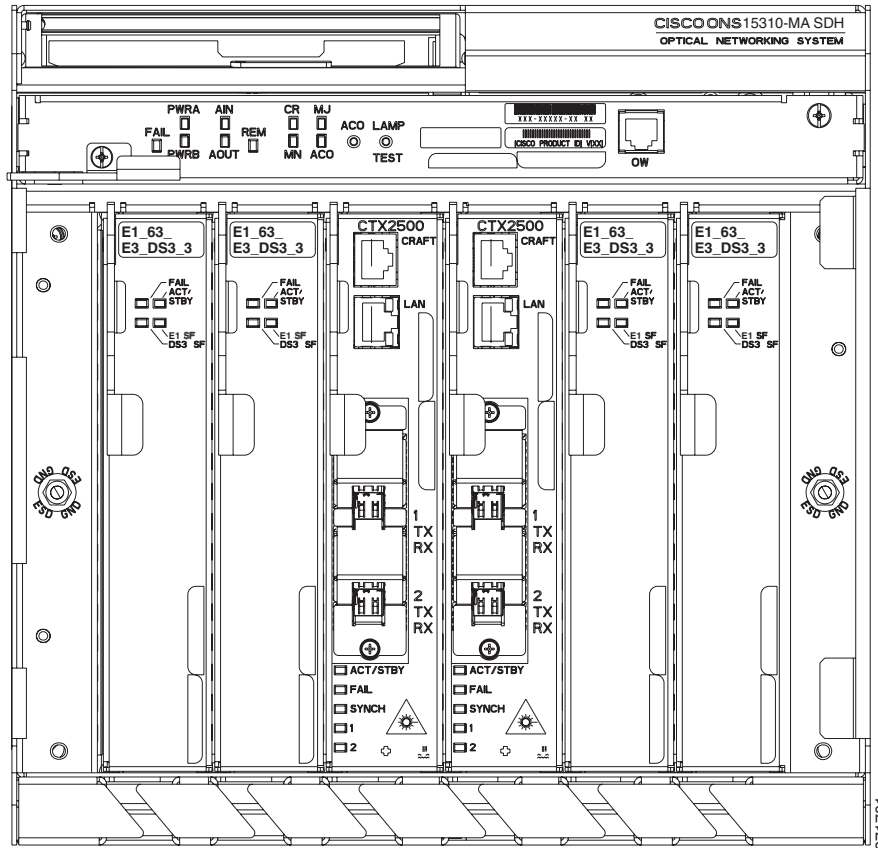
The I-Temp symbol is located on the faceplate of an I-Temp compliant card. A card without this symbol is C-Temp compliant.

2.1 Card Summary and Compatibility

The Cisco ONS 15310-MA SDH uses a common-control card (the 15310E-CTX-K9) and a combination of Ethernet cards (CE-100T-8, CE-MR-6, and ML-100T-8) and electrical cards (E1_21_E3_DS3_3 and E1_63_E3_DS3_3). The 15310E-CTX-K9 card provides optical connections for the ONS 15310-MA SDH.

This section provides a card summary. [Figure 2-1](#) shows the ONS 15310-MA SDH fully populated with cards.

Figure 2-1 ONS 15310-MA SDH with Cards Installed



2.1.1 Card Summary

The ONS 15310-MA SDH cards are summarized in [Table 2-1](#).

Table 2-1 ONS 15310-MA SDH Cards and Descriptions

| Card | Compatible Platform(s) | Description | For Additional Information... |
|---------------|------------------------|---|---|
| 15310E-CTX-K9 | MA | The 15310E-CTX-K9 card serves as the common control and central switching element for the ONS 15310-MA SDH. | See the “ 2.2 15310E-CTX-K9 Card ” section on page 2-4. |
| CE-100T-8 | MA | The CE-100T-8 card provides eight RJ-45 10/100-Mbps Ethernet ports. | See the “ 2.3 CE-100T-8 Card ” section on page 2-6. |
| CE-MR-6 | MA | The CE-MR-6 card provides six 10/100/1000-Mbps Gigabit Ethernet ports. | See the “ 2.4 CE-MR-6 Card ” section on page 2-9. |
| ML-100T-8 | MA | The ML-100T-8 Ethernet card provides eight ports of 10/100 Ethernet-encapsulated traffic into SDH VC4/STM-1 payloads. | See the “ 2.5 ML-100T-8 Card ” section on page 2-12. |

Table 2-1 ONS 15310-MA SDH Cards and Descriptions (continued)

| Card | Compatible Platform(s) | Description | For Additional Information... |
|--|------------------------|---|---|
| E1_21_E3_DS3_3 and E1_63_E3_DS3_3 | MA SDH | The E1_21_E3_DS3_3 and E1_63_E3_DS3_3 cards provide 21 and 63 ITU-Compliant G.703 E1 ports, respectively, as well as three E3/DS-3 ports. | See the “ 2.6 E1_21_E3_DS3_3 and E1_63_E3_DS3_3 Cards ” section on page 2-16. |
| Filler Card (Traffic Slot) | MA | The FILLER card is used to fill unused traffic card slots in the ONS 15310-MA SDH shelves. The Cisco Transport Controller (CTC) graphical user interface (GUI) detects the filler card. | See the “ 2.7 Filler Cards ” section on page 2-18. |
| Filler Card (15310E-CTX-K9 Slot) | MA | The CTX FILLER card is used to fill unused 15310E-CTX-K9 card slots in the ONS 15310-MA SDH shelf. CTC detects the filler card. | See the “ 2.7 Filler Cards ” section on page 2-18. |
| SFP Modules | MA | Small Form-factor Pluggables (SFPs) are integrated fiber-optic transceivers that provide high-speed serial links from a port or slot to the network. | See the “ 2.8 SFP Modules ” section on page 2-19 |

2.1.2 Card Compatibility

Table 2-2 lists CTC software release compatibility for each ONS 15310-MA SDH card. In the table, “Yes” means that the card is compatible with the listed software release.

Table 2-2 ONS 15310-MA SDH Software Release Compatibility Per Card

| Card | R9.0 |
|-----------------------------------|------|
| 15310E-CTX-K9 | Yes |
| CE-100T-8 Card¹ | Yes |
| CE-MR-6 Card | Yes |
| ML-100T-8 Card² | Yes |
| E1_21_E3_DS3_3 | Yes |
| E1_63_E3_DS3_3 | Yes |
| FILLER Card | Yes |
| CTX FILLER Card | Yes |

1. The CE-100T-8 card with product ID (PID) 15310-CE-100T-8 is not compatible with the ONS 15310-MA SDH. 15310-P-CE-100T-8 is compatible with the ONS 15310-MA SDH shelf assembly.
2. The ML-100T-8 card with PID 15310-ML-100T-8 is not compatible with the ONS 15310-MA SDH shelf assembly. 15310-P-ML-100T-8 is compatible with the ONS 15310-MA SDH shelf assembly.

2.2 15310E-CTX-K9 Card

The 15310E-CTX-K9 card, for use with the ONS 15310-MA SDH, is a fully nonblocking cross-connect card that operates in either a simplex or duplex (redundant) configuration. It performs system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection/resolution, SDH DCC termination, system fault detection, and cross-connect maintenance and management for the ONS 15310-MA SDH. The card also provides the circuitry for the STM1/STM4/STM16 interfaces, and ensures that the system maintains timing with SETS stability.

