Technical Specifications

This chapter lists physical dimensions, power specifications, mounting requirements and interface specifications for ASR 5000 system components.

It includes the following sections:

Physical Dimensions

The ASR 5000 can be mounted in any standard (EIA-310-D, IEC 60297) 19-inch (482.6 mm) equipment cabinet or telecommunications rack. The table below lists the dimensions for the chassis and each component that can be placed within the chassis.

Table 1: Physical Dimensions - ASR 5000 Chassis and Components

Component	Height	Width	Depth
Chassis	24.50 in. (62.23 cm)	17.5 in. (44.45 cm)	24.0 in. (60.96 cm)
Application Card	17.05 in. (46.31 cm)	1.01in. (2.56 cm)	14.10 in. (35.81cm)
Line Card (half-height)	8.59 in. (21.82 cm)	1.01in. (2.56 cm)	5.24 in. (13.31cm)
XGLC (full-height)	17.48 in. (44.40 cm)	1.01in. (2.56 cm)	5.24 in. (13.31cm)
Fan Tray (Lower)	2.50 in. (6.35 cm)	16.25 in. (41.27 cm)	17.25 in. (43.82 cm)
Fan Tray (Upper)	2.875 in. (7.30 cm)	16.25 in. (41.27 cm)	19.375 in. (49.21 cm)

Component	Height	Width	Depth
Power Filtering Unit (PFU)	3.6 in. (9.14 cm)	8.25 in. (20.96 cm)	5.12 in. (13.00 cm)

Weights

The following table identifies the maximum weights for fully-loaded systems—cards installed in all slots and all other components installed.

Table 2: ASR 5000 Component Weights

Component	Weight
Chassis	
Empty	65 lbs. (29.48 kg)
As Shipped (empty chassis with PFUs, fan trays, bezels and blanking panels)	160 lbs. (72.57 kg)
Shipping (as shipped chassis, shipping container and packing materials)	251 lbs. (113.85 kg)
Fully loaded (as shipped chassis with all slots filled with cards)	307 lbs. (139.25 kg)
Packet Processing Cards	
Packet Services Card 2 (PSC2)	11.50 lbs. (5.22 kg)
Packet Service Card 3 (PSC3)	11.0 lbs. (4.95 kg)
Switch Process I/O Card (SPIO)	1.25 lbs. (0.57 kg)
System Management Card (SMC)	10.00 lbs. (4.54 kg)
Line Cards	
Channelized Line Card 2 (CLC2)	1.25 lbs. (0.57 kg)
Fast Ethernet (10/100) Line Card (FLC2)	1.00 lbs. (0.45 kg)
Gigabit Ethernet Line Card (GLC2)	1.00 lbs. (0.45 kg)
Optical Line Card (OLC2)	1.25 lbs. (0.57 kg)
Quad Gigabit Ethernet Line Card (QGLC)	1.25 lbs. (0.57 kg)

Component	Weight
Redundancy Crossbar Card (RCC)	1.00 lbs. (0.45 kg)
10 Gigabit Ethernet Line Card (XGLC)	2.25 lbs. (1.02 kg)

Power Specifications

The following table provides essential power specifications for the chassis and all associated cards within the system.

Table 3: Chassis Power Requirements

Characteristic	Value
Input Voltage	Maximum range: -40VDC to -60VDC Nominal range: -48VDC to -60 VDC
TUV Rated Peak Current Load	165A @ -48 VDC
Maximum Peak Power Load	5760W
Chassis Maximum Power Load	800W
Line Card (rear-installed) Maximum Power Load	**SPIO:** 15W **FLC2:** 13.5W **GLC2:** 10.5W **QGLC:** 15W **XGLC:** 25W **OLC2:**23W **CLC2:** 23W **RCC:** 20W
Application Card (front-installed) Maximum Power Load	**SMC:** 130W **PSC2:** 325W **PSC3:** 330W
Power Feed	**PFU:** 160A @ -48VDC

Estimating Power Requirements

Use the following formula to estimate total power consumption for each deployed chassis.

