C H A P T E R 2

Common Control Cards

Note The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN," refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This chapter describes the Cisco ONS 15454 common-control cards. For installation and card turn-up procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. For card safety and compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

- 2.1 Card Overview, page 2-1
- 2.2 TCC2 Card, page 2-2
- 2.3 TCC2P Card, page 2-6
- 2.4 AIC-I Card, page 2-10
- 2.5 MS-ISC-100T Card, page 2-15
- 2.6 Front Mount Electrical Connections, page 2-18

2.1 Card Overview

The card overview section lists the cards described in this chapter.

Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. The cards are then installed into slots displaying the same symbols. See the "1.16.1 Card Slot Requirements" section on page 1-59 for a list of slots and symbols.

2.1.1 Common Control Cards

The following common control cards are needed to support the functions of the DWDM, transponder, and muxponder cards:

- TCC2 or TCC2P
- AIC-I (optional)
- MS-ISC-100T (multishelf configurations only)

2.1.2 Front Mount Electrical Connections (ETSI only)

The following Front Mount Electrical Connections (FMECs) are needed to support the functions of the DWDM, transponder, and muxponder cards:

- MIC-A/P
- MIC-C/T/P

2.2 TCC2 Card

Note For TCC2 card specifications, see the "A.3.1 TCC2 Card Specifications" section on page A-7.

The Advanced Timing, Communications, and Control (TCC2) card performs system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection/resolution, SONET section overhead (SOH) data communications channel/generic communications channel (DCC/GCC) termination, optical service channel (OSC) DWDM data communications network (DCN) termination, and system fault detection for the ONS 15454. The TCC2 also ensures that the system maintains Stratum 3 (Telcordia GR-253-CORE) timing requirements. It monitors the supply voltage of the system.

Note The LAN interface of the TCC2 card meets the standard Ethernet specifications by supporting a cable length of 328 ft (100 m) at temperatures from 32 to 149 degrees Fahrenheit (0 to 65 degrees Celsius).

Figure 2-1 shows the faceplate and block diagram for the TCC2.

Figure 2-1   TCC2 Faceplate and Block Diagram
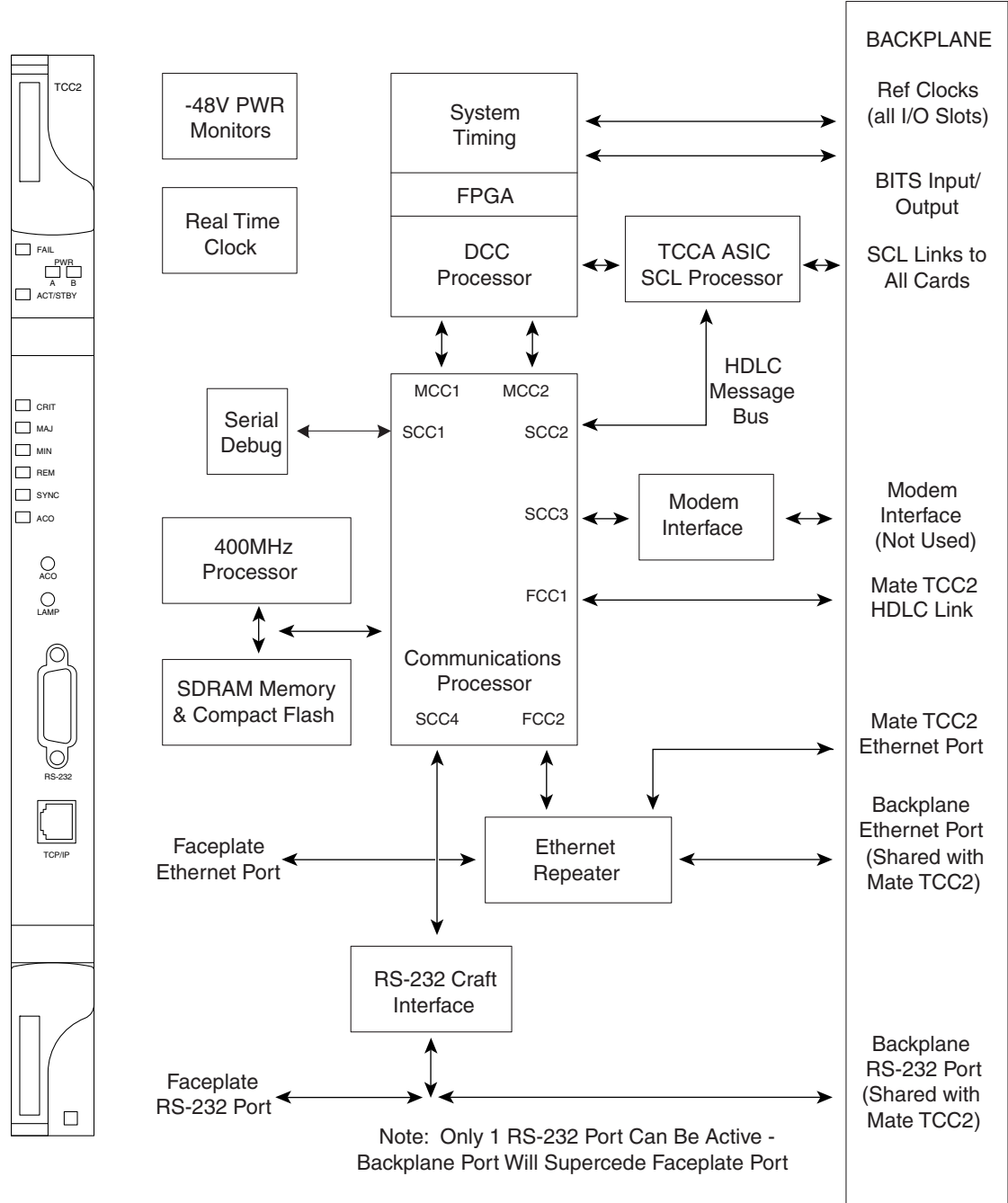
2.2.1 TCC2 Functionality

The TCC2 card terminates up to 32 DCCs. The TCC2 hardware is prepared for up to 84 DCCs, which will be available in a future software release.