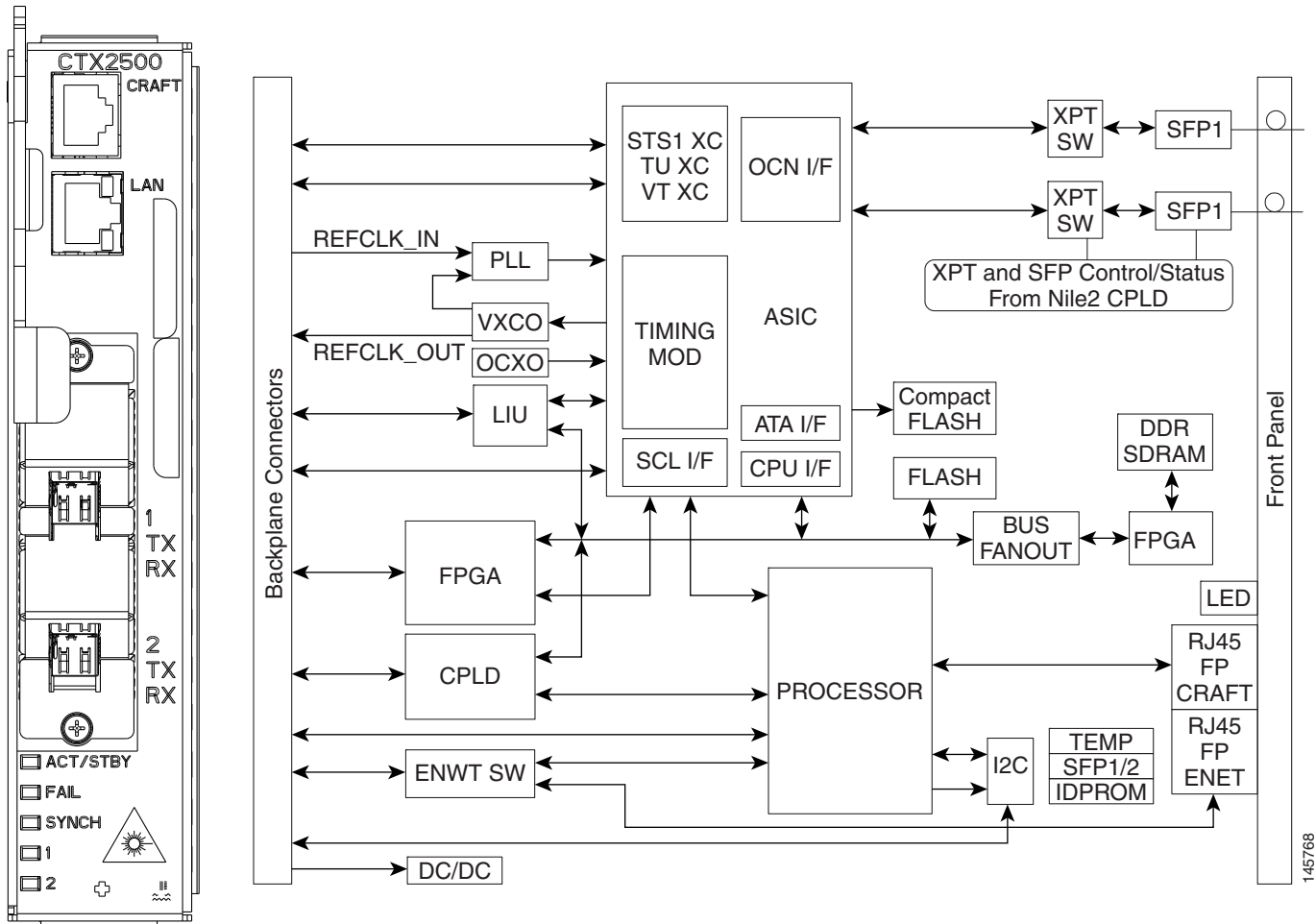


Caution

If the system loses power or the 15310E-CTX-K9 card is reset, you must reset the ONS 15310-MA SDH clock unless the node has been previously provisioned to use Simple Network Time Protocol (SNTP) to update the clock over the LAN.

Figure 2-2 shows the 15310E-CTX-K9 card faceplate and block diagram.

Figure 2-2 15310E-CTX-K9 Faceplate and Block Diagram



2.2.1 System Cross-Connect

The 15310E-CTX-K9 card provides:

- 2016 VC12 ports. That is, 1008 VC-12 Cross-connections (1008X1008)
- 96 VC3 ports. That is, 48 VC-3 Cross-Connections (48X48)
- 128 VC4 ports. That is, 64 VC-4 Cross -Connections (64X64)

2.2.2 15310E-CTX-K9 Card Side Switches

The 15310E-CTX-K9 supports errorless side switches (less than a 50-ms impact to any traffic) when the switch is initiated through software, through either a soft-reset or a software upgrade where there is no FPGA or firmware upgrade. A side switch means switching from a 15310E-CTX-K9 on one side of the shelf to the redundant 15310E-CTX-K9 on the other side of the shelf.

2.2.3 15310E-CTX-K9 Optical Interfaces

There are two PPM (SFP) slots on the 15310E-CTX-K9 faceplate to provide optical interfaces. (PPM is the graphical user interface term for SFP.) Each slot can contain a one-port PPM. Cisco-qualified PPMs can be single-rate (STM1, STM4, or STM16) or multirate (STM1/STM4). Single-rate PPMs are autoprovisioned when they are installed, but multirate PPMs must be provisioned. This behavior can be controlled by NE defaults.



Note

To provision, edit, or delete PPM ports, refer to the “Change Port Settings” chapter in the *Cisco ONS 15310-MA SDH Procedure Guide*. For more information about PPM/SFP hardware, see the “2.8 SFP Modules” section on page 2-19.



Note

CTX-2500 only supports STM1-E Electrical SFP.

2.2.4 15310E-CTX-K9 Card-Level Indicators

The 15310E-CTX-K9 card has four card-level LEDs, described in [Table 2-3](#).

Table 2-3 15310E-CTX-K9 Card-Level Indicators

| Card-Level LEDs | Description |
|-----------------|--|
| FAIL LED (Red) | The red FAIL LED indicates that the card processor is not ready or that a catastrophic software failure occurred on the card. As part of the boot sequence, the FAIL LED turns on and flashes until the software deems the card operational. |

Table 2-3 15310E-CTX-K9 Card-Level Indicators (continued)

| Card-Level LEDs | Description |
|-------------------------------|--|
| ACT/STBY LED (Green/Amber) | The ACT/STBY LED is green if the card is the active 15310E-CTX-K9 card. It is amber if the card is the standby card. |
| SYNC LED (Green/Amber) | The SYNC LED is green if the 15310E-CTX-K9 card detects both a primary and secondary clock reference. It is amber if the card detects only a single clock reference. |

2.2.5 15310E-CTX-K9 Port-Level Indicators

Two bicolor LEDs show the status per port (Ports 1 and 2). The port LED is green if the port is available to carry traffic and is provisioned as in-service. The port LED is red if there is a signal failure or loss of signal on the port.

2.3 CE-100T-8 Card

This section describes the features and functions of the Layer 1 Ethernet card, the CE-100T-8.



Note

The CE-100T-8 card with PID 15310-CE-100T-8 is not compatible with the ONS 15310-MA SDH. The 15310-P-CE-100T-8 is compatible with the ONS 15310-MA SDH shelf assembly. If you install a 15310-CE-100T-8 in an ONS 15310-MA SDH shelf assembly, you will receive a mismatched equipment alarm (mismatchofEquipment). You can view the PID under the node view Inventory tab in CTC.

The CE-100T-8 card maps 8-port 10/100-Mbps Ethernet-encapsulated traffic into SDH payloads, making use of low-order (VC12) virtual concatenation (VCAT), high-order (VC3, VC4) VCAT, generic framing procedure (GFP), and Point-to-Point Protocol/high-level data link control (PPP/HDLC) framing protocols. It also supports the link capacity adjustment scheme (LCAS), which allows hitless dynamic adjustment of SDH link bandwidth. The CE-100T-8 card provides eight RJ-45 10/100-Mbps Ethernet ports on the faceplate of the card. An inactive RJ-11 console port is also on the faceplate.