Note Use these estimates as a guide. Obey all cable and power safety regulations and assure that they are sufficient for your system's requirements.

(Total Application Card Maximum Power Load) + (Total Line Card Maximum Power Load) + Chassis Maximum Power Load = Total Power Consumption

For example, the calculation for estimating the power required for an ASR 5000 installation with (3) PSC2s, (2) SMCs, (2) SPIOs, (2) RCCs, and (4) GLC2s would be:

(325W x 3) + (130W x 2) + (20W x 2) + (13.5W x 4) + 800W = 2129W

Mounting Requirements

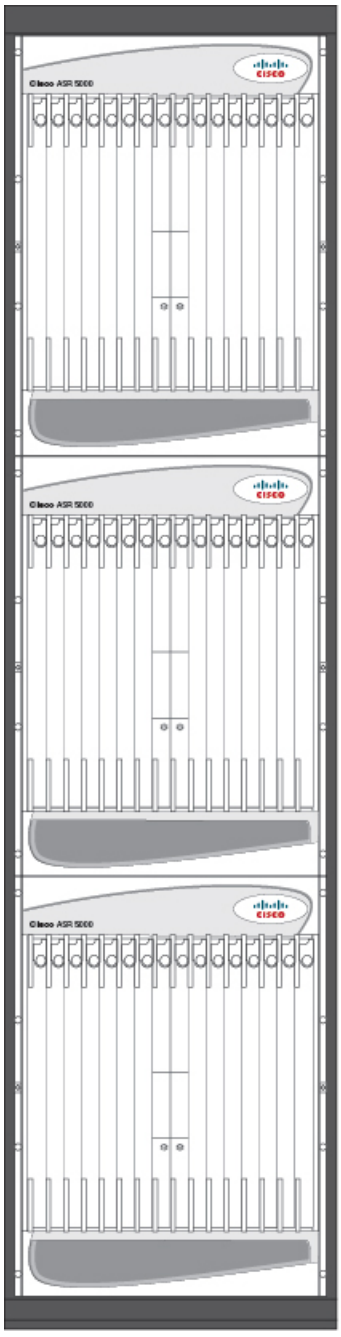
Each 24.5 in. (62.23 cm.) height chassis requires 14 Rack Units (RUs) of space. You can mount the system into any 19-inch (482.6 mm) equipment rack or telco cabinet with the mounting brackets supplied with the chassis. Additional hardware (not supplied), such as extension brackets, may be used to install the chassis in a standard 23-inch (584.2 mm) cabinet or rack. Both front and mid-mount installations are possible, depending on the position of the mounting brackets on the chassis.

You can mount a maximum of three ASR 5000 chassis in a 2- or 4-post equipment rack or telco cabinet, provided that all system cooling and ventilation requirements are met. Three stacked chassis will occupy a minimum of 42 RUs.

Caution When planning chassis installation, ensure that equipment rack or cabinet hardware does not hinder air flow at any of the intake or exhaust vents. Also, make sure that the rack/cabinet hardware, as well as the ambient environment, allow the system to function within the required limits. For more information, refer to *Environmental Specifications* in this guide.

Rack mounting requires the use of industry-standard (EIA-310-D, IEC 60297) equipment racks and cabinets, as well as supplier-recommended fasteners. The following figure depicts how three chassis can be mounted in a 42 RU equipment rack.

Figure 1: Three ASR 5000 Chassis in a 42 RU Rack



Interface Specifications

The table below lists the line card interfaces for use within the chassis.

