Cisco ONS 15530 Overview

The Cisco ONS 15530 is a modular and scalable optical switching and aggregation platform designed to supplement the Cisco ONS 15540 ESP. With the Cisco ONS 15530, users can take advantage of the availability of dark fiber to build a common infrastructure that supports data, SAN (storage area network), and TDM (time-division multiplexing) traffic. For more information about DWDM technology and applications, refer to the *Introduction to DWDM Technology* publication and the *Cisco ONS 15530 Planning and Design Guide*.

The Cisco ONS 15530 is designed to meet or exceed stringent ISP (Internet service provider) requirements for product availability and reliability.

Note Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for the Cisco ONS 15500 Series* for important safety information you should know before working with the system.

This chapter includes the following sections:

Cisco ONS 15530 Chassis

The Cisco ONS 15530 is available in two configurations. Both have two vertically stacked half-height slots specifically for the optical OADM (optical add drop multiplexing) modules, and 10 vertically oriented slots that hold the CPU switch

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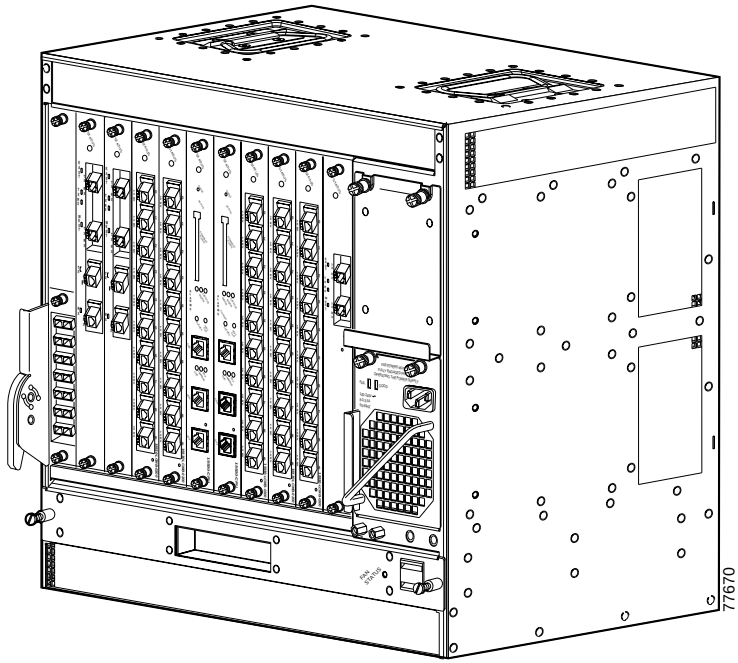
modules, line cards, and 2.5-G transponder trunk line cards. Slot 0 holds two half height optical OADM modules. Slots 1 through 4 and slots 7 through 10 hold the line cards and transponder cards. Slots 5 and 6 hold the CPU switch modules. Power supplies are located on the right side of the chassis next to slot 10. Air inlet and fan tray assembly are located beneath the slots. Cable management is located beneath the slots. The system has an electrical backplane for system control. All optical connections are located on the front of the cards. Figure 1-1 shows a fully populated chassis.

Figure 1-1 Cisco ONS 15530 Shelf



The chassis configurations differ in how cooling air is routed through the chassis and where the lifting handles are placed.

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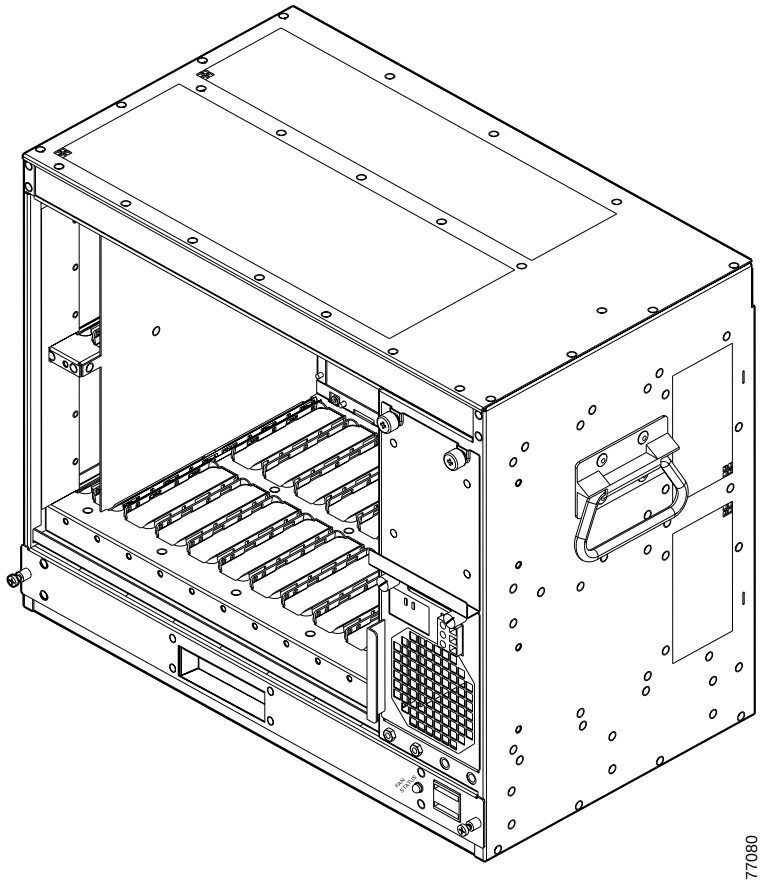
Cisco ONS 15530-CHAS-E Chassis

The dimensions of the Cisco ONS 15530 CHAS-E chassis are 14.4 x 17.3 x 10.1 inches (H x W x D) See Figure 1-2. Handles for lifting the chassis are located on the sides.

Figure 1-2 Cisco ONS 15530 CHAS-E Chassis



The fan assembly draws in cooling air through the air ramp baffle (see Figure 1-3) on the bottom of the chassis, pushing the air across the internal components and out the exhaust baffles on the top of the chassis.

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The air ramp baffle for the Cisco ONS 15530 CHAS-E chassis redirects the cooling air intake as shown in Figure 1-4. The air ramp baffle must be installed when installing the Cisco ONS 15530 CHAS-E type chassis.

Figure 1-3 Cisco ONS 15530 CHAS-E (with Air Ramp Baffle)