The node database, IP address, and system software are stored in TCC2 nonvolatile memory, which allows quick recovery in the event of a power or card failure.

The TCC2 performs all system-timing functions for each ONS 15454. The TCC2 monitors the recovered clocks from each traffic card and two building integrated timing supply (BITS) ports for frequency accuracy. The TCC2 selects a recovered clock, a BITS, or an internal Stratum 3 reference as the system-timing reference. You can provision any of the clock inputs as primary or secondary timing sources. A slow-reference tracking loop allows the TCC2 to synchronize with the recovered clock, which provides holdover if the reference is lost.

The TCC2 monitors both supply voltage inputs on the shelf. An alarm is generated if one of the supply voltage inputs has a voltage out of the specified range.

Install TCC2 cards in Slots 7 and 11 for redundancy. If the active TCC2 fails, traffic switches to the protect TCC2.

The TCC2 card has two built-in interface ports for accessing the system: an RJ-45 10BaseT LAN interface and an EIA/TIA-232 ASCII interface for local craft access. It also has a 10BaseT LAN port for user interfaces via the backplane.

2.2.2 Redundant TCC2 Card Installation

Cisco does not support operation of the ONS 15454 with only one TCC2 card. For full functionality and to safeguard your system, always operate with two TCC2 cards.

When a second TCC2 card is inserted into a node, it synchronizes its software, its backup software, and its database with the active TCC2. If the software version of the new TCC2 does not match the version on the active TCC2, the newly inserted TCC2 copies from the active TCC2, taking about 15 to 20 minutes to complete. If the backup software version on the new TCC2 does not match the version on the active TCC2, the newly inserted TCC2 copies the backup software from the active TCC2 again, taking about 15 to 20 minutes. Copying the database from the active TCC2 takes about 3 minutes. Depending on the software version and backup version the new TCC2 started with, the entire process can take between 3 and 40 minutes.

2.2.3 TCC2 Card-Level Indicators

The TCC2 faceplate has ten LEDs. Table 2-1 describes the two card-level LEDs on the TCC2 faceplate.

Table 2-1   TCC2 Card-Level Indicators

Card-Level LEDs	Definition
Red FAIL LED	This LED is on during reset. The FAIL LED flashes during the boot and write process. Replace the card if the FAIL LED persists.
ACT/STBY LED Green (Active) Yellow (Standby)	Indicates the TCC2 is active (green) or in standby (yellow) mode. The ACT/STBY LED also provides the timing reference and shelf control. When the active TCC2 is writing to its database or to the standby TCC2 database, the card LEDs blink. To avoid memory corruption, do not remove the TCC2 when the active or standby LED is blinking.

2.2.4 Network-Level Indicators

Table 2-2 describes the six network-level LEDs on the TCC2 faceplate.

Table 2-2 TCC2 Network-Level Indicators

System-Level LEDs	Definition
Red CRIT LED	Indicates critical alarms in the network at the local terminal.
Red MAJ LED	Indicates major alarms in the network at the local terminal.
Yellow MIN LED	Indicates minor alarms in the network at the local terminal.
Red REM LED	Provides first-level alarm isolation. The remote (REM) LED turns red when an alarm is present in one or more of the remote terminals.
Green SYNC LED	Indicates that node timing is synchronized to an external reference.
Green ACO LED	After pressing the alarm cutoff (ACO) button, the ACO LED turns green. The ACO button opens the audible alarm closure on the backplane. ACO is stopped if a new alarm occurs. After the originating alarm is cleared, the ACO LED and audible alarm control are reset.

2.2.5 Power-Level Indicators

Table 2-3 describes the two power-level LEDs on the TCC2 faceplate.

Table 2-3 TCC2 Power-Level Indicators

Power-Level LEDs	Definition
Green/Amber/Red PWR A LED	The PWR A LED is green when the voltage on supply input A is between the low battery voltage (LWBATVG) and high battery voltage (HIBATVG) thresholds. The LED is amber when the voltage on supply input A is between the high battery voltage and extremely high battery voltage (EHIBATVG) thresholds or between the low battery voltage and extremely low battery voltage (ELWBATVG) thresholds. The LED is red when the voltage on supply input A is above extremely high battery voltage or below extremely low battery voltage thresholds.
Green/Amber/Red PWR B LED	The PWR B LED is green when the voltage on supply input B is between the low battery voltage and high battery voltage thresholds. The LED is amber when the voltage on supply input B is between the high battery voltage and extremely high battery voltage thresholds or between the low battery voltage and extremely low battery voltage thresholds. The LED is red when the voltage on supply input B is above extremely high battery voltage or below extremely low battery voltage thresholds.