Table 4: Line Card Interfaces

Card Type	Port	Quantity	Connector Type	Notes
SPIO	Console	1	RJ-45, RS-232 serial	—
	Console Cable Assembly	1	RJ-45 to DB-9	—
	Gigabit Ethernet	2	Optical SFP	—
	10/100 Mbps	2	RJ-45, Ethernet	1
	CO Alarm	1	10-pin, Molex	—
	CO Alarm cable Assembly	1	Dual 10-pin Molex to barrier terminal	—
	BITS BNC (optional)	1	BNC, coaxial cable	2
	BITS 3-Pin (optional)		3-pin, wire-wrap	
FLC2	10/100 Ethernet	8	RJ-45, Ethernet	1
GLC2	Gigabit Ethernet	1	SFP-SX	3
			SFP-LX	
			SFP-T, copper RJ-45	
QGLC	Gigabit Ethernet	4	SFP-SX	4
			SFP-LX	
			SFP-T, copper RJ-45	
XGLC	10 Gigabit Ethernet	1	10GBase-SR, SFP+	5
			10GBase-LR, SFP+	
OLC2	ATM/POS OC-3 SM IR-1	1	Single-mode Fiber, LC duplex	—
	ATM/POS OC-3 Multi-Mode		Multi-mode Fiber, LC duplex	
CLC2	Channelized (STM-1/OC-3) SM IR-1	1	Single-mode Fiber, LC duplex	—
	Channelized (STM-1/OC-3)Multi-Mode		Multi-mode Fiber, LC duplex	

Notes

1 An RJ-45 Ethernet interface may have more than one pin-out configuration, depending on the type of cable used.

2 An SPIO may be equipped with one type of BITS connector – BNC or 3-pin.
3 A Small Form-factor Pluggable transceiver is supplied with the GLC2 based on the customer-specified interface type.
4 Four Small Form-factor Pluggable transceivers are supplied with the QGLC based on the customer-specified interface type.
5 An enhanced SFP (SFP+) transceiver is supplied with the XGLC based on the customer-specified interface type.

SPIO Card Interfaces

Each interface on the SPIO card is described below. In each accompanying figure, the interface is shown in the same orientation as the way it appears on the card.

Console Port

The Console port is an RJ-45 RS-232 interface used to access the command line interface. The interface communicates at a baud rate of 9600 to 115,200 bps (115.2 Kbps). The default is 115,200 bps.

Table 5: SPIO Console RJ-45 Pinout

Pin	Signal Description	Signal Type
1	Clear to Send (CTS)	Input
2	Data set Ready (DSR)	Input
3	Receive Data (RX)	Input
4	Signal Ground (SGND)	N/A
5	Ready to Send (RTS)	Output
6	Transmit Data (TX)	Output
7	Data Carrier Detect (DCD)	Input
8	Data Terminal Ready (DTR)	Output

Console Cable Specifications

SPIO cards are shipped with a console cable assembly that includes a 7-foot (2 meter) serial cable with RJ-45 connectors on each end, and an RJ-45-to-DB-9 adapter. Use the RJ-45-to-DB-9 adapter to connect the console

cable to a terminal server or terminal emulation device such as a laptop computer. The cable's pin-out is provided in the following figure and table.

Figure 2: SPIO Console Cable Assembly

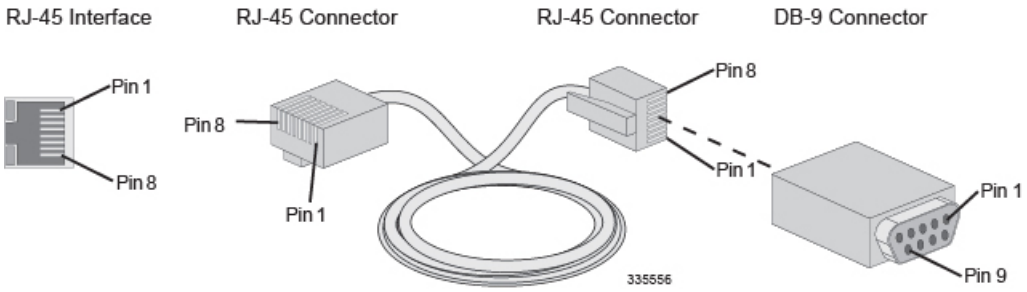


Table 6: RJ-45 to DB-9 Cable

Signal Description	Signal Type	RJ-45 Pin	DB-9 Pin	Signal
Clear to Send (CTS)	Input	1	7	RTS
Data set Ready (DSR)	Input	2	4	DTR
Receive Data (RxD)	Input	3	3	TxD
Signal Ground (SGND)	N/A	4	5	SGND
Ready to Send (RTS)	Output	5	8	CTS
Transmit Data (TxD)	Output	6	2	RxD
Data Carrier Detect (DCD)	Input	7	1	DCD
Data Terminal Ready (DTR)	Output	8	6	DSR