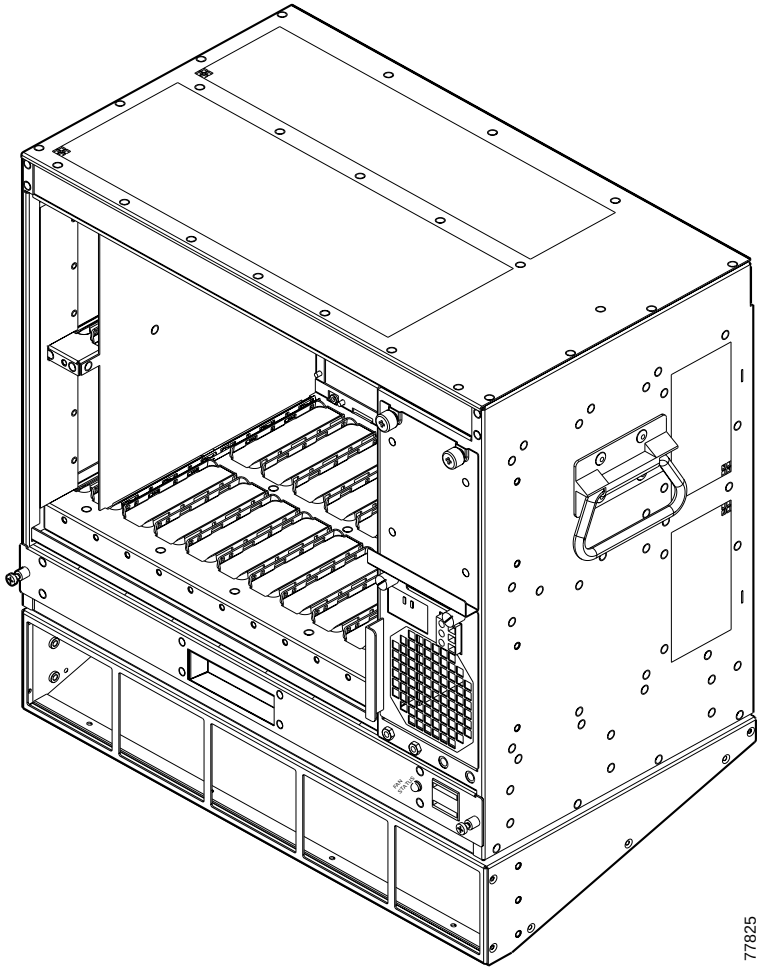

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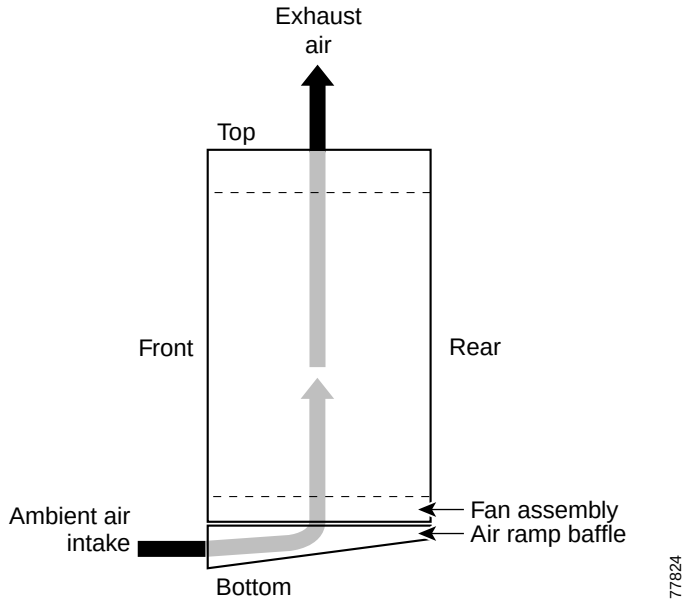
Figure 1-4 Cisco ONS 15530 CHAS-E Chassis Airflow (with Air Ramp Baffle Installed)



Cisco ONS 15530 CHAS-N Chassis

The dimensions of the Cisco ONS 15530 CHAS-N chassis are 14.4 x 15.7 x 10.1 inches (H x W x D). (See Figure 1-5.) Handles for lifting the chassis are located on the top. The fan assembly draws in cooling air through the intake baffles on the front of the chassis, below the fan assembly, pushing the air over the internal components and out the exhaust on the top rear and sides of the chassis (see Figure 1-6).

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Figure 1-5 Cisco ONS 15530 CHAS-N Chassis

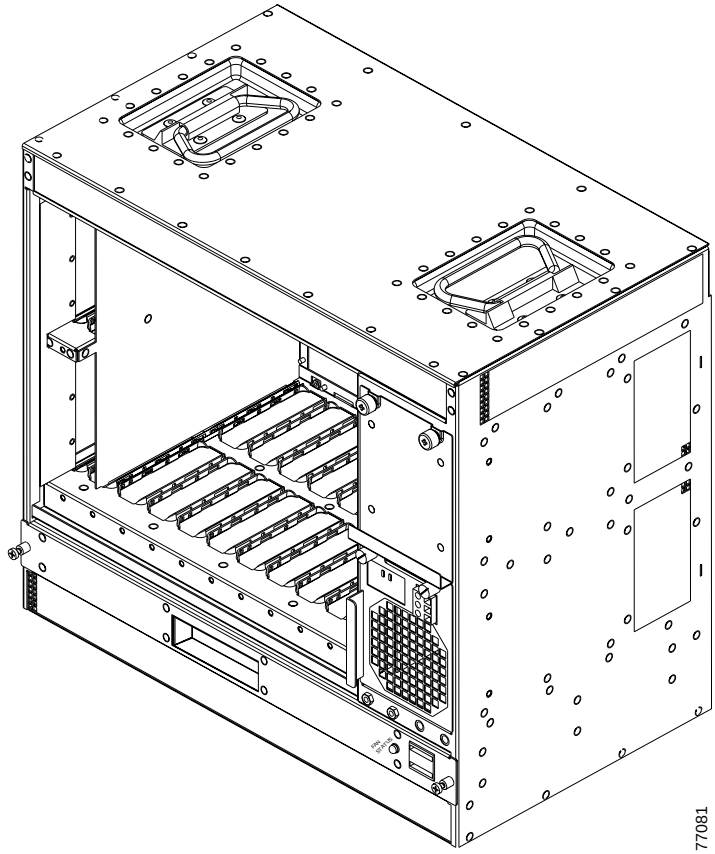

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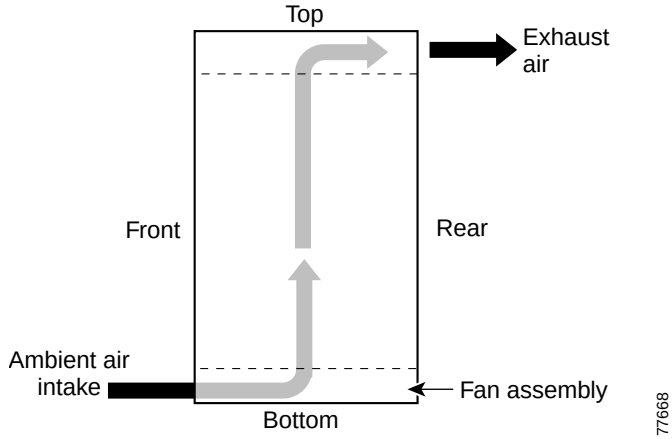
Figure 1-6 Cisco ONS 15530 CHAS-N Chassis Airflow



Fan Assembly

The Cisco ONS 15530 fan assembly is located at the bottom of the chassis. The assembly contains six individual fans and a fan controller board (see Figure 1-8). The controller board monitors the status of each fan and reports the status to the CPU switch modules. If a single fan fails, a minor alarm is reported to the CPU and the fan assembly LED changes from green to yellow (see Figure 1-7). If two or more fans fail, a major alarm is reported to the CPU and the fan LED changes to red.

Table 1-1 lists the fan assembly LED status describing the alarm reports for the fan assembly. The fan assembly is hot-swappable.

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Figure 1-7 Fan Assembly LED

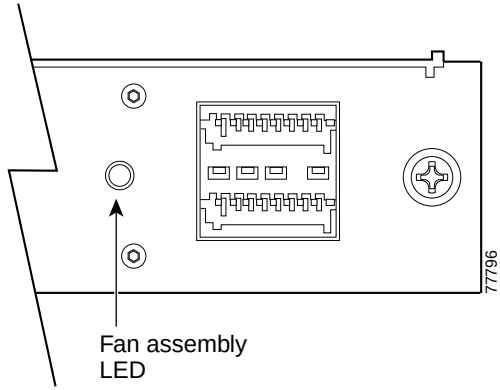

Table 1-1 Fan Assembly Status

Fan Failure	LED	Status
None	Green	Normal
One	Yellow	Minor
Two or more	Red	Major

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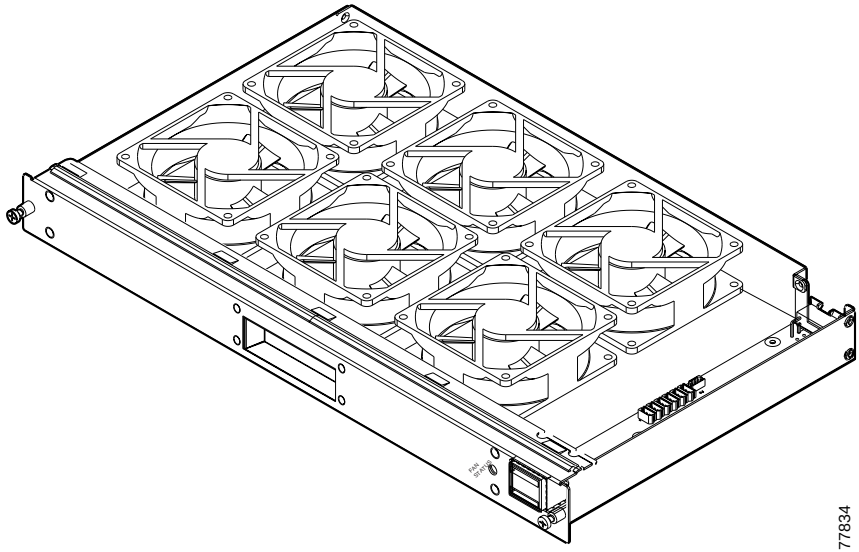
Figure 1-8 Fan Assembly



Power Supplies

The Cisco ONS 15530 chassis supports redundant 120–240 VAC (see Figure 1-9) or –48 VDC (see Figure 1-10) power. The power supplies are located at the right of the chassis, next to the card slots (see Figure 1-1). Up to two power supplies can be installed for redundancy.

