



APPENDIX **A**

Specifications



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 SNCP feature, which may be used in any topological network configuration. Cisco does not recommend using its SNCP feature in any particular topological network configuration.

This appendix contains shelf, card, and Small Form-factor Pluggable (SFP) specifications for the Cisco ONS 15310-MA SDH.

A.1 Cisco ONS 15310-MA SDH Shelf Specifications

This section provides ONS 15310-MA SDH topologies; Cisco Transport Controller (CTC) specifications; LAN, TL1, modem, alarm, and electrical interface assembly (EIA) interface specifications; timing, power, and environmental specifications; and shelf dimensions.

A.1.1 Alarm Interface

The ONS 15310-MA SDH alarm interface has the following specifications:

- The alarm interface provides 32 alarm inputs and 8 contacts for alarm outputs.
- Connector J6: Alarm inputs
- Connector J7: Alarm outputs

A.1.2 UDC Interface

The ONS 15310-MA SDH 64-kbps user data channel (UDC) digital interface has the following specifications:

- The 64-kbps digital interface provides a digital input and output.
- Any F1 byte that is accessible on the system is interfaced at the UDC connector.
- The UDC provides a simplex interface. Protection for UDC overhead channel(s) follows interface line protection for traffic.

- The UDC can be enabled or disabled through the management interfaces. The default state is disabled.
- The physical interface is defined in ITU-T G.703 as a 120-ohm, twisted pair connection. The jitter specification is defined in ITU-T G.823.
- The UDC supports a serial port interface adaptation function to overhead bytes F1. This is an EIA/TIA-232 interface capable of 9.6-, 19.2-, 38.4-, and 56-kbps operation. The rate is selectable through the management interface. The default is 56 kbps with no parity and 1 stop bit.
- Connector J3: UDC

A.1.3 Cisco Transport Controller LAN Interface

The ONS 15310-MA SDH CTC LAN interface has the following specifications:

- 10/100BaseT
- 15310E-CTX-K9 access: RJ-45 connector
- Connector J3: LAN port

A.1.4 TL1 Craft Interface

The ONS 15310-MA SDH TL1 craft interface has the following specifications:

- Speed: 9600 baud, no parity, 1 stop bit
- 15310E-CTX-K9: EIA/TIA-232 with RJ-45 type connector
- Connector J2: Craft port

A.1.5 Configurations

The ONS 15310-MA SDH supports the following configurations:

- Two-fiber path protection
- 1+1 protection
- Extended SNCP
- Add/drop multiplexer (ADM)
- Point-to-point (PPP) terminal mode

A.1.6 LEDs

[Table A-1](#) describes the system-level LEDs, located on the on the ONS 15310-MA SDH fan tray, and the possible LED colors and their significance.

Table A-1 LED Description

LED	Color and Meaning
FAIL	Red indicates system failure or during initialization
CR	Red indicates a critical alarm is present on the shelf assembly.
MJ	Red indicates a major alarm is present on the shelf assembly.
MN	Amber indicates a minor alarm is present on the shelf assembly.
REM	Red indicates a remote alarm is present on the shelf assembly.
PWR A PWR B	Green indicates that a DC power source present and within normal operating range. Red indicates that DC power source is not present, or is present and not within normal operating range.

A.1.7 Push Buttons

The ONS 15310-MA SDH has the following push buttons:

- Lamp test: When momentarily pushed, lights all LEDs on the ONS 15310-MA SDH front panel. If an LED has more than one color, all the colors will be cycled when the lamp test button is pushed.



Note Another use for the lamp test button is to reset the CTC password to its default value (otbu+1). To reset the password, press the lamp test button for at least five seconds, release it for a maximum of five seconds, then press it again for at least five seconds. After the button is released, the default password is set.