The circuit types supported are:

- VC3 and VC4 CCAT
- VC3-Nv VCAT (N = 1–3)
- VC3-Nv LCAS (N = 1–3)
- VC3-2v software LCAS (SW-LCAS) (compatible with ML-Series cards only)
- VC12-Nv VCAT (N = 1-63)
- VC12-Nv LCAS(N = 1-63)



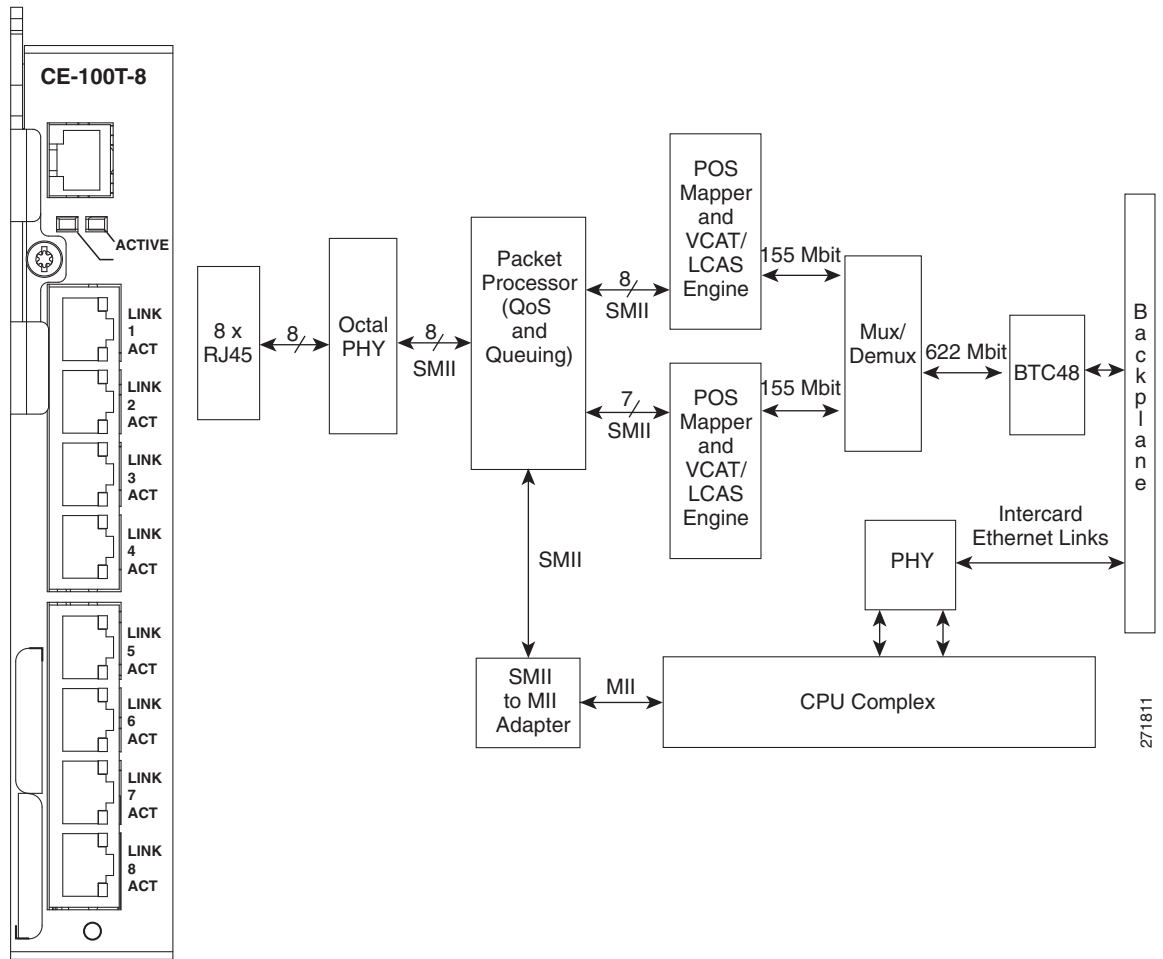
Note

The SW-LCAS is not supported on CE-100T-8 cards for interoperation with the CE-MR-6 and ML-MR-10 cards.

Each 10/100 Ethernet port can be mapped to an SDH channel in increments of VC12 or VC3 granularity. There are eight backend packet-over-SDH (POS) ports (VCAT groups [VCGs]) available on the ML-100T-8 card. Additionally, the CE-100T-8 card supports packet processing, classification, quality of service (QoS)-based queuing, and traffic scheduling.

Figure 2-3 shows the CE-100T-8 card faceplate and block diagram.

Figure 2-3 CE-100T-8 Faceplate and Block Diagram



The following paragraphs describe the general functions of the CE-100T-8 card and relate it to the block diagram in Figure 2-3.

In the ingress direction (Ethernet-to-SDH), an octal PHY, which performs all of the physical layer interface functions for 10/100-Mbps Ethernet, sends the frame to the packet processor for queuing in the respective packet buffer memory. The packet processor performs packet processing, packet switching, and classification. The Ethernet frames are then passed over SMII channels to the POS mappers, where Ethernet traffic is terminated and is encapsulated using the PPP/HDL or GFP framing protocols. The encapsulation method is selected on a per-port basis. The encapsulated Ethernet frames are then mapped into a configurable number of VCAT low-order and high-order payloads, such as VC12 synchronous payload envelope (SPE), VC3 SPE, or a contiguous concatenated (CCAT) payload such as VC4 SPE. Up to 63 VC12 SPEs or three VC3 SPEs can be virtually concatenated.

The SPE from each POS mapper (up to VC4) carrying encapsulated Ethernet frames are passed onto the multiplexer/demultiplexer (mux/demux) next, where the VC4 frames from both POS mappers are multiplexed to form an VC4-4 frame for transport over the SDH network by means of the Bridging Transmission Convergence (BTC-48) application-specific integrated circuit (ASIC).

**Note**

Although the VC4 frames are multiplexed into an VC4-4 frame, the frame carries at most an VC4-2c payload, leaving half of the VC4-4 bandwidth free.

In the egress direction (SDH-to-Ethernet), the mux/demux extracts the first and second VC4 SPEs from the VC4-4 frame it receives from the BTC-48 before sending them to the POS mappers. The VC4 SDH SPE carrying GFP or PPP/HDLC encapsulated Ethernet frames are then extracted and buffered in the external memory of the POS mappers. This memory is used for providing alignment and differential delay compensation for the received low/high order virtual concatenated payloads. When alignment and delay compensation are complete, the Ethernet frames are decapsulated with one of the framing protocols (GFP or PPP/HDLC). Decapsulated Ethernet frames are then passed onto the packet processor for QoS queuing and traffic scheduling. The network processor switches the frame to one of the corresponding PHY channels and then onto the Ethernet port for transmission to the external clients.

With regard to QoS, the VLAN class-of-service (CoS) threshold (value 0 to 7, default 7) and the IP type-of-service (ToS) threshold (value 0 to 255, default 255) on incoming Ethernet packets are both available for priority queuing. These thresholds are provisionable through CTC, TL1, and Cisco Transport Manager (CTM). CoS takes precedence over ToS unless the CoS threshold is set to the default of 7. This threshold value does not prioritize any packets based on CoS, so ToS is used. The value configured is a threshold and any value greater than that value is set as a priority. For example, if a CoS of 5 is set as the threshold, only CoS values of 6 and 7 would be set to priority.

2.3.1 CE-100T-8 Card-Level Indicators

The CE-100T-8 card faceplate has two card-level LED indicators, described in [Table 2-4](#).

Table 2-4 CE-100T-8 Card-Level Indicators

| Card-Level LEDs | Description |
|-----------------|---|
| SF LED (Red) | The red FAIL LED indicates that the card processor is not ready or that a catastrophic software failure occurred on the CE-100T-8 card. As part of the boot sequence, the FAIL LED blinks until the software deems the card operational, then it turns off. |
| ACT LED (Green) | The ACT LED provides the operational status of the CE-100T-8. When the ACT LED is green, it indicates that the CE-100T-8 card is active and the software is operational; otherwise, it is off. |

2.3.2 CE-100T-8 Port-Level Indicators

The CE-100T-8 card has two LEDs embedded into each of the eight Ethernet-port RJ-45 connectors. The LEDs are described in [Table 2-5](#).