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Figure 1-9 120–240 VAC Power Supply

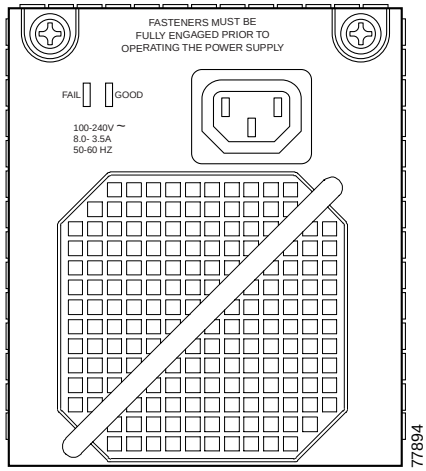
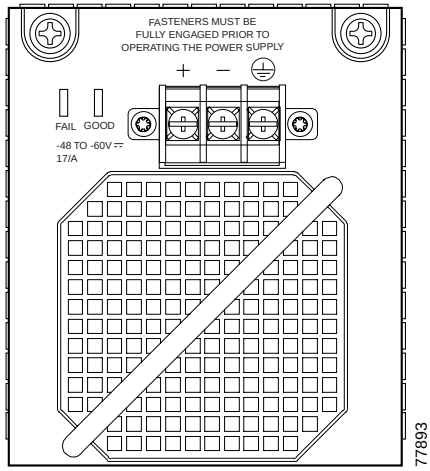


Figure 1-10 –48 VDC Power Supply



See the "Powering Up the Shelf" section on page 2-47 for more information about the power supplies.

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Backplane

The Cisco ONS 15530 backplane implements all board-to-board signal interconnects and provides power distribution within the chassis. Connections are present for two power supplies and the fan assembly. The backplane contains a total of 12 slots; two half-height slots for the OADM modules, two full height slots for the CPU switch modules, and eight full height slots for line cards and transponder cards.

Cable Storage Drawer

The cable storage drawer is mounted directly below the fan assembly. It provides storage for the excess cable length. Sliding radius limiters move to release the excess fiber cable slack when the drawer is pulled out, allowing the user to raise the fiber routing tray and access the fan assembly.

Cisco ONS 15530 Components

The following hardware components can be installed in the Cisco ONS 15530:

- CPU Switch Modules, page 1-12
- OSC Modules and Carrier Motherboards, page 1-17
- PSM, page 1-18
- Transponder Line Cards, page 1-20
- Optical Add Drop Multiplexing Modules, page 1-25
- Wide-Band Variable Optical Attenuator and Per-Band Optical Equalizer Modules, page 1-26
- ESCON Aggregation Cards, page 1-31
- 8-Port FC/GE Aggregation Cards, page 1-33
- 2.5-Gbps ITU Trunk Cards, page 1-36
- 10-Gbps ITU Trunk Cards, page 1-40
- 10-Gbps Uplink Cards, page 1-44

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CPU Switch Modules

The Cisco ONS 15530 supports two CPU switch modules for redundancy, one in active mode and the other in hot-standby mode. CPU switch modules are installed in slot 5 and slot 6. Each CPU switch module has a processor, a switch fabric, a clock, an Ethernet switch for communication between processors and with the LRC (line card redundancy controller) on the OADM modules and line cards, and an SRC (switch card redundancy controller). The active processor controls the system. All LRCs in the system use the system clock and synchronization signals from the active processor. Interfaces on the CPU switch modules permit access by 10/100 Ethernet, console terminal, or modem connections.

Figure 1-11 shows the front panel of the CPU switch module.

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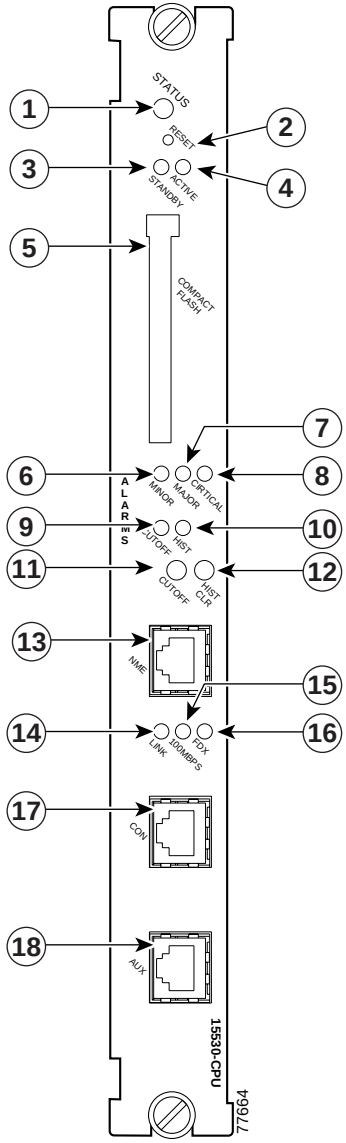
Figure 1-11 Cisco ONS 15530 CPU Switch Module



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Callout	Description	Callout	Description
1	Card status LED	10	HIST LED
2	Reset button	11	Cutoff LED
3	Standby LED	12	HIST CLR LED
4	Active LED	13	NME port
5	CompactFlash card slot	14	Link LED
6	Minor alarm LED	15	100 Mbps LED
7	Major alarm LED	16	Full-duplex LED
8	Critical alarm LED	17	Console port
9	Cutoff LED	18	Auxiliary port

CPU Switch Module Ports, LEDs, and Switches

Table 1-2 lists the LEDs on the CPU switch module faceplate with a description of the status indication.

Table 1-2 CPU Switch Module LEDs

LED	Status	Description
STATUS	Green	IOS is loaded and running.
	Yellow	Card is in the process of booting.
ACTIVE	Green	Module is the primary CPU switch module, otherwise the LED is off.
STANDBY	Green	Module is in standby mode, otherwise the LED is off.
ALARM LEDs		
CRITICAL	Red	A system wide critical alarm exists.
MAJOR	Yellow	A system wide major alarm exists.
MINOR	Yellow	A system wide minor alarm exists.
HIST	Yellow	A system wide major or minor alarm has occurred.

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Table 1-2 CPU Switch Module LEDs (continued)

LED	Status	Description
HIST CLR	Yellow	A system wide major or minor alarm has occurred.
CUTOFF	Red	A major or minor alarm exists and the cutoff button has been pushed.
FDX	Green	Module is running full-duplex.
	Off	Module is running half-duplex.
100MBPS	Green	Module is running at 100 Mbps.
	Off	Module is running at 10 Mbps.
LINK	Green	Link is up.
	Off	Link is down.

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Connector Ports

The front panel on the CPU switch module contains three ports with RJ-45 connectors (see Figure 1-11):

- Network Management Ethernet port (NME)—This Ethernet port connects the CPU switch module to a 10/100BASE-T network management LAN.
- Console port (CON)—This asynchronous EIA/TIA-232 serial port connects a terminal to the CPU switch module for local administrative access.
- Auxiliary port (AUX)—This asynchronous EIA/TIA-232 serial port connects a modem to the CPU switch module for remote administrative access.