Note For ONS 15454 ETSI shelf, the power-level LEDs are either green or red. The LED is green when the voltage on supply inputs is between the extremely low battery voltage and extremely high battery voltage thresholds. The LED is red when the voltage on supply inputs is above extremely high battery voltage or below extremely low battery voltage thresholds.

2.3 TCC2P Card

Note For TCC2P card specifications, see the "A.3.2 TCC2P Card Specifications" section on page A-8.

The Advanced Timing, Communications, and Control Plus (TCC2P) card is an enhanced version of the TCC2 card. The primary enhancements are Ethernet security features and 64K composite clock BITS timing.

The TCC2P card performs system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection/resolution, SONET SOH DCC/GCC termination, and system fault detection for the ONS 15454. The TCC2P also ensures that the system maintains Stratum 3 (Telcordia GR-253-CORE) timing requirements. It monitors the supply voltage of the system.

Note The LAN interface of the TCC2P card meets the standard Ethernet specifications by supporting a cable length of 328 ft (100 m) at temperatures from 32 to 149 degrees Fahrenheit (0 to 65 degrees Celsius). The interfaces can operate with a cable length of 32.8 ft (10 m) maximum at temperatures from –40 to 32 degrees Fahrenheit (–40 to 0 degrees Celsius).

Figure 2-2 shows the faceplate and block diagram for the TCC2P card.

Figure 2-2   TCC2P Faceplate and Block Diagram

Note: Only 1 EIA/TIA 232 Port Can Be Active - Backplane Port Will Supercede Faceplate Port
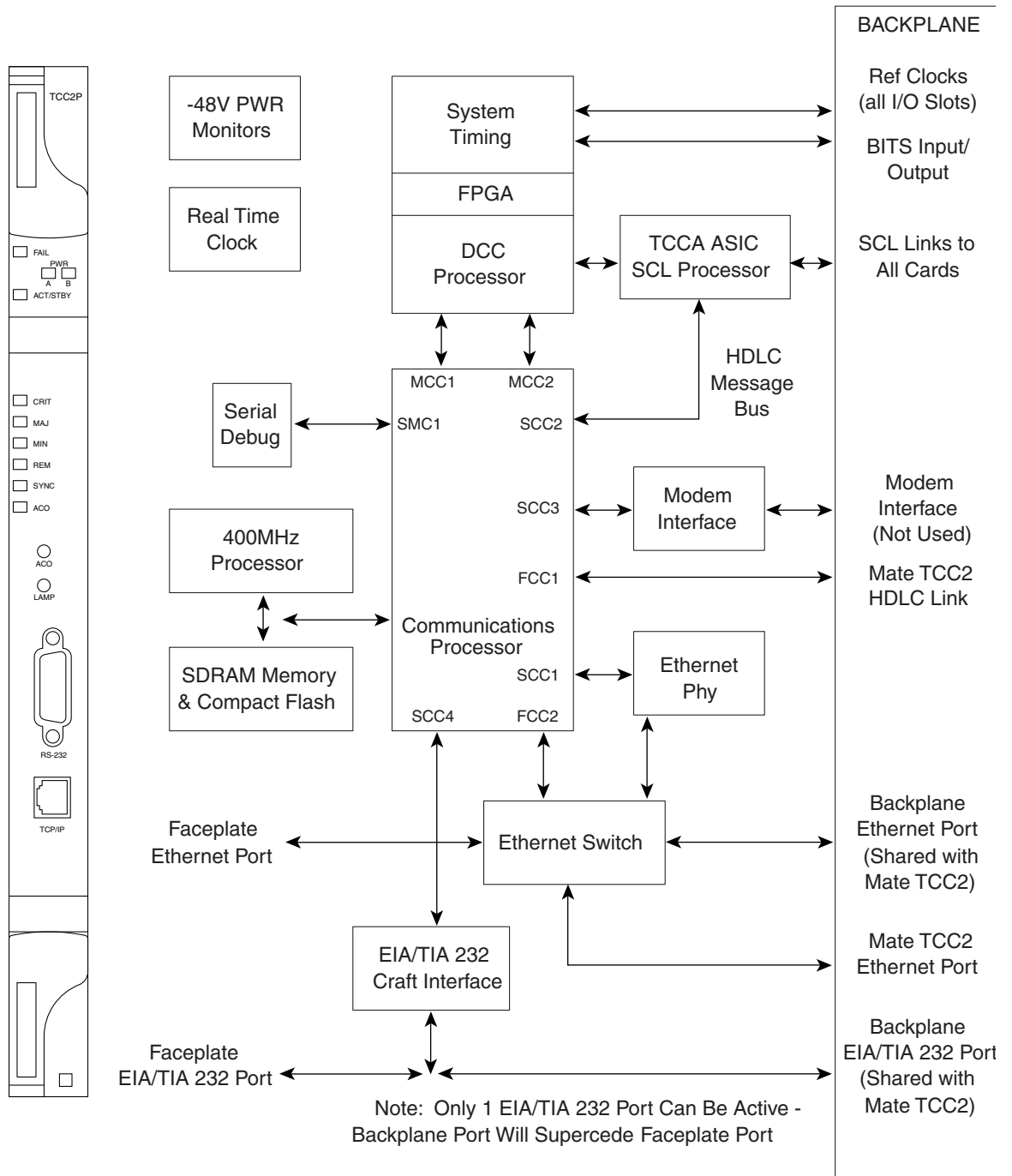
2.3.1 TCC2P Functionality

The TCC2P card supports multichannel, high-level data link control (HDLC) processing for the DCC. Up to 84 DCCs can be routed over the TCC2P card and up to 84 section DCCs can be terminated at the TCC2P card (subject to the available optical digital communication channels). The TCC2P selects and processes 84 DCCs to facilitate remote system management interfaces.