Table 2-5 CE-100T-8 Port-Level Indicators

| Port-Level Indicators | Description |
|---------------------------|--|
| ACT LED (Amber) | A steady amber LED indicates a link is detected, but there is an issue inhibiting traffic. A blinking amber LED means traffic is flowing. |
| LINK LED (Green) | A steady green LED indicates that a link is detected, but there is no traffic. A blinking green LED flashes at a rate proportional to the level of traffic being received and transmitted over the port. |
| Both ACT and LINK LED OFF | Unlit green and amber LEDs indicate no traffic. |

2.4 CE-MR-6 Card

This section describes the features and functions of the CE-MR-6 Ethernet card. This card is compatible with the Cisco ONS 15310-MA SDH.

The CE-MR-6 card provides six IEEE 802.3-compliant 10/100/1000-Mbps Gigabit Ethernet ports at the ingress. At the egress, the CE-MR-6 card provides an integrated Ethernet over SDH mapper with six virtual ports to transfer Ethernet packets over an SDH network.

The CE-MR-6 card uses pluggable Small Form-Factor Pluggable Interface Converters (SFPs) to transport Ethernet traffic over an SDH network. SFP modules are offered as separate orderable products for flexibility. For details, see the “[2.8 SFP Modules](#)” section on page 2-19.

The Ethernet frames are encapsulated using the ITU-T generic framing procedure (GFP) [with or without cyclic redundancy check (CRC)] or LAN extension (LEX), the point-to-point protocol (PPP) with high-level data link control (HDLC).

The Ethernet ports automatically configure to operate at either half or full duplex and can determine whether to enable or disable flow control. The Ethernet ports can also be oversubscribed using flow control.

The CE-MR-6 card supports the link capacity adjustment scheme (LCAS), which allows hitless dynamic adjustment of SDH link bandwidth. The CE-MR-6 card's LCAS is hardware-based, but the CE-MR-6 also supports software LCAS (SW-LCAS). This makes it compatible with ML-Series cards, which support only SW-LCAS, along with the CE-100T-8 cards. The CE-MR-6 card also supports the non link capacity adjustment scheme (no-LCAS). The CE-MR-6 card supports both flexible and fixed VCAT groups (VCG).


Note

The SW-LCAS is not supported on CE-MR-6 cards for interoperation with the CE-100T-8 and ML-MR-10 cards.


Note

The CE-MR-6 card does not support interoperation between the LCAS and non-LCAS circuits.

The Ethernet frames can be mapped into:

- E1X1 G.707-based high-order virtual concatenated (HO VCAT) payloads
 - VC4-nv, where n is 1 to 7
 - VC3-nv, where n is 1 to 21

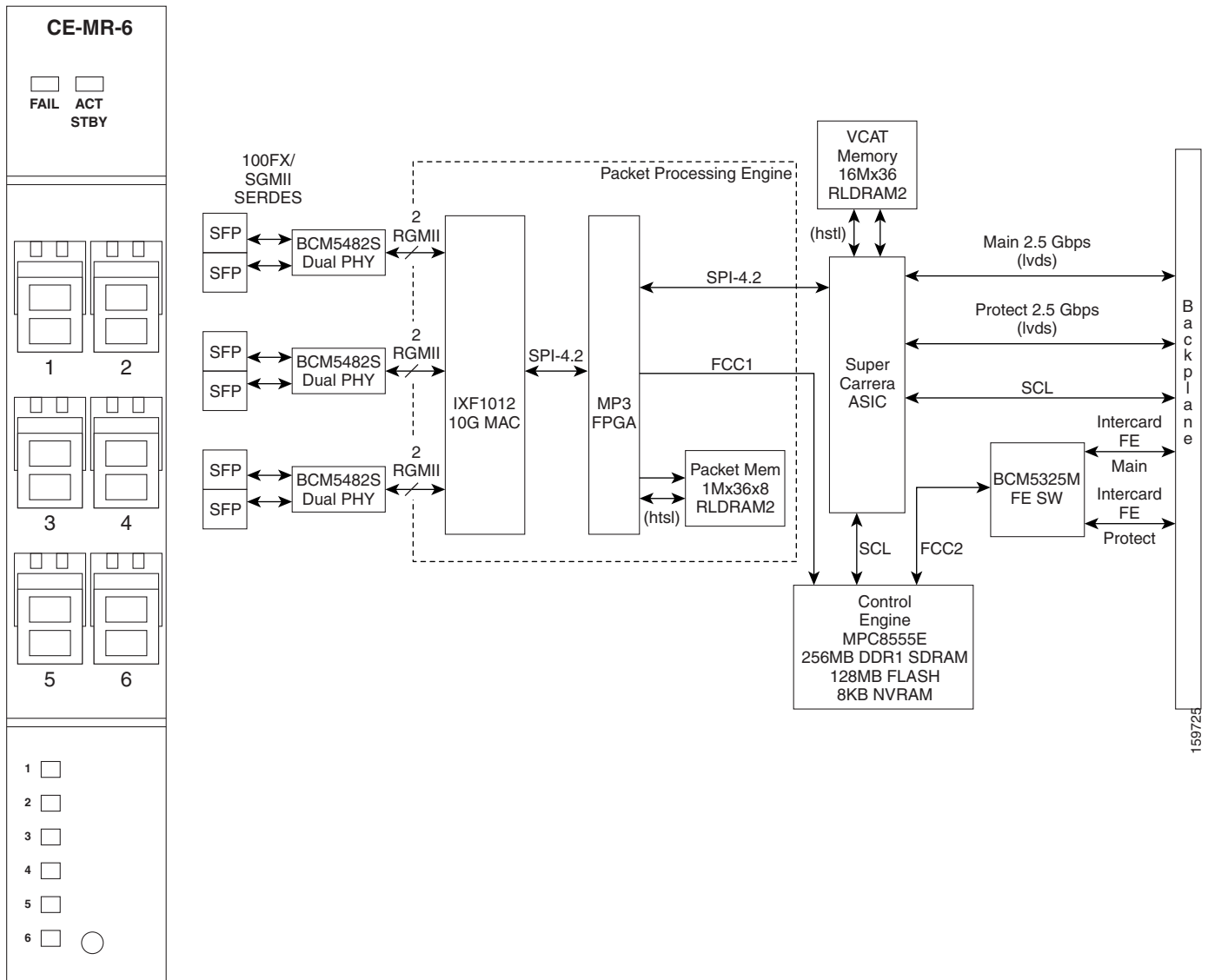
- E1X1 G.707-based low-order virtual concatenated (LO VCAT) payloads
 - VC12-nv, where n is 1 to 63
- Contiguously concatenated (CCAT) SDH payloads
 - Standard CCAT sizes (VC3, VC4, VC4-4c, VC4-8c, and VC4-16c)
 - Non-standard CCAT sizes (VC4-2c and VC4-3c)

To configure a CE-MR-6 card circuit, refer to the “Create Circuits and VC low-order path Tunnels” chapter in the *Cisco ONS 15310-MASDH Procedure Guide*.

The CE-MR-6 card provides multiple management options through Cisco Transport Controller (CTC), Cisco Transport Manager (CTM), Transaction Language 1 (TL1), and Simple Network Management Protocol (SNMP).

Figure 2-4 shows the CE-MR-6 card faceplate and block diagram.

Figure 2-4 CE-MR-6 Faceplate and Block Diagram



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2.4.1 CE-MR-6 Card-Level Indicators

The CE-MR-6 card faceplate has two card-level LED indicators, described in [Table 2-6](#).