The RJ-45 connectors on the front panel of the CPU switch module have an extra EMI shield and the signals going to them are filtered. Table 1-3 shows the pinouts of the console and auxiliary ports.

Table 1-3 Console and Auxiliary Port RJ-45 Pinout

Pin #	Console			Auxiliary		
	Direction	Function		Direction	Function	
1	Output	RTS	Request To Send	Output	RTS	Request To Send
2	Output	DTR	Data terminal ready	Output	DTR	Data terminal ready
3	Output	TxD	Transmit data	Output	TxD	Transmit data
4	N/A	GND	Ground	N/A	GND	Ground
5	N/A	GND	Ground	N/A	GND	Ground
6	Input	RxD	Receive data	Input	RxD	Receive data
7	Input	DSR	Data set ready	Input	CD	Carrier Detect
8	Input	CTS	Clear To Send	Input	CTS	Clear To Send

CompactFlash Card Slot

A CompactFlash card slot (see Figure 1-11) can store the Cisco IOS image or a system configuration file on a CompactFlash memory card. The system can also boot from the software stored on the CompactFlash memory card.

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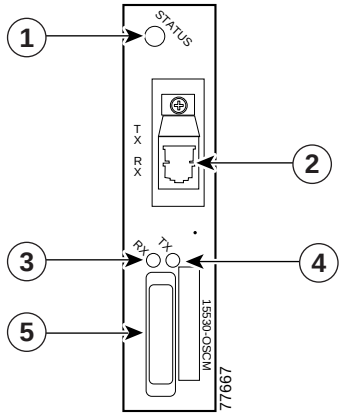
OSC Modules and Carrier Motherboards

The OSC (optical supervisory channel) module supports an optional out-of-band management channel for communicating between systems on the network. Using a 33rd wavelength (channel 0), the OSC allows control and management traffic to be carried without requiring a separate Ethernet connection to each Cisco ONS 15530 in the network. Up to two OSC modules can be installed in the carrier motherboard, one module for the west direction and one for the east direction.

The OSC always terminates on a neighboring node. By contrast, data channels may or may not be terminated on a given node, depending on whether the channels on the OADM modules are treated as either express (pass-through) or add/drop channels.

Figure 1-12 shows the front panel of the OSC module.

Figure 1-12 OSC Module



Callout	Description	Callout	Description
1	Card status LED	4	Transmit LED
2	OADM port	5	Card handle
3	Receive LED		

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OSC Module LEDs

Table 1-4 lists the LEDs on the OSC module faceplate, their default conditions, and what the conditions indicate.

Table 1-4 OSC Module LEDs

LED	Status	Description
STATUS	Green	OSC module initialization process is complete.
	Yellow	OSC module is in initialization process.
TX	Green	Transmit laser is enabled.
RX	Green	Light reception exists at wave OSC interface.

PSM

The PSM (protection switch module) provides trunk fiber protection for Cisco ONS 15530 systems configured in point-to-point topologies. The PSM sends the DWDM signal from the OADM module to both the west and east directions. It receives both the west and east signals and selects one to send to the OADM module. When a trunk fiber cut occurs on the active path, the PSM switches the received signal to the standby path. Since the PSM occupies one of the OADM subslots in the shelf, it protects a maximum of four channels and the OSC in a single shelf configuration.

The PSM also has an optical monitor port for testing the west and east receive signals. This port samples one percent of these signals which can be monitored with an optical power meter, or optical spectrum analyzer.

A PSM can be installed in subslots 0/0 and 0/1 of the Cisco ONS 15530 chassis.

The PSM for the Cisco ONS 15530 has a front panel with four MU connector pairs, as shown in Figure 1-13.

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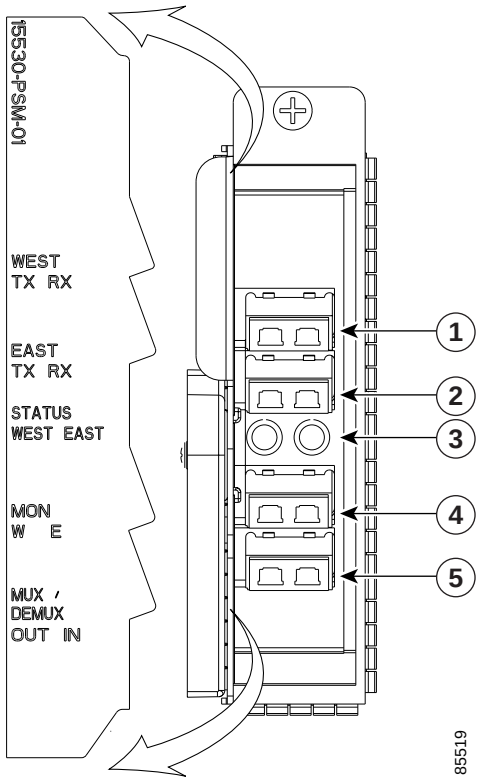
Figure 1-13 PSM



1	Rx/Tx West ports
2	Rx/Tx East ports
3	East/West LEDs
4	East/West Optical Monitor ports
5	Common In/Out ports

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PSM LEDs

Table 1-5 lists the LEDs on the PSM faceplate, their default conditions, and what the conditions indicate.

Table 1-5 PSM LEDs

LED Status	Description
Green	Software initialization is successful.
Off	Board failure.

Transponder Line Cards

The protocol-transparent and bit-rate transparent transponder line card converts a single client signal into an ITU wavelength, or channel. The transponder line cards have tunable lasers and you can configure the line cards to work in two different wavelengths. The Cisco ONS 15530 holds up to four transponder line cards, one for each wavelength supported by the OADM modules.

The Cisco ONS 15530 supports four types of single client interface transponder line cards: SM (single mode) unprotected, SM splitter protected, MM (multimode) unprotected, and MM splitter protected. Both types of SM transponder line cards accept SM client signals on the 1310-nm wavelength through an SC connector and support client signal clock rates ranging from 16 Mbps to 2.5 Gbps. Both types of MM transponder line cards accept SM and MM client signals on the 1310-nm wavelength through an SC connector and support client signal clock rates ranging from 16 Mbps to 622 Mbps (see Figure 1-14 and Figure 1-15).

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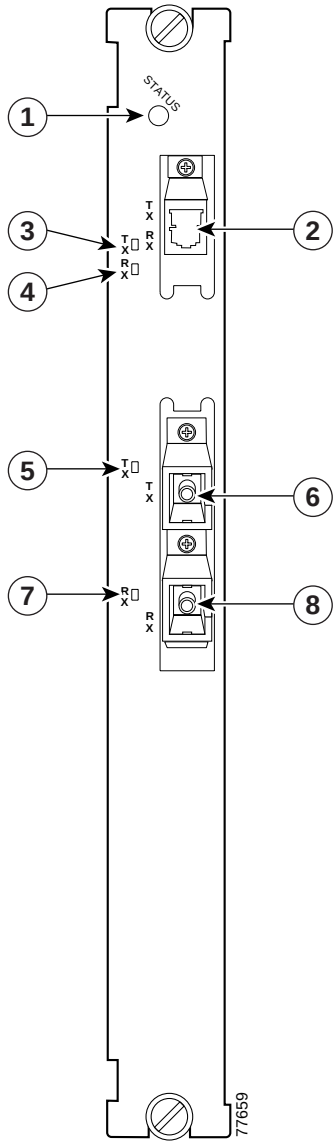
Figure 1-14 Transponder Line Card LEDs (Nonsplitter)



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Callout	Description	Callout	Description
1	Card status LED	5	Client side transmit LED
2	ITU side port	6	Client side transmit port
3	ITU transmit LED	7	Client side receive LED
4	ITU receive LED	8	Client side receive port