The TCC2P card also originates and terminates a cell bus carried over the module. The cell bus supports links between any two cards in the node, which is essential for peer-to-peer communication. Peer-to-peer communication accelerates protection switching for redundant cards.

The node database, IP address, and system software are stored in TCC2P card nonvolatile memory, which allows quick recovery in the event of a power or card failure.

The TCC2P card performs all system-timing functions for each ONS 15454. The TCC2P card monitors the recovered clocks from each traffic card and two BITS ports for frequency accuracy. The TCC2P card selects a recovered clock, a BITS, or an internal Stratum 3 reference as the system-timing reference. You can provision any of the clock inputs as primary or secondary timing sources. A slow-reference tracking loop allows the TCC2P card to synchronize with the recovered clock, which provides holdover if the reference is lost.

The TCC2P card supports 64/8K composite clock and 6.312 MHz timing output.

The TCC2P card monitors both supply voltage inputs on the shelf. An alarm is generated if one of the supply voltage inputs has a voltage out of the specified range.

Install TCC2P cards in Slots 7 and 11 for redundancy. If the active TCC2P card fails, traffic switches to the protect TCC2P card. All TCC2P card protection switches conform to protection switching standards when the bit error rate (BER) counts are not in excess of $1 * 10 \exp - 3$ and completion time is less than 50 ms.

The TCC2P card has two built-in Ethernet interface ports for accessing the system: one built-in RJ-45 port on the front faceplate for on-site craft access and a second port on the backplane. The rear Ethernet interface is for permanent LAN access and all remote access via TCP/IP as well as for Operations Support System (OSS) access. The front and rear Ethernet interfaces can be provisioned with different IP addresses using CTC.

Two EIA/TIA-232 serial ports, one on the faceplate and a second on the backplane, allow for craft interface in TL1 mode.

Note To use the serial port craft interface wire-wrap pins on the backplane, the DTR signal line on the backplane port wire-wrap pin must be connected and active.

2.3.2 Redundant TCC2P Card Installation

Cisco does not support operation of the ONS 15454 with only one TCC2P card. For full functionality and to safeguard your system, always operate with two TCC2P cards.

When a second TCC2P card is inserted into a node, it synchronizes its software, its backup software, and its database with the active TCC2P card. If the software version of the new TCC2P card does not match the version on the active TCC2P card, the newly inserted TCC2P card copies from the active TCC2P card, taking about 15 to 20 minutes to complete. If the backup software version on the new TCC2P card does not match the version on the active TCC2P card, the newly inserted TCC2P card copies the backup

software from the active TCC2P card again, taking about 15 to 20 minutes. Copying the database from the active TCC2P card takes about 3 minutes. Depending on the software version and backup version the new TCC2P card started with, the entire process can take between 3 and 40 minutes.

2.3.3 TCC2P Card-Level Indicators

The TCC2P faceplate has ten LEDs. Table 2-4 describes the two card-level LEDs on the TCC2P faceplate.

Table 2-4   TCC2P Card-Level Indicators

Card-Level LEDs	Definition
Red FAIL LED	This LED is on during reset. The FAIL LED flashes during the boot and write process. Replace the card if the FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	Indicates the TCC2P is active (green) or in standby (amber) mode. The ACT/STBY LED also provides the timing reference and shelf control. When the active TCC2P is writing to its database or to the standby TCC2P database, the card LEDs blink. To avoid memory corruption, do not remove the TCC2P when the active or standby LED is blinking.

2.3.4 Network-Level Indicators

Table 2-5 describes the six network-level LEDs on the TCC2P faceplate.

Table 2-5   TCC2P Network-Level Indicators

System-Level LEDs	Definition
Red CRIT LED	Indicates critical alarms in the network at the local terminal.
Red MAJ LED	Indicates major alarms in the network at the local terminal.
Amber MIN LED	Indicates minor alarms in the network at the local terminal.
Red REM LED	Provides first-level alarm isolation. The remote (REM) LED turns red when an alarm is present in one or more of the remote terminals.
Green SYNC LED	Indicates that node timing is synchronized to an external reference.
Green ACO LED	After pressing the ACO button, the ACO LED turns green. The ACO button opens the audible alarm closure on the backplane. ACO is stopped if a new alarm occurs. After the originating alarm is cleared, the ACO LED and audible alarm control are reset.

2.3.5 Power-Level Indicators

Table 2-6 describes the two power-level LEDs on the TCC2P faceplate.

Table 2-6   TCC2P Power-Level Indicators

Power-Level LEDs	Definition
Green/Amber/Red PWR A LED	The PWR A LED is green when the voltage on supply input A is between the low battery voltage (LWBATVG) and high battery voltage (HIBATVG) thresholds. The LED is amber when the voltage on supply input A is between the high battery voltage and extremely high battery voltage (EHIBATVG) thresholds or between the low battery voltage and extremely low battery voltage (ELWBATVG) thresholds. The LED is red when the voltage on supply input A is above extremely high battery voltage or below extremely low battery voltage thresholds.
Green/Amber/Red PWR B LED	The PWR B LED is green when the voltage on supply input B is between the low battery voltage and high battery voltage thresholds. The LED is amber when the voltage on supply input B is between the high battery voltage and extremely high battery voltage thresholds or between the low battery voltage and extremely low battery voltage thresholds. The LED is red when the voltage on supply input B is above extremely high battery voltage or below extremely low battery voltage thresholds.