Table 2-6 CE-MR-6 Card-Level Indicators

| Card-Level LEDs | Description |
|----------------------|---|
| FAIL LED (Red) | The red FAIL LED indicates that the card processor is not ready or that a catastrophic software failure occurred on the CE-MR-6 card. As part of the boot sequence, the FAIL LED blinks until the software deems the card operational, then it turns off. |
| ACT/STBY LED (Green) | The ACT/STBY LED provides the operational status of the CE-MR-6. When the ACT/STBY LED is green, it indicates that the CE-MR-6 card is active and the software is operational; otherwise, it is off. |

2.4.2 CE-MR-6 Port-Level Indicators

The CE-MR-6 card has an LED for each of the six ports, described in [Table 2-7](#).

Table 2-7 CE-MR-6 Port-Level Indicators

| Port-Level Indicators | Description |
|-----------------------|--|
| Off | No link exists to the Ethernet port. |
| Steady amber | A link exists to the Ethernetport, but traffic flow is inhibited. For example, a lack of circuit setup, an error on the line, or a disabled port might inhibit traffic flow. |
| Solid green | A link exists to the Ethernet port, but no traffic is carried on the port. |
| Flashing green | A link exists to the Ethernet port, and traffic is carried on the port. The LED flash rate reflects the traffic rate for that port. |

2.5 ML-100T-8 Card

This section describes the features and functions of the Layer 2 10/100 Ethernet card, the ML-100T-8. The card is compatible with the ONS 15310-MA SDH.



Note

The ML-100T-8 card with PID 15310-ML-100T-8 is not compatible with the ONS 15310-MA SDH. 15310-P-ML-100T-8 is compatible with the ONS 15310-MA SDH shelf assembly. If you install a 15310-ML-100T-8 in an ONS 15310-MA SDH shelf assembly, you will receive a mismatched equipment alarm (mismatchofEquipment). You can view the PID under the node view Inventory tab in CTC.

2.5.1 ML-100T-8 Card Description

The ML-100T-8 card maps eight ports of 10/100 Ethernet encapsulated traffic into SDH VC4 payloads. The card is compatible with high-order VC3 VCAT and the GFP and PPP/HDLC framing protocols. It also supports LCAS, which allows hitless dynamic adjustment of SDH link bandwidth. Each 10/100 Ethernet port can be mapped to an SDH channel in increments of VC3 granularity.

The ML-100T-8 card provides a switched operating mode, with eight subscriber interfaces and two virtual POS (VCG) interfaces mapped through the cross-connect for transport with other services between network elements (NEs).

The circuit types supported are:

- VC3
- VC3-Nv VCAT (N=1–2)
- VC3-Nv LCAS (N=1–2)
- VC3-2v SW-LCAS

Additionally, the ML-100T-8 card supports packet processing, classification, QoS-based queuing, traffic scheduling, and packet multiplexing services for Layer 2/3.

2.5.2 ML-Series Cisco IOS CLI Console Port

The ML-Series card has an RJ-11 serial console port on the card faceplate labeled Console. It enables communication from the serial port of a PC or workstation running terminal emulation software to the Cisco IOS command line interface (CLI) on a specific ML-Series card.

Due to space limitations on the ML-Series card faceplate, the console port is an RJ-11 modular jack instead of the more common RJ-45 modular jack. Cisco supplies an RJ-11 to RJ-45 console cable adapter with each ML-Series card. After connecting the adapter, the console port functions like the standard Cisco RJ-45 console port. [Figure 2-5](#) shows the RJ-11-to-RJ-45 console cable adapter.

Figure 2-5 Console Cable Adapter

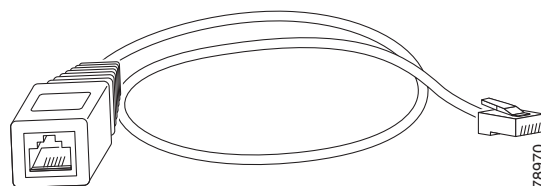
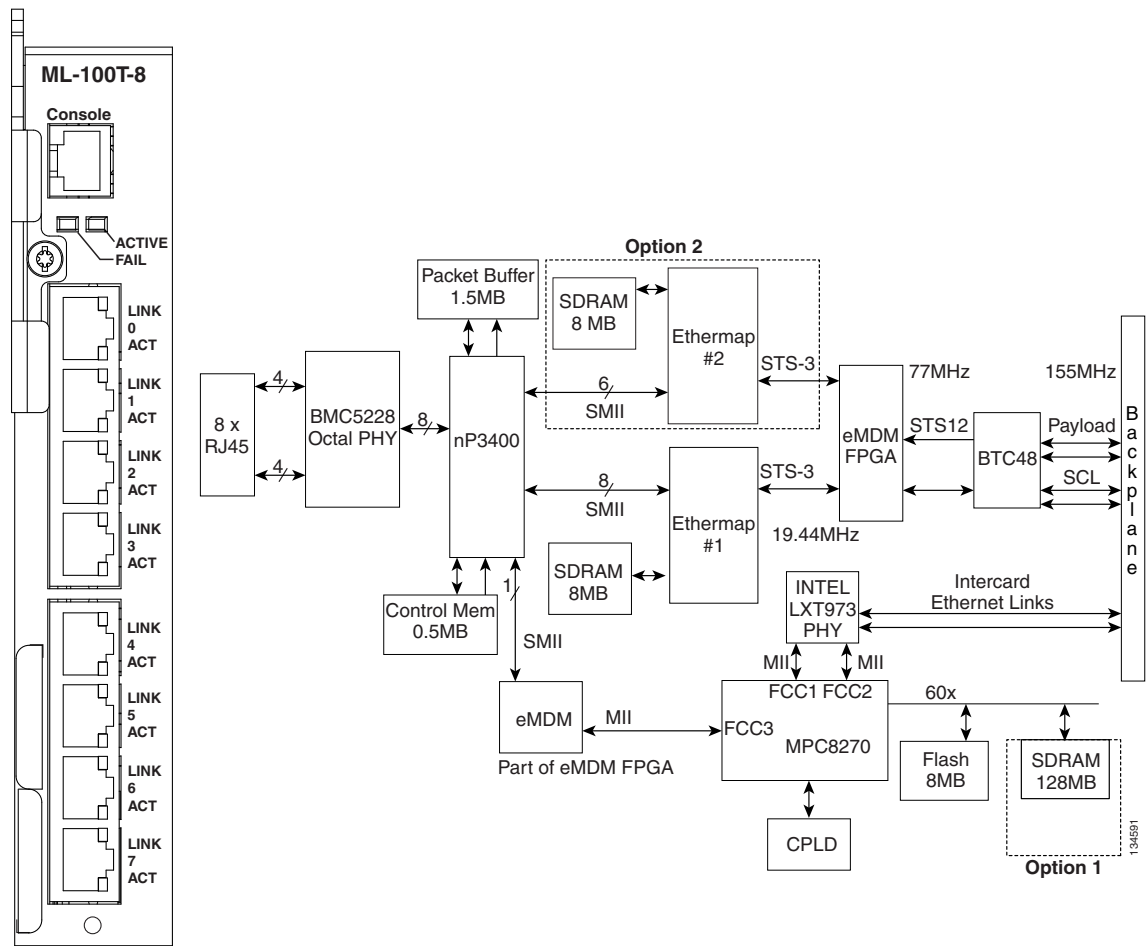


Figure 2-6 shows the ML-100T-8 card faceplate and block diagram.

Figure 2-6 ML-100T-8 Card Faceplate and Block Diagram



The following paragraphs describe the general functions of the ML-100T-8 card and relate to the block diagram in Figure 2-6.