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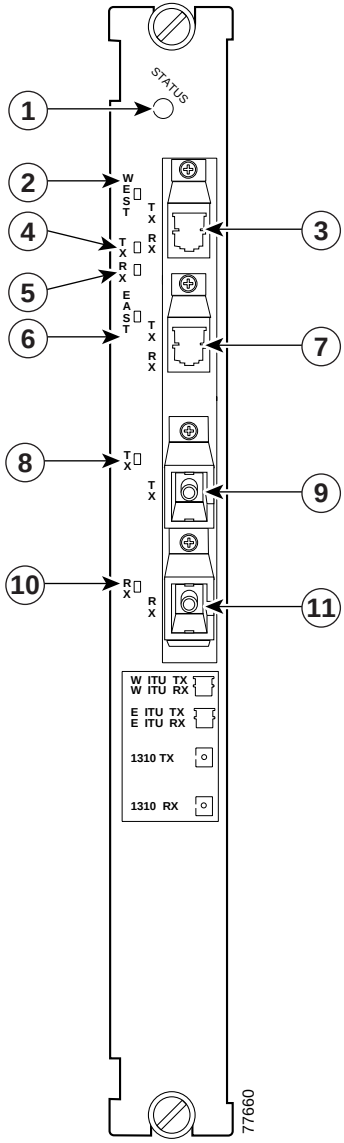
Figure 1-15 Transponder Line Card LEDs (Splitter)



Callout	Description	Callout	Description
1	Card status LED	7	East side ITU port
2	West side ITU LED	8	Client side transmit LED
3	West side ITU port	9	Client side transmit port
4	ITU side transmit LED	10	Client side receive LED
5	ITU side receive LED	11	Client side receive port
6	East side ITU LED		

The transponder line cards are hot swappable, permitting in-service upgrades and replacement. All client signals on the transponders are supported in 3R (reshape, retime, retransmit) mode, regardless of protocol encapsulation type. The client interfaces also support the OFC (open fiber control) safety protocol for Fibre Channel, ISC compatibility mode, and FICON. The client side ports use SC-type connectors.

On the trunk side, the transponder line card output laser power ranges from 5 to 10 dBm and the receive detector has a sensitivity of –32 dBm. The ports on the trunk side use MU-type connectors.

Transponder Line Card LEDs

Table 1-6 lists the LEDs on the transponder line card faceplate, their default conditions, and what the conditions indicate.

Table 1-6 Transponder Line Card LEDs

LED	Status	Description
STATUS	Green	Card is properly initialized.
	Blinking green	Good system clock is present and card is out of reset state.
	Yellow	System clock is not present.
EAST[1]	Green	Card is listening to the east side signal.
TX (Trunk port)	Green	Port is up and transmit laser is enabled.

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Table 1-6 Transponder Line Card LEDs (continued)

LED	Status	Description
RX (Trunk port)	Green	Light reception exists at the port.
WEST[1]	Green	Card is listening to the west side signal.
TX (Client port)	Green	Port is up and transmit laser is enabled.
RX (Client port)	Green	Light reception exists at the port.

1. This LED is only present on transponder line cards with splitter.

Optical Add Drop Multiplexing Modules

The OADM modules are passive devices that optically multiplex and demultiplex a specific band of four ITU wavelengths. The OADM modules supported by the Cisco ONS 15530 each add and drop a specified band of four channels at a node and pass the other bands through. To support the 32-channel spectrum, there are eight different 4-channel cards (see Figure 1-16).

In the transmit direction, the OADM modules multiplex signals transmitted by the transponder line cards and 10G ITU trunk cards over optical cross connections and provide the interfaces to connect the multiplexed signal to the DWDM trunk side. In the receive direction, the OADM modules demultiplex the signals from the trunk side before passing them over optical cross connections to the transponder line cards and 10G ITU trunk cards.

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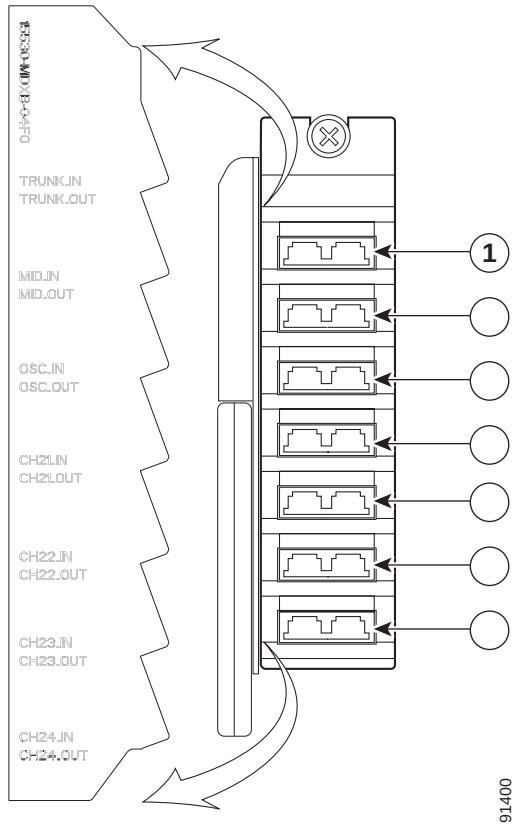
Figure 1-16 OADM Module



Wide-Band Variable Optical Attenuator and Per-Band Optical Equalizer Modules

The WB-VOA (wide-band variable optical attenuator) and PB-OE (per-band power equalizer) modules are half-width modules that allow the ONS 15530 to extend the internodal and ring circumference distances and number of nodes supported for point-to-point, hub ring, and mesh ring networks by equalizing power levels.

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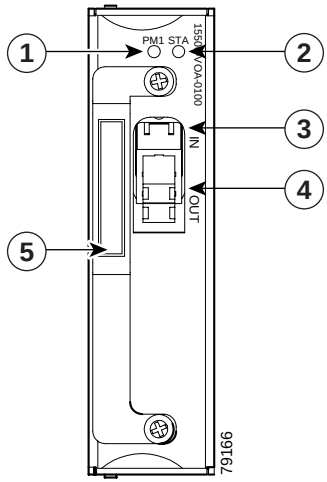
The WB-VOA module and the PB-OE module are available in single and dual band versions. These modules are installed into a carrier motherboard. This motherboard is installed into and operates on the Cisco ONS 15530 chassis. The carrier motherboard can be installed in slots 1 to 4 or 7 to 10. All optical connectors are located on the front panel and the connectors are angled.

Figure 1-17 and Figure 1-18 show the single and dual versions of the WB-VOA module. Figure 1-19 and Figure 1-20 show the single-band and dual-band versions of the PB-OE module.

Figure 1-17 Single WB-VOA Module



Callout	Description	Callout	Description
1	PM1 LED	4	OUT port
2	Card status LED	5	Handle
3	IN port		

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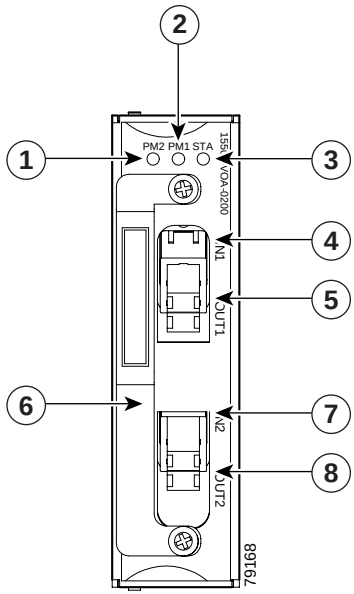
Table 1-7 Single WB-VOA Module LEDs

LED	Status	Description
PM1	Green	Light reception exists at the port.
STA	Green	Card is properly initialized.

Figure 1-18 Dual WB-VOA Module



Callout	Description	Callout	Description
1	PM2 LED	5	OUT1 port
2	PM1 LED	6	Handle
3	Card status LED	7	IN2 port
4	IN1 port	8	OUT2 port

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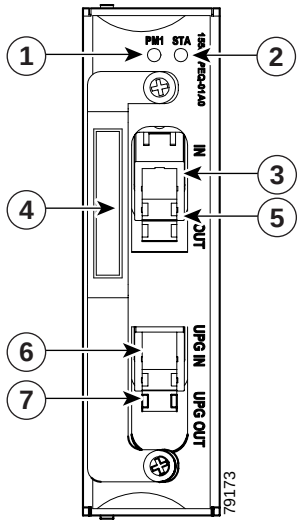
Table 1-8 Dual WB-VOA Module LEDs

LED	Status	Description
PM2	Green	Light reception exists at the port.
PM1	Green	Light reception exists at the port.
STATUS	Green	Card is properly initialized.