Note   For ONS 15454 ETSI shelf, the power-level LEDs are either green or red. The LED is green when the voltage on supply inputs is between the extremely low battery voltage and extremely high battery voltage thresholds. The LED is red when the voltage on supply inputs is above extremely high battery voltage or below extremely low battery voltage thresholds.
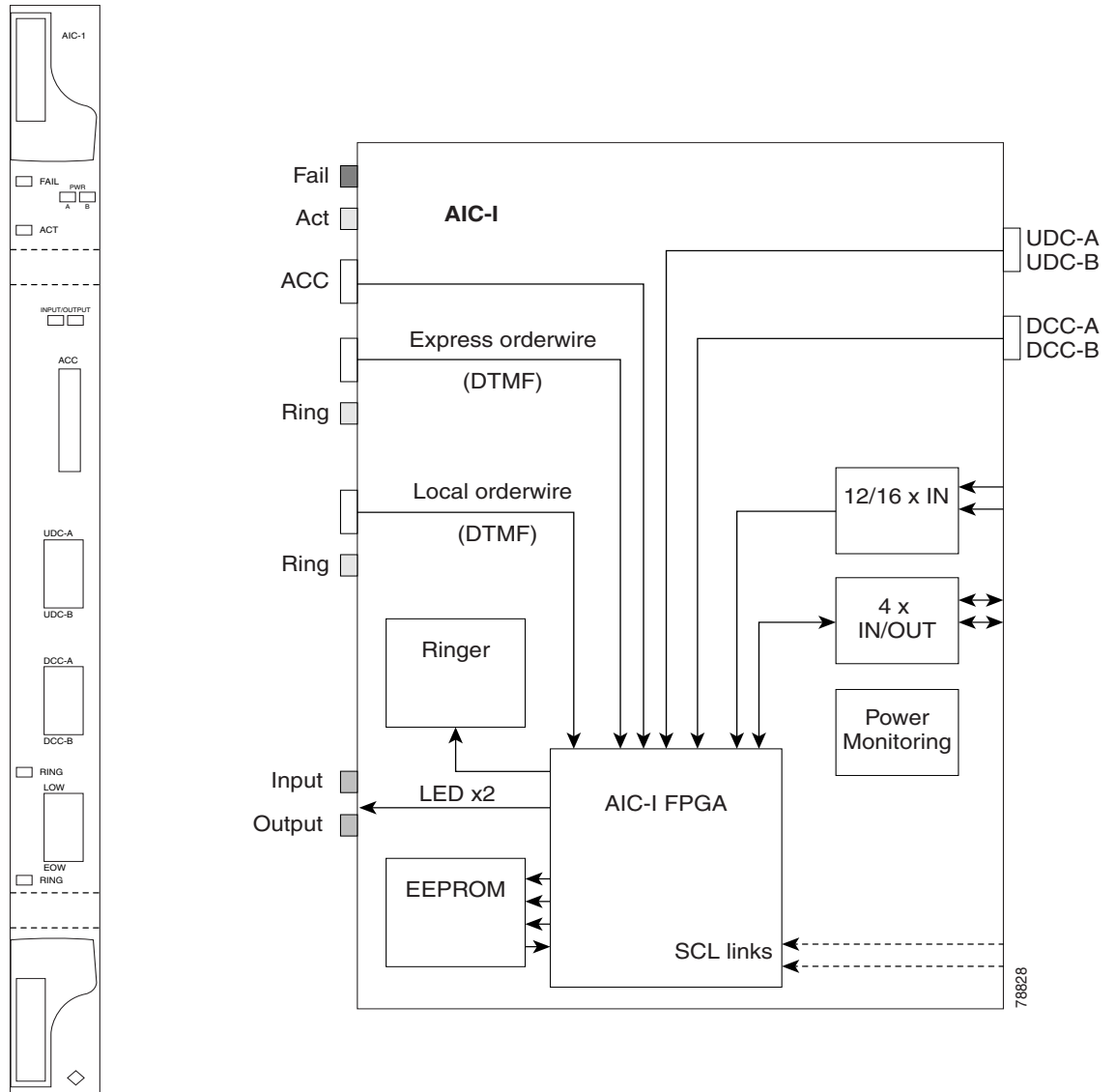
2.4 AIC-I Card

Note   For hardware specifications, see the "A.3.3 AIC-I Card Specifications" section on page A-9.

The optional Alarm Interface Controller–International (AIC-I) card provides customer-defined (environmental) alarms and controls and supports local and express orderwire. It provides 12 customer-defined input and 4 customer-defined input/output contacts. The physical connections are via the backplane wire-wrap pin terminals. If you use the additional alarm expansion panel (AEP), the AIC-I card can support up to 32 inputs and 16 outputs, which are connected on the AEP connectors. The AEP is compatible with ANSI shelves only. A power monitoring function monitors the supply voltage (–48 VDC). Figure 2-3 shows the AIC-I faceplate and a block diagram of the card.