In the ingress direction (Ethernet-to-SDH), Ethernet frames first enter from a physical Ethernet port to one of the corresponding channels of the octal PHY, which performs all of the physical layer interface functions for 10/100 Ethernet. The PHY sends the Ethernet frame to the packet processor by means of the SMII interfaces for queuing in the respective packet buffer memory. The packet processor performs packet processing, packet switching, and classification. The Ethernet frames are then passed on to the POS mappers through the SMII interfaces. The POS mappers terminate the 10/100-Mbps Ethernet traffic. The Ethernet frames are extracted and buffered in POS mapper external memory. Ethernet frames are encapsulated using one of the framing protocols (PPP/HDLC or GFP), selected on a per-port basis. The encapsulated Ethernet frames are mapped into a configurable number of VC3 or VCAT low-order payloads (VC3-1v or VC3-2v). The SPE from each POS mapper (up to VC4) carrying encapsulated Ethernet frames are next passed onto the mux/demux, where the VC4 frames from both POS mappers are multiplexed to form an VC4-4c frame for transport over the SDH network by means of the BTC-48 ASIC.

**Note**

Although the VC4 frames are multiplexed into an VC4-4c frame, the frame carries at most an VC4-2c payload, leaving half of the VC4-4c bandwidth free.

In the egress direction (SDH-to-Ethernet), the mux/demux extracts the first and second VC4 SPEs from the VC4-4 frame it receives from the BTC-48 before sending it to the POS mapper. The VC4 SDH SPEs carrying GFP or PPP/HDLC encapsulated Ethernet frames are then extracted and buffered in the POS mapper external memory. This memory is used for providing alignment and differential delay compensation for the received high-order VCAT payloads. After alignment and delay compensation have been done, the Ethernet frames are decapsulated with one of the framing protocols (GFP or PPP/HDLC). Decapsulated Ethernet frames are then passed onto the network processor for QoS queuing, traffic scheduling, packet switching, and multiplexing. The network processor switches the frame to one of the corresponding PHY channels and then onto the Ethernet port for transmission to the external clients.

2.5.3 ML-100T-8 Card-Level Indicators

The ML-100T-8 card faceplate has two card-level LED indicators, described in [Table 2-8](#).

Table 2-8 ML-100T-8 Card-Level Indicators

| Card-Level LEDs | Description |
|-----------------|---|
| SF LED (Red) | The red FAIL LED indicates that the card processor is not ready or that a catastrophic software failure occurred on the ML-100T-8 card. As part of the boot sequence, the FAIL LED blinks until the software deems the card operational, then it turns off. |
| ACT LED (Green) | The ACT LED provides the operational status of the ML-100T-8. When the ACT LED is green, it indicates that the ML-100T-8 card is active and the software is operational; otherwise, it is off. |

2.5.4 ML-100T-8 Port-Level Indicators

The ML-100T-8 card has two LEDs embedded into each of the eight Ethernet port RJ-45 connectors. The LEDs are described in [Table 2-9](#).

Table 2-9 ML-100T-8 Port-Level Indicators

| Port-Level Indicators | Description |
|---------------------------|--|
| ACT LED (Amber) | A steady amber LED indicates a link is detected, but there is an issue inhibiting traffic. A blinking amber LED means traffic is flowing. |
| LINK LED (Green) | A steady green LED indicates that a link is detected, but there is no traffic. A blinking green LED flashes at a rate proportional to the level of traffic being received and transmitted over the port. |
| Both ACT and LINK LED OFF | Unlit LEDs indicate no traffic. |

2.6 E1_21_E3_DS3_3 and E1_63_E3_DS3_3 Cards


Note

For hardware specifications, see the “A.2.5 E1_21_E3_DS3_3 and E1_63_E3_DS3_3 Cards” section on page A-7.

The ONS 15310-MA SDH E1_21_E3_DS3_3 and E1_63_E3_DS3_3 cards provide 21 and 63 ITU-Compliant G.703 E1 ports, respectively, as well as three E3/DS-3 ports. Each E1 port operates at 2.048 Mbps. Each E3/DS-3 port operates at 34.368 Mbps/44.736 Mbps over a single 75-ohm 728 A or equivalent coaxial span. These cards can operate as a working or protect card in 1:1 protection schemes.

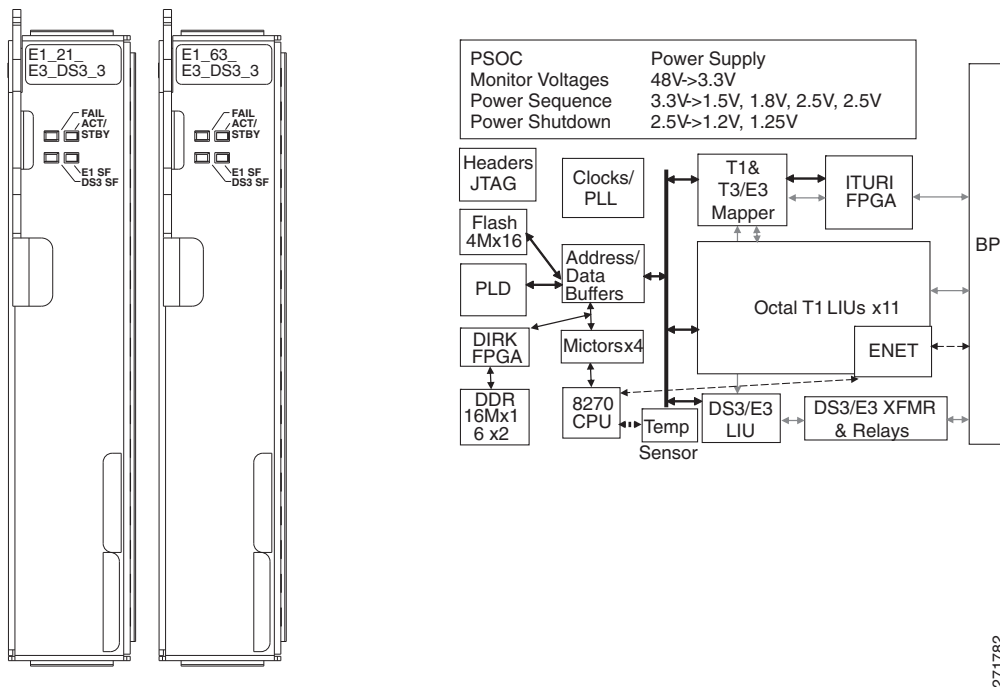
In addition, the E1_21_E3_DS3_3 card provides retiming, so that any outgoing E1 signal can be retimed to eliminate accumulated jitter and wander at the point of egress from a synchronous network. Any incoming E1 signal from the transport element can also be used as a timing source.

The E1_21_E3_DS3_3 and E1_63_E3_DS3_3 cards can be installed in Slots 1, 2, 5, and 6. Card installed in Slots 1 and 2 correspond with the electrical interface assembly (EIA) installed on Side A at the rear of the shelf assembly, and cards in Slots 5 and 6 correspond with the EIA installed on Side B.

See the “3.2.1 1:1 Electrical Card Protection” section on page 3-2 for information about electrical card protection and supported shelf configurations.

Figure 2-7 shows the E1_21_E3_DS3_3 and E1_63_E3_DS3_3 card faceplates and block diagram.