Figure 1-19 Single-Band PB-OE Module



Callout	Description	Callout	Description
1	PM1 LED	5	OUT port
2	Card status LED	6	UPG IN port
3	IN port	7	UPG OUT port
4	Handle		

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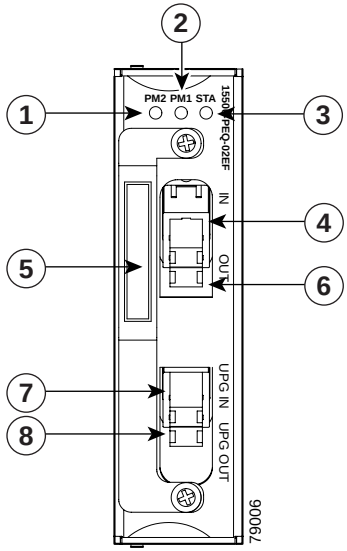
Table 1-9 Single-Band PB-OE Module

LED	Status	Description
PM1	Green	Light reception exists at the port.
STA	Green	Card is properly initialized.

Figure 1-20 Dual-Band PB-OE Module



Callout	Description	Callout	Description
1	PM2 LED	5	Handle
2	PM1 LED	6	OUT port
3	Card status LED	7	UPG IN port
4	IN port	8	UPG OUT port

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Table 1-10 Dual-Band PB-OE LEDs

LED	Status	Description
PM2	Green	Light reception exists at the port.
PM1	Green	Light reception exists at the port.
STATUS	Green	Card is properly initialized.

ESCON Aggregation Cards

The ESCON aggregation card is a 10-port card for ESCON (Enterprise Systems Connection) traffic. The ESCON card converts the 10 client signals from optical to electrical and then aggregates them into a single 2.5-Gbps signal. This aggregated signal is sent through the backplane and the active switch fabric to either a 10G ITU trunk card or a 10-Gbps uplink card. The cross connection between the two cards is configured using the CLI (command-line interface). The ESCON aggregation card has a redundant backplane connection.

The ESCON aggregation card uses multi-mode 62.5/125 um optical cable with SFPs (small form factor pluggables) and MT-RJ connectors for the client signals. (See Figure 1-21.)

Note The SFPs (part number 15500-XVRA-01A2 ONS 15530 ESCON-1310nm MM-MTRJ) must be purchased separately.

Note A patch cable to adapt MT-RJ connectors to standard ESCON connectors directly or intermediately to SC-type connectors may be required.

This signal is sent through the switch fabric to a 10G ITU trunk card or a 10-Gbps uplink card. The 10Gbps ITU trunk card converts the aggregated signal to an ITU-compliant wavelength, or channel. The 10-Gbps uplink card converts the aggregated signal to transmit to another shelf.

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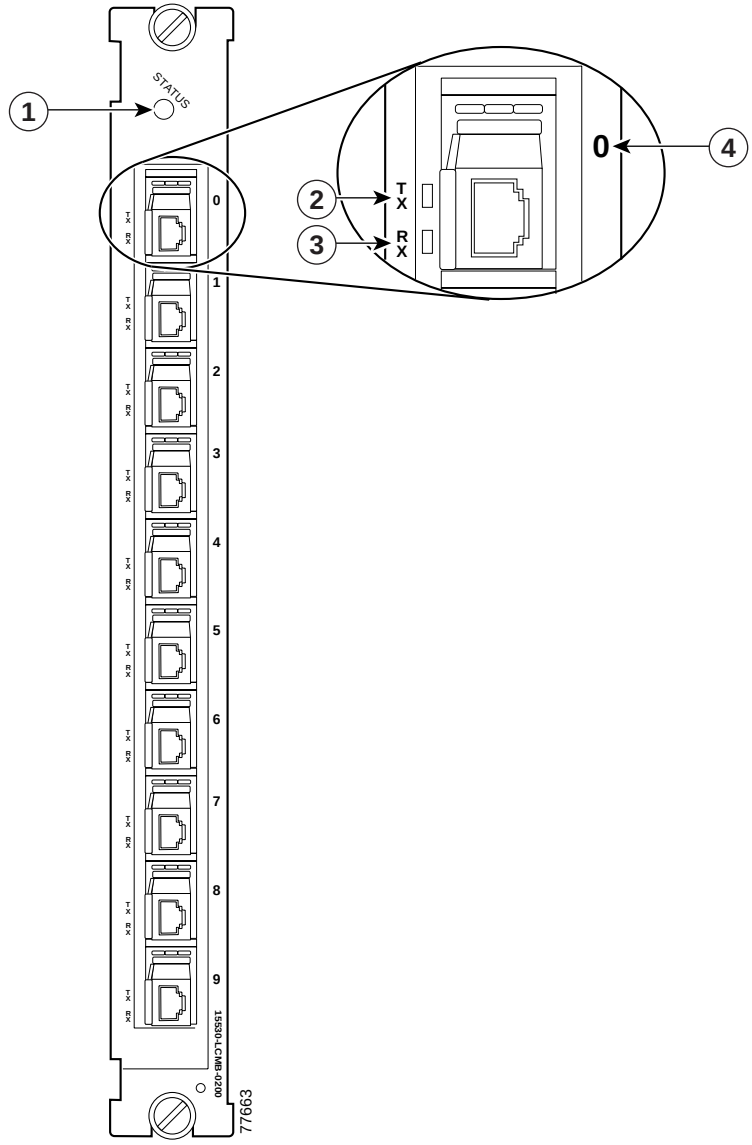
Figure 1-21 Cisco ONS 15530 ESCON Aggregation Card



Callout	Description	Callout	Description
1	Card status LED	3	Port receive LED
2	Port transmit LED	4	Port number

Table 1-11 describes the ESCON aggregation card LED status.

Table 1-11 ESCON Aggregation Card LEDs

LED	Status	Description
STATUS	Green	Card is properly initialized.
	Blinking green	Good system clock is present and card is out of reset state.
	Yellow	System clock is not present.
TX	Green	Port is up and transmit laser is enabled.
RX	Green	Light reception exists at the port.

8-Port FC/GE Aggregation Cards

The Cisco ONS 15530 supports a line card specifically for FC (Fibre Channel) and GE (Gigabit Ethernet) traffic. The 8-port Fibre Channel/Gigabit Ethernet aggregation card accepts up to eight SFP (small form-factor pluggable) optics for client traffic. Each SFP optic supports either FC or GE, depending on how it is configured in the CLI. The 8-port FC/GE aggregation card converts client signals from two adjacent port pairs (0–1, 2–3, 4–5, or 6–7) from optical form to electrical form, and then aggregates them into four 2.5-Gbps signals. These aggregated signals pass through the backplane and the switch fabric on the active CPU switch module to a 2.5-Gbps ITU trunk card, a 10-Gbps ITU trunk card, or a 10-Gbps uplink card. The cross connections between the two cards through the backplane and switch fabric are configured using the CLI. The 8-port FC/GE aggregation card has redundant connections over the backplane to the switch fabric on the active and standby CPU switch modules.

Note The 8-port FC/GE aggregation card also supports FICON trafficc at 1 Gbps.

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Note We strongly recommend configuring port pairs as FC only or GE only. Mixing FC and GE in a port pair increases the FC signal latency between nodes.

The 8-port FC/GE aggregation card uses single-mode and multimode SFP optics for the client signals. There are no restrictions on populating the line card with SFPs. For example, you can mix a single-mode SFP optic with a multimode SFP optic in the same port pair. Table 1-12 lists features for the SFP optics supported by the 8-port FC/GE aggregation card.