Figure 2-3 **AIC-I Faceplate and Block Diagram**

2.4.1 AIC-I Card-Level Indicators

Table 2-7 describes the eight card-level LEDs on the AIC-I card faceplate.

Table 2-7 **AIC-I Card-Level Indicators**

Card-Level LEDs	Description
Red FAIL LED	Indicates that the card's processor is not ready. The FAIL LED is on during reset and flashes during the boot process. Replace the card if the red FAIL LED persists.
Green ACT LED	Indicates the AIC-I card is provisioned for operation.

Table 2-7   AIC-I Card-Level Indicators (continued)

Card-Level LEDs	Description
Green/Red PWR A LED	The PWR A LED is green when a supply voltage within a specified range has been sensed on supply input A. It is red when the input voltage on supply input A is out of range.
Green/Red PWR B LED	The PWR B LED is green when a supply voltage within a specified range has been sensed on supply input B. It is red when the input voltage on supply input B is out of range.
Yellow INPUT LED	The INPUT LED is yellow when there is an alarm condition on at least one of the alarm inputs.
Yellow OUTPUT LED	The OUTPUT LED is yellow when there is an alarm condition on at least one of the alarm outputs.
Green RING LED	The RING LED on the local orderwire (LOW) side is flashing green when a call is received on the LOW.
Green RING LED	The RING LED on the express orderwire (EOW) side is flashing green when a call is received on the EOW.

2.4.2 External Alarms and Controls

The AIC-I card provides input/output alarm contact closures. You can define up to 12 external alarm inputs and 4 external alarm inputs/outputs (user configurable). The physical connections are made using the backplane wire-wrap pins or FMEC connections. See the "1.9 ONS 15454 ANSI Alarm Expansion Panel" section on page 1-32 for information about increasing the number of input/output contacts.

LEDs on the front panel of the AIC-I indicate the status of the alarm lines, one LED representing all of the inputs and one LED representing all of the outputs. External alarms (input contacts) are typically used for external sensors such as open doors, temperature sensors, flood sensors, and other environmental conditions. External controls (output contacts) are typically used to drive visual or audible devices such as bells and lights, but they can control other devices such as generators, heaters, and fans.

You can program each of the twelve input alarm contacts separately. You can program each of the sixteen input alarm contacts separately. Choices include:

- Alarm on Closure or Alarm on Open
- Alarm severity of any level (Critical, Major, Minor, Not Alarmed, Not Reported)
- Service Affecting or Non-Service Affecting alarm-service level
- 63-character alarm description for CTC display in the alarm log

You cannot assign the fan-tray abbreviation for the alarm; the abbreviation reflects the generic name of the input contacts. The alarm condition remains raised until the external input stops driving the contact or you provision the alarm input.

The output contacts can be provisioned to close on a trigger or to close manually. The trigger can be a local alarm severity threshold, a remote alarm severity, or a virtual wire:

- Local NE alarm severity: A hierarchy of Not Reported, Not Alarmed, Minor, Major, or Critical alarm severities that you set to cause output closure. For example, if the trigger is set to Minor, a Minor alarm or above is the trigger.
- Remote NE alarm severity: Same as the local NE alarm severity but applies to remote alarms only.

- Virtual wire entities: You can provision any environmental alarm input to raise a signal on any virtual wire on external outputs 1 through 4 when the alarm input is an event. You can provision a signal on any virtual wire as a trigger for an external control output.

You can also program the output alarm contacts (external controls) separately. In addition to provisionable triggers, you can manually force each external output contact to open or close. Manual operation takes precedence over any provisioned triggers that might be present.

Note For ANSI shelves, the number of inputs and outputs can be increased using the AEP. The AEP is connected to the shelf backplane and requires an external wire-wrap panel.

2.4.3 Orderwire

Orderwire allows a craftsperson to plug a phoneset into an ONS 15454 and communicate with craftspeople working at other ONS 15454s or other facility equipment. The orderwire is a pulse code modulation (PCM) encoded voice channel that uses E1 or E2 bytes in section/line overhead.

The AIC-I allows simultaneous use of both local (section overhead signal) and express (line overhead channel) orderwire channels on a SONET/SDH ring or particular optics facility. Express orderwire also allows communication via regeneration sites when the regenerator is not a Cisco device.

You can provision orderwire functions with CTC similar to the current provisioning model for DCC/GCC channels. In CTC, you provision the orderwire communications network during ring turn-up so that all NEs on the ring can reach one another. Orderwire terminations (that is, the optics facilities that receive and process the orderwire channels) are provisionable. Both express and local orderwire can be configured as on or off on a particular SONET/SDH facility. The ONS 15454 supports up to four orderwire channel terminations per shelf. This allows linear, single ring, dual ring, and small hub-and-spoke configurations. Orderwire is not protected in ring topologies such as bidirectional line switched ring (BLSR), multiplex section-shared protection ring (MS-SPRing), path protection, or subnetwork connection protection (SNCP) ring.

Caution Do not configure orderwire loops. Orderwire loops cause feedback that disables the orderwire channel.

The ONS 15454 implementation of both local and express orderwire is broadcast in nature. The line acts as a party line. Anyone who picks up the orderwire channel can communicate with all other participants on the connected orderwire subnetwork. The local orderwire party line is separate from the express orderwire party line. Up to four OC-N/STM-N facilities for each local and express orderwire are provisionable as orderwire paths.