To construct a RJ-45 to DB-25 cable for modem connectivity, refer to the table that follows.

Table 7: RJ-45 to DB-25 Cable

Signal Description	Signal Type	RJ-45 Pin	DB-25 Pin	Signal
Clear to Send (CTS)	Input	1	5	CTS
Data set Ready (DSR)	Input	2	6	DSR
Receive Data (RX)	Input	3	3	RxD
Signal Ground (SGND)	-	4	7	SGND

Signal Description	Signal Type	RJ-45 Pin	DB-25 Pin	Signal
Ready to Send (RTS)	Output	5	4	RTS
Transmit Data (TX)	Input	6	2	TxD
Data Carrier Detect (DCD)	Output	7	8	DCD
Data Terminal Ready (DTR)	Output	8	20	DTR

Fiber SFP Interface

The fiber Small Form-factor Pluggable (SFP) interface has two host connectors that transmit and receive data.

Table 8: Fiber SFP Interface Transmit and Receive Levels

Signal	Level
Max TX:	0 dBm
Min TX:	-9.5 dBm
Max RX:	0 dBm (saturation average power)
Min RX:	-20 (typical) / -17 (max.) dBm (sensitivity average power)

10/100/1000 Mbps RJ-45 Interface

The two RJ-45 interfaces are auto-sensing 10/100/1000 Ethernet (10Base-T/100Base-TX/1000Base-T) that require unshielded twisted pair (UTP) copper cable.

Table 9: SPIO RJ-45 Ethernet Interface Pinouts

Pin	10Base-T 10Mbps Cat3	100Base-Tx 100Mbps Cat5	1000Base-Tx 1Gbps Cat5+
1	TX+	TX+	BI DA+
2	TX-	TX-	BI DA-
3	RX+	RX+	BI DB+
4	Not used	Not used	BI DC+
5	Not used	Not used	BI DC-
6	RX-	RX-	BI DB-

Pin	10Base-T 10Mbps Cat3	100Base-Tx 100Mbps Cat5	1000Base-Tx 1Gbps Cat5+
7	Not used	Not used	BI DD+
8	Not used	Not used	BI DD-

Central Office Alarm Interface

The Central Office (CO) alarm interface is a 10-pin Molex connector supporting three dry-contact relay switches. The three normally closed (NC) relays can support normally open (NO) or NC devices.

Table 10: SPIO CO Alarms Interface Pinout

Pin	Signal
1	Major Alarm - Normally closed
2	Major Alarm - Common
3	Major Alarm - Normally open
4	Minor Alarm - Normally closed
5	Minor Alarm - Common
6	Minor Alarm - Normally open
7	Critical Alarm - Normally closed
8	Critical Alarm - Common
9	Critical Alarm - Normally open
10	Not used

The 8-foot (2.4 meter) CO alarm cable shipped with the chassis supports redundant SPIO card installations. This "Y" cable has two Molex connectors on one end that are keyed to fit into the CO Alarm interfaces in one direction only. Each connector mates with one of the side-by-side SPIO cards. On the opposite end is a 9-pin terminal block that you can mount to the telco cabinet or equipment rack frame.

The following figure and table display this cable assembly and its pinouts.