Figure 2-7 E1_21_E3_DS3_3 and E1_63_E3_DS3_3 Card Faceplates and Block Diagram



In E1_63_E3_DS3_3 cards, the 63 E1 ports have backplane interface connectors as shown in Figure 2-8. Wideband Electrical Ports (WBE) E1s 1 to 28 are connected to the AMP Champ-1 connector Ports 1 to 28, WBE E1 Ports 29 to 56 to the Amp Champ-2 connector Ports 29 to 56, and WBE E1 Ports 59 to 65 to the AMP Champ-3 connector Ports 59 to 65, respectively. In AMP Champ-3, you can only use the

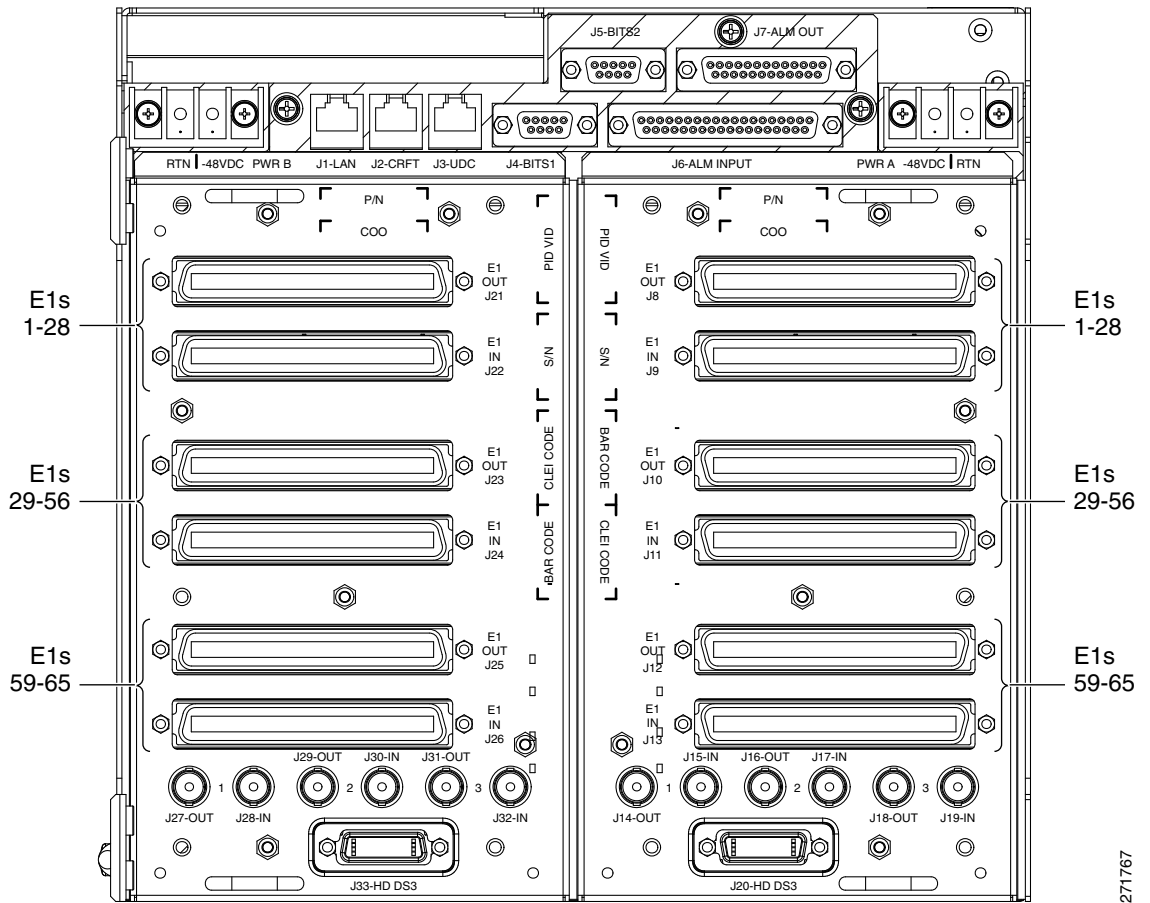
seven E1 ports from 59 to 65. You cannot use connectors 57 and 58, because the line timing configuration on the ASIC might disturb the data path in these two ports. WBE Port 63 is accessed by AMP Champ-3 connector Port 65. This restriction is not applicable to the E1_21_E3_DS3_3 card.

Refer to the 32xE1-LFH-RJ45 Panel and 32xE1-LFH-1.0/2.3 Panel sections of *Cisco ONS 15305 Installation and Operations Guide, Release 2.0* for information about patch panels.


Note

When you use a third-party patch panel, you need to use an unconnected cable.

Figure 2-8 BIC Configuration on WBE Cards



2.6.1 E1_21_E3_DS3_3 and E1_63_E3_DS3_3 Card-Level Indicators

The E1_21_E3_DS3_3 and E1_63_E3_DS3_3 cards have three card-level LED indicators (Table 2-10).

Table 2-10 E1_21_E3_DS3_3 and E1_63_E3_DS3_3 Card-Level Indicators

| Card-Level Indicators | Description |
|---|---|
| Red FAIL LED | Indicates that the card 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) Amber (Standby) | When the ACT/STBY LED is green, the card is operational and ready to carry traffic. When the ACT/STBY LED is amber, the card is operational and in standby (protect) mode. |
| Amber E1 and DS3 SF LEDs | Indicates a signal failure or condition such as LOS or LOF on one or more card ports. |

2.7 Filler Cards

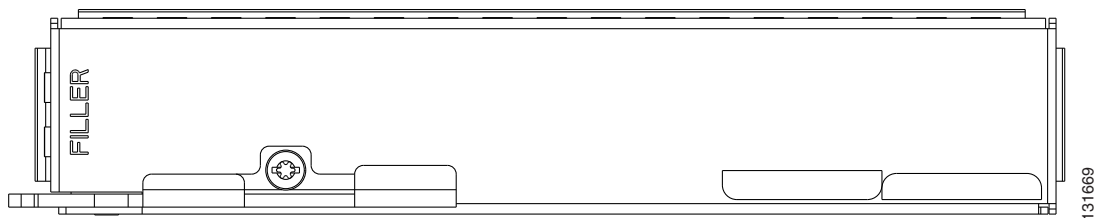
If a card slot is left empty, a filler card must be installed in the slot. The filler card serves three functions: it prevents exposure to hazardous voltages and currents inside the chassis, it eliminates electromagnetic interference (EMI) that might disrupt other equipment, and it directs the flow of cooling air through the chassis.


Caution

Do not operate the ONS 15310-MA SDH system unless a card is plugged into each card slot.

The blank card is a printed circuit board (PCB) with a blank faceplate and two rear connectors that plug into receptacles at the back of the slot. CTC detects when a filler card is plugged in and displays it in node view.

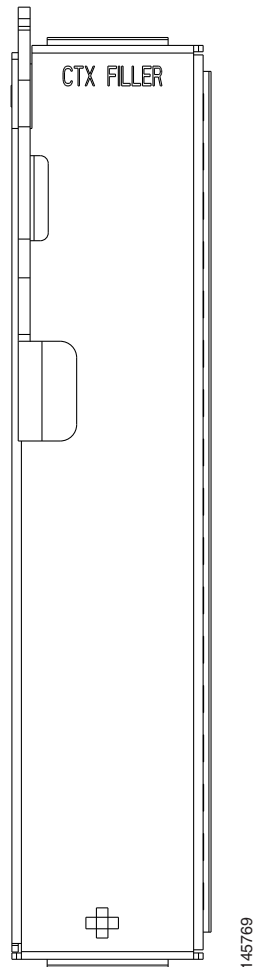
Figure 2-9 shows the filler card faceplate. This card is used in ONS 15310-MA SDH traffic card slots.

Figure 2-9 Filler Card
Caution

Do not attempt to install the FILLER card in a 15310E-CTX-K9 card slot (Slots 3 and 4) on the 15310-MA SDH shelf assembly. Only a CTX FILLER card should be installed in the 15310E-CTX-K9 slot.

Figure 2-10 shows the 15310E-CTX-K9 filler card faceplate for the ONS 15310-MA SDH.

Figure 2-10 15310E-CTX-K9 Filler Card



Caution

Do not attempt to install the CTX FILLER card in a traffic card slot (Slots 1, 2, 5, and 6 in the ONS 15310-MA SDH). Only 15310-EXP-FILLER cards should be installed in the traffic card slots.

2.8 SFP Modules

This section describes the small-form factor pluggables (SFPs) that can be used with the CE-MR-6 and 15310E-CTX-K9 cards to provide optical interfaces. The SFP slots for the ONS 15310-MA SDH are located at the bottom of the 15310E-CTX-K9 card. The CE-100T-8, ML-100T-8, and electrical cards do not use SFPs.

2.8.1 Compatibility by Card

Table 2-11 lists the SFPs compatible with the 15310E-CTX-K9 and CE-MR-6 cards. For more information about SFPs, see the “A.3 SFP Specifications” section on page A-9.