The AIC-I supports selective dual tone multifrequency (DTMF) dialing for telephony connectivity, which causes one AIC-I card or all ONS 15454 AIC-I cards on the orderwire subnetwork to "ring." The ringer/buzzer resides on the AIC-I. There is also a "ring" LED that mimics the AIC-I ringer. It flashes when a call is received on the orderwire subnetwork. A party line call is initiated by pressing ***0000** on the DTMF pad. Individual dialing is initiated by pressing ***** and the individual four-digit number on the DTMF pad.

Table 2-8 shows the pins on the orderwire connector that correspond to the tip and ring orderwire assignments.

Table 2-8   Orderwire Pin Assignments

RJ-11 Pin Number	Description
1	Four-wire receive ring
2	Four-wire transmit tip
3	Two-wire ring
4	Two-wire tip
5	Four-wire transmit ring
6	Four-wire receive tip

When provisioning the orderwire subnetwork, make sure that an orderwire loop does not exist. Loops cause oscillation and an unusable orderwire channel.

Figure 2-4 shows the standard RJ-11 connectors used for orderwire ports.

Figure 2-4   RJ-11 Connector
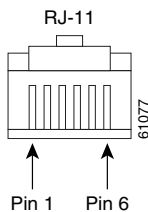
2.4.4 Power Monitoring

The AIC-I card provides a power monitoring circuit that monitors the supply voltage of –48 VDC for presence, undervoltage, and overvoltage.

2.4.5 User Data Channel

The user data channel (UDC) features a dedicated data channel of 64 kbps (F1 byte) between two nodes in an ONS 15454 network. Each AIC-I card provides two user data channels, UDC-A and UDC-B, through separate RJ-11 connectors on the front of the AIC-I card. Each UDC can be routed to an individual optical interface in the ONS 15454. For instructions, see the *Cisco ONS 15454 DWDM Procedure Guide*.

The UDC ports are standard RJ-11 receptacles. Table 2-9 lists the UDC pin assignments.

Table 2-9   UDC Pin Assignments

RJ-11 Pin Number	Description
1	For future use
2	TXN
3	RXN

Table 2-9 *UDC Pin Assignments (continued)*

RJ-11 Pin Number	Description
4	RXP
5	TXP
6	For future use

2.4.6 Data Communications Channel

The DCC features a dedicated data channel of 576 kbps (D4 to D12 bytes) between two nodes in an ONS 15454 network. Each AIC-I card provides two data communications channels, DCC-A and DCC-B, through separate RJ-45 connectors on the front of the AIC-I card. Each DCC can be routed to an individual optical interface in the ONS 15454. For instructions, see the *Cisco ONS 15454 DWDM Procedure Guide*.

The DCC ports are synchronous serial interfaces. The DCC ports are standard RJ-45 receptacles. Table 2-10 lists the DCC pin assignments.

Table 2-10 *DCC Pin Assignments*

RJ-45 Pin Number	Description
1	TCLKP
2	TCLKN
3	TXP
4	TXN
5	RCLKP
6	RCLKN
7	RXP
8	RXN

2.5 MS-ISC-100T Card

Note For hardware specifications, see the "A.3.7 MS-ISC-100T Card Specifications" section on page A-12.

The Multishelf Internal Switch Card (MS-ISC-100T) is an Ethernet switch used to implement the multishelf LAN. It connects the node controller shelf to the network and to subtending shelves. The MS-ISC-100T must always be equipped on the node controller shelf; it cannot be provisioned on a subtending controller shelf.

The recommended configuration is to implement LAN redundancy using two MS-ISC-100T cards: one switch is connected to the Ethernet front panel port of the TCC2/TCC2P card in Slot 7, and the other switch is connected to the Ethernet front panel port of the TCC2/TCC2P card in Slot 11. The Ethernet configuration of the MS-ISC-100T card is part of the software package and is automatically loaded. The MS-ISC-100T card operates in Slots 1 to 6 and 12 to 17 on the node controller shelf; the recommended slots are Slot 6 and Slot 12.

Table 2-11 lists the MS-ISC-100T port assignments.

Table 2-11   MS-ISC-100T Card Port Assignments

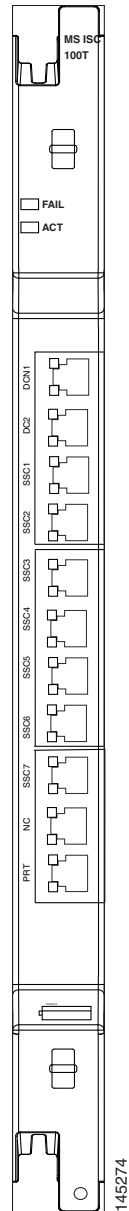| Port	Description
DCN 1and DCN 2	Connection to the network
SSC1 to SSC7	Connection to subtending shelves
NC	Connection to TCC2/TCC2P using a cross-over cable
PRT	Connection to the PRT port of the redundant MS-ISC-100T

Figure 2-5 shows the card faceplate.

⚠

Caution   Shielded twisted-pair cabling should be used for interbuilding applications.

Figure 2-5 *MS-ISC-100T Faceplate*

2.5.1 MS-ISC-100T Card-Level Indicators

The MS-ISC-100T card supports two card-level LED indicators. The card-level indicators are described in Table 2-12.