Figure 3: SPIO CO Alarms Cable Assembly

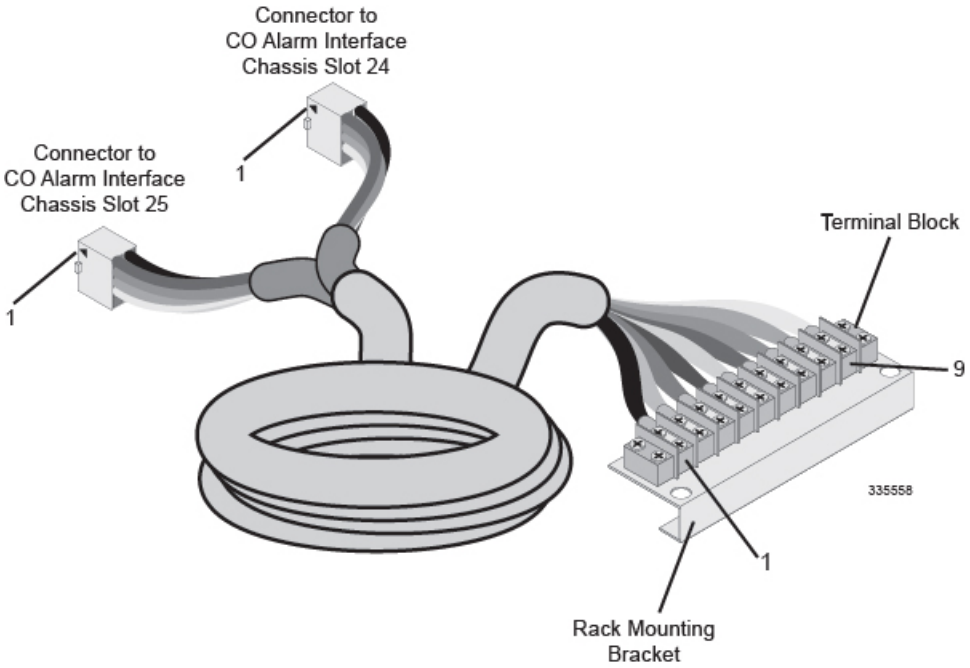


Table 11: CO Alarms Cable Pinout

CO Alarms IF Pin No.	Cable Wire Color	Cable Terminal Block Position No.	Signal
1	Black	1	Major Alarm - Normally closed
2	Orange	2	Major Alarm - Common
3	Red	3	Major Alarm - Normally open
4	Brown	4	Minor Alarm - Normally closed
5	Yellow	5	Minor Alarm - Common
6	Green	6	Minor Alarm - Normally open
7	Blue	7	Critical Alarm - Normally closed
8	Violet	8	Critical Alarm - Common
9	Gray	9	Critical Alarm - Normally open
10	Not wired	Not equipped	Not applicable