Caution

Only use SFPs certified for use in Cisco Optical Networking Systems (ONSs). The qualified Cisco SFP top assembly numbers (TANs) are provided in Table 2-11.

Table 2-11 SFP Card Compatibility

| Card | Compatible SFP (Cisco Product ID) | Cisco Top Assembly Number (TAN) |
|---------------|-----------------------------------|---------------------------------|
| 15310E-CTX-K9 | ONS-SI-2G-I1 | 10-1993-02 |
| | ONS-SI-2G-L1 | 10-2102-02 |
| | ONS-SI-2G-S1 | 10-1992-02 |
| | ONS-SI-2G-L2 | 10-1990-02 |
| | ONS-SI-622-L2 | 10-1936-02 |
| | ONS-SE-2G-S1 | 10-2017-01 |
| | ONS-SE-2G-1470 through | 10-2461-01 through |
| | ONS-SE-2G-1610 | 10-2468-01 |
| | ONS-SE-155-1470 | 10-1996-02 |
| | ONS-SE-155-1490 | 10-1998-02 |
| | ONS-SE-155-1510 | 10-1999-02 |
| | ONS-SE-155-1530 | 10-2000-02 |
| | ONS-SE-155-1550 | 10-2001-02 |
| | ONS-SE-155-1570 | 10-2002-02 |
| | ONS-SE-155-1590 | 10-2003-02 |
| | ONS-SE-155-1610 | 10-1997-02 |
| | ONS-SE-622-1470 | 10-2004-02 |
| | ONS-SE-622-1490 | 10-2005-02 |
| | ONS-SE-622-1510 | 10-2006-02 |
| | ONS-SE-622-1530 | 10-2007-02 |
| | ONS-SE-622-1550 | 10-2008-02 |
| | ONS-SE-622-1570 | 10-2009-02 |
| | ONS-SE-622-1590 | 10-2010-02 |
| | ONS-SE-622-1610 | 10-2011-02 |
| | ONS-SI-622-I1 | 10-1956-02 |
| | ONS-SI-622-L1 | 10-1958-02 |
| | ONS-SC-2G-30.3 | 10-2155-02 |
| | ONS-SC-2G-31.1 | 10-2156-02 |
| | ONS-SC-2G-31.9 | 10-2157-02 |
| | ONS-SC-2G-32.6 | 10-2158-02 |
| | ONS-SC-2G-34.2 | 10-2159-02 |
| | ONS-SC-2G-35.0 | 10-2160-02 |
| | ONS-SC-2G-35.8 | 10-2161-02 |
| | ONS-SC-2G-36.6 | 10-2162-02 |
| | ONS-SC-2G-38.1 | 10-2163-02 |
| | ONS-SC-2G-38.9 | 10-2164-02 |

Table 2-11 SFP Card Compatibility (continued)

| Card | Compatible SFP (Cisco Product ID) | Cisco Top Assembly Number (TAN) | |
|------------------|-----------------------------------|---------------------------------|------------|
| 15310E-CTX-K9 | ONS-SC-2G-39.7 | 10-2165-02 | |
| | ONS-SC-2G-40.5 | 10-2185-02 | |
| | ONS-SC-2G-42.1 | 10-2166-02 | |
| | ONS-SC-2G-42.9 | 10-2167-02 | |
| | ONS-SC-2G-43.7 | 10-2168-02 | |
| | ONS-SC-2G-44.5 | 10-2169-02 | |
| | ONS-SC-2G-46.1 | 10-2170-02 | |
| | ONS-SC-2G-46.9 | 10-2171-02 | |
| | ONS-SC-2G-47.7 | 10-2172-02 | |
| | ONS-SC-2G-48.5 | 10-2173-02 | |
| | ONS-SE-Z1= | 10-1971-02 | |
| | ONS-SC-2G-50.1 | 10-2186-02 | |
| | ONS-SC-2G-50.9 | 10-2174-02 | |
| | ONS-SC-2G-51.7 | 10-2175-02 | |
| | ONS-SC-2G-52.5 | 10-2176-02 | |
| | ONS-SC-2G-54.1 | 10-2177-02 | |
| | ONS-SC-2G-54.9 | 10-2178-02 | |
| | ONS-SC-2G-55.7 | 10-2179-02 | |
| | ONS-SC-2G-56.5 | 10-2180-02 | |
| | ONS-SC-2G-58.1 | 10-2181-02 | |
| | ONS-SC-2G-58.9 | 10-2182-02 | |
| | ONS-SC-2G-59.7 | 10-2183-02 | |
| | ONS-SC-2G-60.6 | 10-2184-02 | |
| | ONS-SI-155-I1 | 10-1938-02 | |
| | ONS-SI-155-SR-MM | 10-2279-01 | |
| | ONS-SI-155-L1 | 10-1957-02 | |
| | ONS-SI-155-L2 | 10-1937-02 | |
| | ONS-SC-155-EL | 10-2363-01 | |
| | CE-MR-6 | ONS-SI-GE-SX | 10-2295-01 |
| | | ONS-SI-GE-LX | 10-2300-01 |
| | | ONS-SI-GE-ZX | 10-2296-01 |
| | | ONS-SI-100-FX | 10-2350-01 |
| | | ONS-SI-100-LX10 | 10-2294-01 |
| ONS-SE-ZE-EL | | 10-2351-01 | |
| ONS-SE-100-BX10U | | 10-2352-01 | |
| ONS-SE-100-BX10D | | 10-2353-01 | |

2.8.2 SFP Description

SFPs are integrated fiber-optic transceivers that provide high-speed serial links from a port or slot to the network. Various latching mechanisms can be utilized on the SFPs. There is no correlation between the type of latch to the model type (such as SX or LX/LH) or technology type (such as Gigabit Ethernet). See the label on the SFP for the technology type and model. One type of latch available is a mylar tab, shown in [Figure 2-11](#). A second type of latch is an actuator/button ([Figure 2-12](#)), and a third type is a bail clasp ([Figure 2-13](#)).

SFP dimensions are:

- Height 0.03 in. (8.5 mm)
- Width 0.53 in. (13.4 mm)
- Depth 2.22 in. (56.5 mm)

SFP temperature ranges are:

- COM—Commercial operating temperature range –5 to 70 degrees C (23 to 158 degrees F)
- EXT—Extended operating temperature range –5 to 85 degrees C (23 to 185 degrees F)
- IND—Industrial operating temperature range –40 to 85 degrees C (–40 to 85 degrees F)

Figure 2-11 Mylar Tab SFP

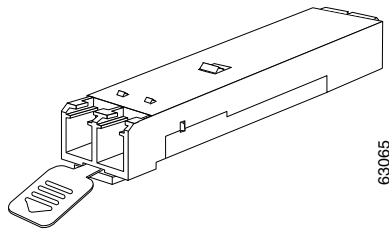


Figure 2-12 Actuator/Button SFP

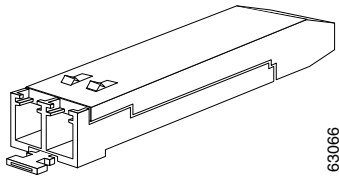
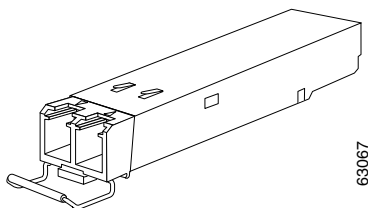


Figure 2-13 Bail Clasp SFP



2.8.3 PPM Provisioning

SFPs are known as pluggable port modules (PPMs) in CTC. PPMs provide STM1, STM4, and STM16 line rates for the ONS 15310-MA SDH. See the [“2.2.3 15310E-CTX-K9 Optical Interfaces”](#) section on [page 2-5](#) for more information. To provision PPMs, including provisioning or changing the optical line rate, refer to the *Cisco ONS 15310-MA SDH Procedure Guide*.