Table 2-12 **MS-ISC-100T 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 is turned on until the software deems the card operational.
ACT LED (Green)	The green ACT LED provides the operational status of the card. If the ACT LED is green, it indicates that the card is active and the software is operational.

2.6 Front Mount Electrical Connections

This section describes the MIC-A/P and MIC-C/T/P FMECs, which provide power, external alarm, and timing connections for the ONS 15454 ETSI shelf.

2.6.1 MIC-A/P FMEC

Note   For hardware specifications, see the "A.3.5 MIC-A/P FMEC Specifications (ETSI only)" section on page A-11.

The MIC-A/P FMEC 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/TCC2P card), sixteen alarm inputs, and four configurable alarm inputs/outputs. Its position is in Slot 23 in the center of the subrack Electrical Facility Connection Assembly (EFCA) area.

The MIC-A/P FMEC has the following features:

- Connection for one of the two possible redundant power supply inputs

- Connection for eight alarm outputs (coming from the TCC2/TCC2P card)

- Connection for four configurable alarm inputs/outputs

- Connection for sixteen alarm inputs

- Storage of manufacturing and inventory data

For proper system operation, both the MIC-A/P and MIC-C/T/P FMECs must be installed in the ONS 15454 ETSI shelf. Figure 2-6 shows the MIC-A/P faceplate.

Figure 2-6 **MIC-A/P Faceplate**
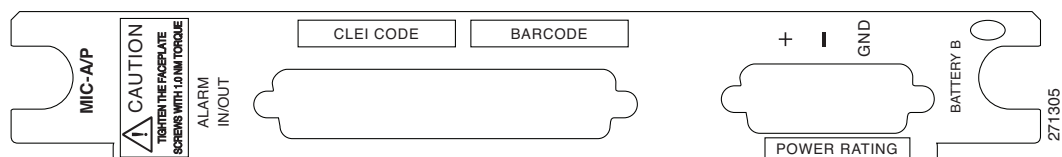
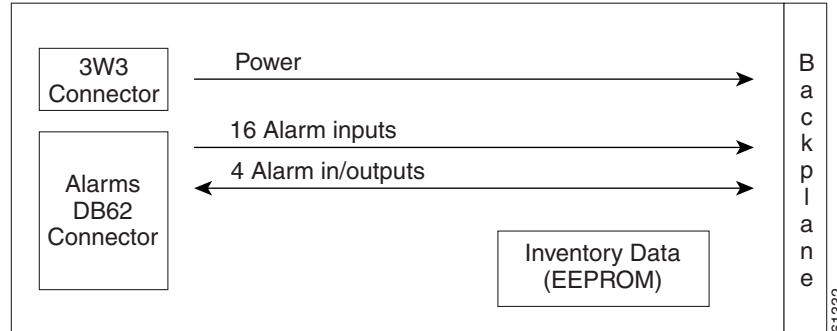Figure 2-7 shows a block diagram of the MIC-A/P.

Figure 2-7   MIC-A/P Block Diagram

Table 2-13 shows the alarm interface pinouts on the MIC-A/P DB-62 connector.

Table 2-13   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
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

Table 2-13   Alarm Interface Pinouts on the MIC-A/P DB-62 Connector (continued)

Pin No.	Signal Name	Signal Description
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
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

Table 2-13 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector (continued)

Pin No.	Signal Name	Signal Description
61	VISALM3 N	Normally open Remote visual alarm
62	VISALM3 P	Normally open Remote visual alarm

2.6.2 MIC-C/T/P FMEC

**Note** For hardware specifications, see the

The MIC-C/T/P FMEC 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. Install the MIC-C/T/P in Slot 24.

The MIC-C/T/P FMEC has the following 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
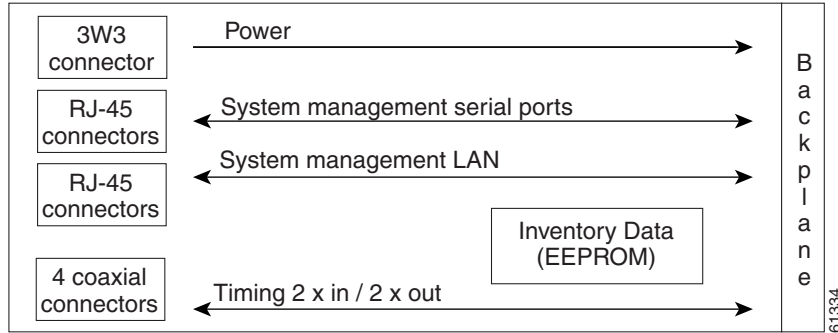- Storage of manufacturing and inventory data

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

Figure 2-8 shows the MIC-C/T/P FMEC faceplate.

Figure 2-8 MIC-C/T/P Faceplate
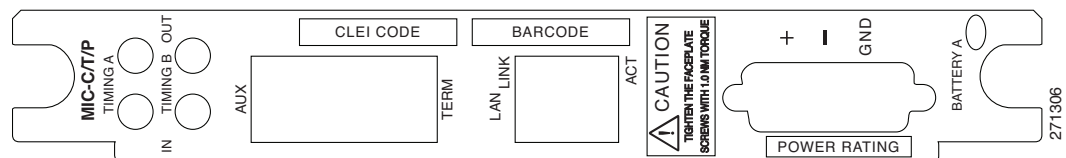
Figure 2-9 shows a block diagram of the MIC-C/T/P.

Figure 2-9   *MIC-C/T/P Block Diagram*

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