Table 1-12 8-Port FC/GE aggregation card SFP Optics Features

Part Number	Supported Protocols	Fiber Type	Wavelength	Connector Type
15500-XVRA-02C1	Gigabit Ethernet[1], Fibre Channel (1 Gbps)[2]	MM 50/125 m MM 62.5/125 m	850 nm	Duplex LC
15500-XVRA-03B1	Gigabit Ethernet[3], Fibre Channel (1 Gbps)[4]	SM 9/125 m	1310 nm	Duplex LC

1. 1000BaseSX
2. FC-0-100-M5-SN-S and FC-0-100-M6-SN-S standards
3. 1000BaseLX
4. FC-0-100-SM-LC-S standard

The Cisco ONS 15530 supports up to four 8-port FC/GE aggregation cards for a total of 32 client signals.

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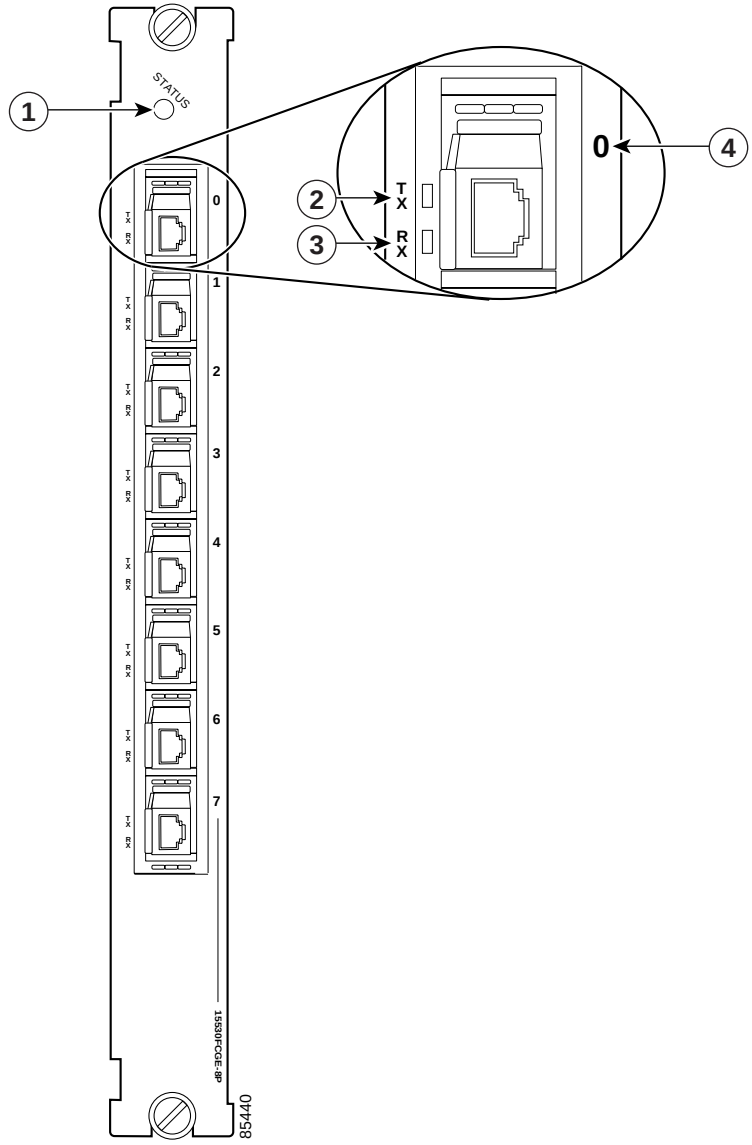
Figure 1-22 8-Port FC/GE Aggregation Card



1	Card status LED	**2**	Transmit Port status
3	Receive Port status	**4**	Port number

Table 1-13 describes the LEDs on the 8-port FC/GE aggregation card.

Table 1-13 8-Port FC/GE aggregation card LEDs

LED	Status	Description
STATUS	Off	No power to the board.
	Red	Card is in reset or the LRC is not configured.
	Yellow	Card is out of reset.
	Green	Card is properly initialized.
TX	Green	Port is up and transmit laser is enabled.
RX	Green	Light reception exists at the port.

2.5-Gbps ITU Trunk Cards

The 2.5-Gbps ITU trunk card sends and receives the ITU grid wavelength signal to and from an OADM module. This card accepts a 2.5-Gbps (3.125-Gbps line rate) electrical signal from either a 10-port ESCON aggregation card or an 8-port FC/GE aggregation card, which is converted to the ITU grid wavelength, or channel. The 2.5-Gbps ITU trunk card has redundant interfaces to the backplane, connecting to the switch fabrics on the active and standby CPU switch modules. The ITU laser is tunable to one of two channel frequencies. There are 16 different 2.5-Gbps ITU trunk cards (for channels 1–2, 3–4,..., 31–32) to support the 32 channels.

The 2.5-Gbps ITU trunk card has two versions: nonsplitter (shown in Figure 1-24) and splitter (shown in Figure 1-23). The nonsplitter version has only one pair of optical connectors on the front panel, which connects to either the east or the west OADM module, and can be used for unprotected, line card protected, or switch fabric protected applications. The card supports 32 channels as shown in Table A-2 on page A-3.

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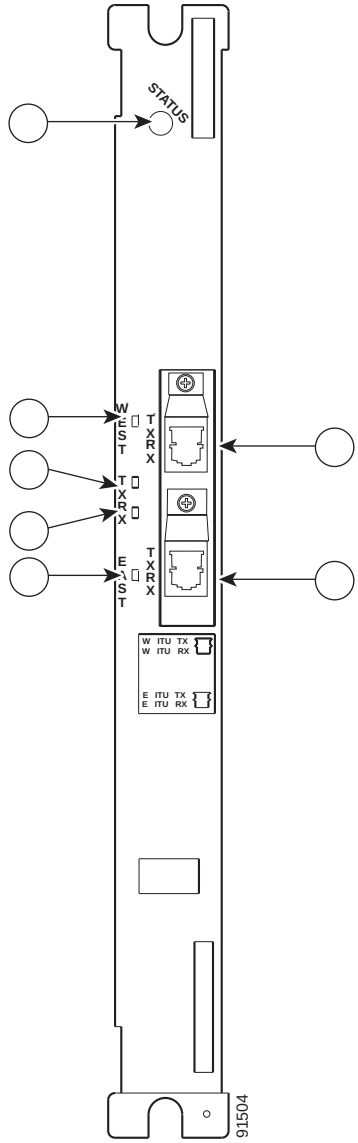
Figure 1-23 2.5-Gbps ITU Trunk Card (Splitter)



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1	Card status LED	**5**	Receive LED
2	West side port LED	**6**	East side port LED
3	West side port	**7**	East side port
4	Transmit LED		

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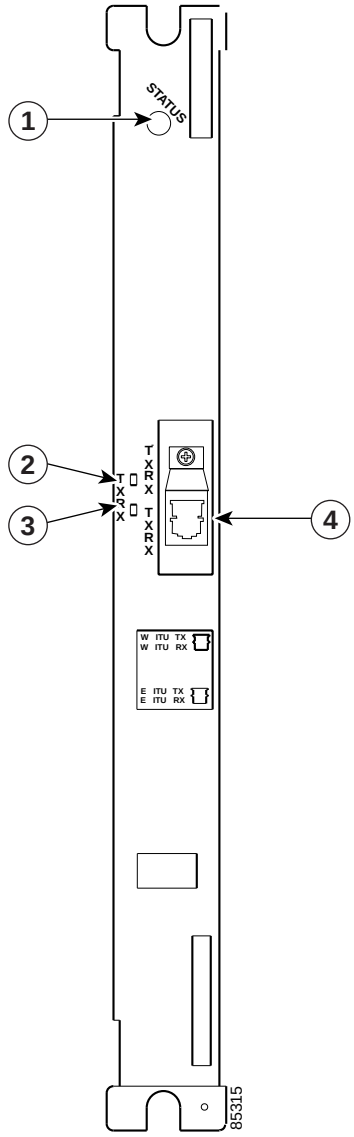
Figure 1-24 2.5-Gbps ITU Trunk Card (Nonsplitter)



1	Card status LED	**2**	Transmit LED
3	Receive LED	**4**	Transmit/Receive port

Table 1-14 lists and describes the 2.5-Gbps ITU Trunk Card LEDs.