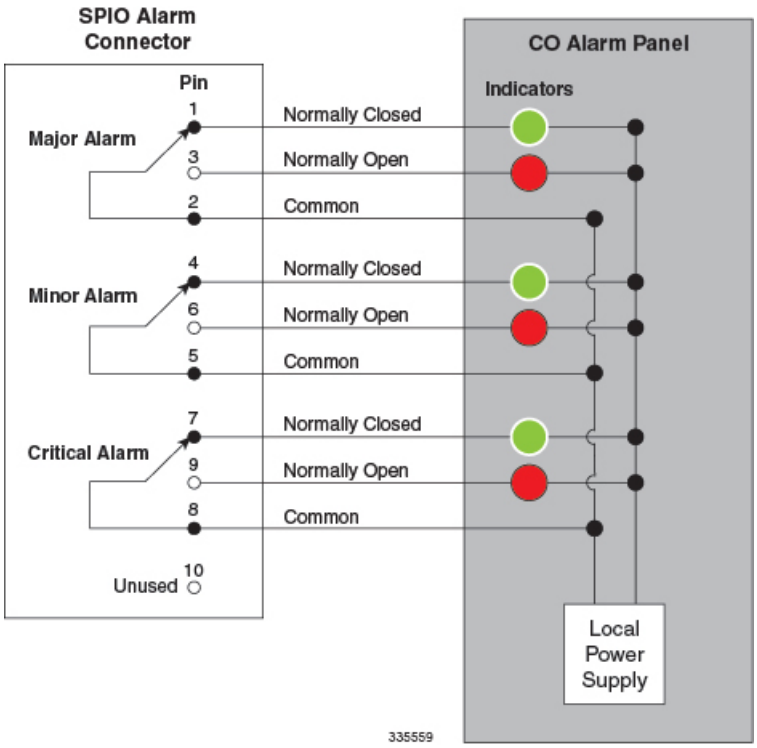
Electrical Characteristics

Each of the three dry-contact relay switches is rated to support a maximum switching current of 1A@30VDC. The relay contacts should not directly connected to high current devices such as sirens and flashing lamps.

Central Office Alarm Wiring Example

The following figure depicts how the dry-contact relays can each control up to two external alarm indicators. In this example, the CO alarm interface is connected to a CO Alarm Panel, where green LEDs are wired to indicate normal operation, and red LEDs are wired to indicate an alarm condition.

Figure 4: CO Alarm Interface Schematic



With all relays de-energized (normally closed), the green LED is illuminated. If an alarm relay is energized, the NO (normally open) contact closes and the red LED is illuminated.

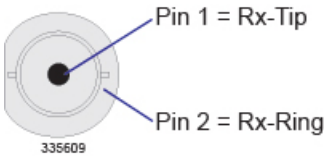
BITS Timing Interface

Important External Building Interface Timing Supply (BITS) timing is an alternative to using clock signals derived from an ATM port on an OLC/OLC2, or an ANSI SONET STS-3/SDH STM-1 port on a CLC/CLC2 to synchronize line card timing. (Line-derived clocking requires that the SPIO be equipped with the optional Stratum 3 clock module.)

BITS E1 BNC Interface

The BNC version of the SPIO employs a 75-ohm coaxial BNC connector that accepts an analog E1 BITS signal from which the SPIO derives a 2048 kHz clock. The following figure shows the BITS BNC timing interface.

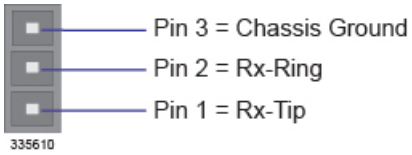
Figure 5: SPIO E1 BITS BNC Pinout



BITS T1 3-Pin Interface

The 3-pin version of the SPIO employs a wire-wrap connector that accepts a T1 (DS1) BITS data signal (all ones) from which the SPIO derives a 1544 kHz clock. The following figure shows the BITS 3-wire timing interface wire-wrap pin-out.

Figure 6: SPIO T1 BITS Wire-Wrap Pinout



Fast Ethernet Line Card (FLC2) Interfaces

Each of the eight RJ-45 interfaces available on the FLC2 supports auto-sensing 10Base-Tx or 100Base-Tx Ethernet interfaces.

10/100 Mbps RJ-45 Interface

The RJ-45 interfaces on the Fast Ethernet line card support the following cable types and transfer rates.

Table 12: FLC2 RJ-45 Ethernet Pinouts

Pin	10Base-T 10Mbps Cat3	100Base-TX 100Mbps Cat5
1	TX+	TX+
2	TX-	TX-
3	RX+	RX+
4	na	na
5	na	na
6	RX-	RX-
7	na	na
8	na	na

Gigabit Ethernet Card (GLC2/QGLC) SFP Interfaces

1000Base-SX

The 1000Base-SX fiber SFP interface on the Gigabit Ethernet Card (GLC2) has one pair of fiber connectors. The Quad Gigabit Ethernet Card (QGLC) has four pairs.

Table 13: 100Base-SX Fiber Transmit and Receive Levels

Signal	Level
Max TX:	0 dBm
Min TX:	-9.5 dBm
Max RX:	0 dBm (saturation average power)
Min RX:	-20 (typical) / -17 (max.) dBm (sensitivity average power)

1000Base-LX Interface

The 1000Base-LX fiber SFP interface on the Ethernet 1000 LX line card has one pair of host connectors. The QGLC has four pairs.

Table 14: 1000Base-LX Fiber Transmit and Receive Levels

Signal	Level
Max TX:	0 dBm
Min TX:	-9.5 dBm
Max RX:	0 dBm (saturation average power)
Min RX:	-20 (typical) / -19 (max.) dBm (sensitivity average power)

1000Base-T

The 1000Base-T SFP copper interfaces on the GLC2 and QGLC line cards require unshielded twisted pair (UTP) copper CAT-5 cable with a bit error rate (BER) less than 10e-10. Pinouts for the RJ-45 Ethernet ports are shown in the table below.

Table 15: 1000Base-T RJ-45 Ethernet Copper Pinouts

Pin	1000Base-Tx 1Gbps Cat5+
1	BI DA+
2	BI DA-
3	BI DB+
4	BI DC+
5	BI DC-
6	BI DB-
7	BI DD+
8	BI DD-
RX = Receive Data TX = Transmit Data BI = BI directional data DA, DB, DC, DD = Data Pair A, B, C, and D	

10 Gigabit Ethernet Line Card (XGLC) SFP+

10GBase-SR

The 10GBase-SR fiber SFP+ interface on the XGLC has one pair of fiber connectors.

Table 16: 10GBase-SR Fiber Transmit and Receive Levels

Signal	Level
Max TX:	-1.0 dBm
Min TX:	-7.3 dBm
Max RX:	-1.0 dBm (saturation average power)
Min RX:	-11.1 (max.) dBm (sensitivity average power)

10 Base-LR Interface

The 10GBase-LR fiber SFP+ interface on the XGLC has one pair of host connectors.

Table 17: 10GBase-LR Fiber Transmit and Receive Levels

Signal	Level
Max TX:	0.5 dBm
Min TX:	-8.2 dBm
Max RX:	0.5 dBm (saturation average power)
Min RX:	-12.6 (max.) dBm (sensitivity average power)

Fiber ATM/POS OC-3 (OLC2) Multi-Mode Interface

Fiber ATM/POS OC-3 SM IR-1 Interface

The fiber-optic SFP interface on OLC2 Optical ATM Line Cards with the SM IR-1 interface has one pair of host connectors.

Table 18: OC-3 SM IR-1 Fiber Transmit and Receive Levels

Signal	Level
Max TX:	-8 dBm
Min TX:	-15 dBm
Max RX:	-8 dBm (saturation average power)
Min RX:	-28 (max.) dBm (sensitivity average power)

The fiber-optic SFP interface on OLC2 Optical ATM Line Cards with the multi-mode interface has one pair of host connectors.

Table 19: Multi-Mode Fiber Transmit and Receive Levels

Signal	Level
Max TX:	-14 dBm
Min TX:	-19 dBm
Max RX:	-12 dBm (saturation average power)
Min RX:	-30 (max.) dBm (sensitivity average power)

Channelized Line Cards

Channelized Line Card (CLC2) with Single-Mode Interface

The optical SFP interface on the 4-port CLC2 with the single-mode interface has four pairs of connectors that accept SFP transceivers.

Table 20: Single-Mode Fiber Transmit and Receive Levels

Signal	Level
Max TX:	-8 dBm
Min TX:	-15 dBm
Max RX:	-8 dBm (saturation average power)
Min RX:	-28 (max.) dBm (sensitivity average power)

Channelized Line Cards (CLC2) with Multi-Mode Interface

The fiber SFP interface on the 4-port CLC2 with the multi-mode interface has four pairs of connectors that receive SFP transceivers.

Table 21: Multi-Mode Fiber Transmit and Receive Levels 0

Signal	Level
Max TX:	-14 dBm
Min TX:	-19 dBm
Max RX:	-12 dBm (saturation average power)
Min RX:	-30 (max.) dBm (sensitivity average power)