Table 1-14 2.5-Gbps ITU Trunk Card LEDs

LED	Status	Description
STATUS	Green	Card is properly initialized.
WEST	Green	Card is listening to the west side signal.
TX	Green	Port is up and transmit laser is enabled.
RX	Green	Light reception exists at the port.
EAST	Green	Card is listening to the east side signal.

10-Gbps ITU Trunk Cards

The 10-Gbps ITU trunk card sends and receives the ITU grid wavelength signal to and from an OADM module. This card accepts up to four 2.5-Gbps (3.125-Gbps line rate) electrical signals from the 10-port ESCON aggregation cards and 8-port FC/GE aggregation cards, and combines them into one 10-Gbps signal, which is converted to the ITU grid wavelength, or channel. The 10-Gbps ITU trunk card has four separate redundant interfaces to the backplane, each connecting to the switch fabrics on the active and standby CPU switch modules.

The 10-Gbps ITU trunk card has two versions: nonsplitter and splitter. The nonsplitter version has only one pair of optical connectors on the front panel, which connects to either the east or the west OADM module, and can be used for unprotected, line card protected, or switch fabric protected applications (see Figure 1-25). The splitter version of the 10-Gbps ITU trunk card has two pairs of optical connectors on the front panel, which connect to the east and west OADM modules, and is designed for splitter protected applications (see Figure 1-26).

The Cisco ONS 15530 supports up to four 10-Gbps ITU trunk cards for a total of four channels.

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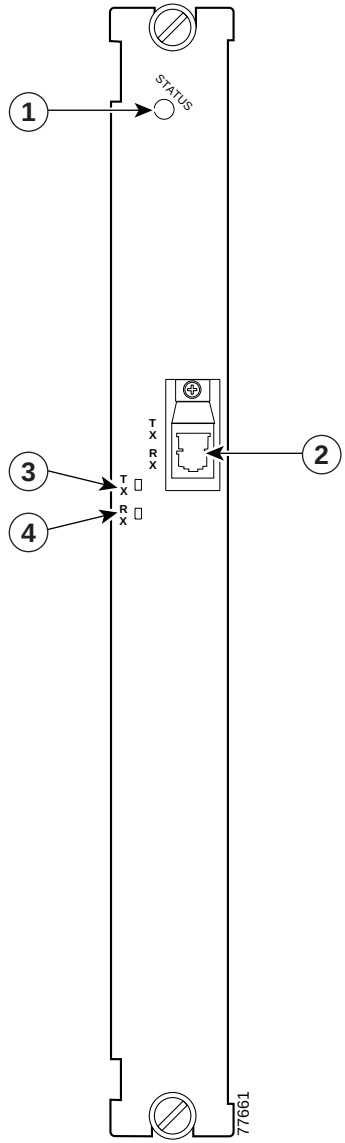
Figure 1-25 10-Gbps ITU Trunk Card (Nonsplitter)



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1	Card status LED	**3**	Transmit LED
2	ITU port	**4**	Receive LED

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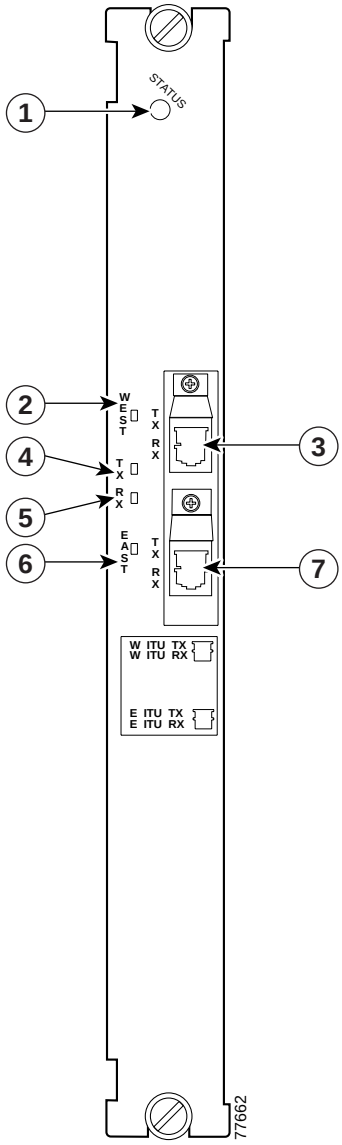
Figure 1-26 10-Gbps ITU Trunk Card (Splitter)



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1	Card status LED	5	Receive LED
2	West side port LED	6	East side port LED
3	West side port	7	East side port
4	Transmit LED		

Table 1-15 describes the10-Gbps ITU trunk card LED status.

Table 1-15 10-Gbps ITU Trunk Card LEDs

LED	Status	Description
STATUS	Green	Card is properly initialized.
WEST	Green	Card is listening to the west side signal.
TX	Green	Port is up and transmit laser is enabled.
RX	Green	Light reception exists at the port.
EAST	Green	Card is listening to the east side signal.

10-Gbps Uplink Cards

The 10-Gbps uplink card, shown in Figure 1-27, sends and receives a 10-GE 1310-nm signal to and from a 10-GE uplink card on another Cisco ONS 15530, or to and from a 10-GE transponder module on a Cisco ONS 15540 ESP or Cisco ONS 15540 ESPx. This card accepts up to four (3.125-Gbps line rate) electrical signals from 10-port ESCON aggregation cards and 8-port FC/GE aggregation cards, and combines them into one 10-GE signal.

The 10-Gbps uplink card has four separate redundant interfaces to the backplane. Each interface connects to the switch fabric on the active and standby CPU switch modules.

The 10-Gbps uplink card has only one version: nonsplitter. The nonsplitter version has only one pair of optical connectors on the front panel and can be used for unprotected or line card protected applications. For splitter protected configurations, the splitter line card motherboards on the Cisco ONS 15540 ESP and the Cisco ONS 15540 ESPx provide the facility protection.

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The Cisco ONS 15530 supports up to four 10-Gbps uplink cards for a total of four signals.

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Figure 1-27 10-Gbps Uplink Card

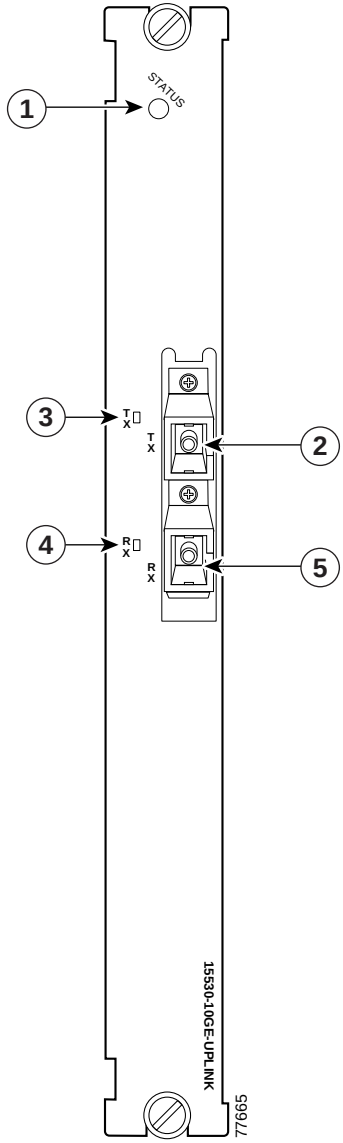

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Table 1-16 describes the 10-Gbps uplink line card LED status.

Table 1-16 10-Gbps Uplink Line Card LEDs

LED	Status	Description
STATUS	Green	Card is properly initialized.
TX	Green	Port is up and transmit laser is enabled.
RX	Green	Light reception exists at the port.

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