A.1.8 BITS Interface

The ONS 15310-MA SDH has the following building integrated timing supply (BITS) specifications:

- Supports two BITS inputs and two BITS outputs
- The BITS I/O ports support a 100-ohm termination for external 2.048 Mbps for E1.
- Connector J4: BITS1; Connector J5: BITS2

A.1.9 System Timing

The ONS 15310-MA SDH has the following timing specifications:

- +/- 20 ppm SDH Synchronous Equipment Timing Source (SETS) free-running internal clock
- Maintains SETS holdover (+/- 4.6 ppm for first 24 hours) in the event of reference frequency loss
- Timing reference: External BITS, line optical port, any E1 clock, and internal clock

A.1.10 Power Specifications

The ONS 15310-MA SDH has the following power specifications:

- Input power: –48 VDC nominal
- Maximum power consumption
 - Chassis with no cards installed (fan tray only): 55 W
 - Chassis with cards installed: 347 W
- Power requirements: –44 to –52 VDC
- Power terminals: Three-prong male locking connector

A.1.11 Environmental Specifications

The ONS 15310-MA SDH has the following environmental specifications:

- Operating temperature: –40 to +65 degrees Celsius (–40 to +149 degrees Fahrenheit)
- Operating humidity: 5 to 85 percent, noncondensing. Operation is guaranteed for 96 hours at 95 percent relative humidity.

A.1.12 Fan-Tray Assembly Specifications

- Environmental
 - Operating temperature: –40 to +65 degrees Celsius (–40 to 149 degrees Fahrenheit)
 - Operating humidity: 5 to 85 percent, noncondensing. Operation is guaranteed for 96 hours at 95 percent relative humidity.
- Power
 - 50 W, 4.2 Amps (at 12 V), 170 BTU/hr
- Shelf Acoustics (NEBS acoustic noise compliant)
 - Normal fan speed: 58 dBA
 - High fan speed: 64 dBA

A.1.13 Shelf Dimensions

The ONS 15310-MA SDH has the following shelf dimensions:

- Height: 6 Rack Units (RUs), 10.44 inches (26.51 cm)
- Width:
 - 10.67 inches (27.10 cm)
- Depth:
 - 12 inches (20.5 cm) without cables installed
 - 13.7 inches (34.8 cm) with cables installed
- Weight:
 - 25 lbs. (11.3 kg) maximum (line cards, fan-tray assembly, and two electrical interface assemblies (EIAs) installed)

A.2 Card Specifications

This section provides specifications for the 15310-MA SDH electrical and 15310E-CTX-K9 cards. For compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.

A.2.1 15310E-CTX-K9 Card

The 15310E-CTX-K9 card is installed in Slots 3 and 4 of the ONS 15310-MA SDH only. The 15310E-CTX-K9 has the following specifications.

- LAN Port
 - Supports a 10/100-Mbps Ethernet interface for Cisco Transport Controller/Transaction Language One (CTC/TL1) provisioning.
 - For node access in secure mode, SSL (for TL1) and HTTPS (for CTC) security protocols are supported.
- CRAFT Port
 - An EIA/TIA-232 craft interface is provided and is used for TL1 provisioning.
 - The craft interface is set to 9600 baud, no parity, and 1 stop bit by default.
- Nonvolatile memory
 - 128 MB, Compact Flash card
- Optical ports: Line
 - Bit rate: STM1 (155.520 Mbps), STM4, (622.080 Mbps), and STM16 (2488.320 Mbps), depending on the SFP installed



Note Both optical interfaces on the card can be configured as STM1, STM4, or STM16.

- Code: Scrambled NRZ
- Fiber: depends on the SFP used
(see the [“A.3 SFP Specifications”](#) section on page A-9)
- Loopback modes: Terminal and facility
- Connectors: LC duplex connector for each SFP
- Compliance: ITU-T G.707, ITU-T G.957
- Optical ports: Transmitter
 - Maximum transmitter output power: Depends on the SFP used
(see the [“A.3 SFP Specifications”](#) section on page A-9)
 - Minimum transmitter output power: Depends on the SFP used
(see the [“A.3 SFP Specifications”](#) section on page A-9)
 - Center wavelength: See wavelength plan
 - Center wavelength accuracy: 1 nm to 4 nm, depending on the SFP used
 - Transmitter: DFB laser
- Optical ports: Receiver

- Maximum receiver level: Depends on the SFP used (see the “A.3 SFP Specifications” section on page A-9)
- Minimum receiver level: Depends on the SFP used (see the “A.3 SFP Specifications” section on page A-9)
- Receiver: PIN PD
- Receiver input wavelength range: Depends on the SFP used
- Environmental
 - Operating temperature:
 - C-Temp: +23 to +131 degrees Fahrenheit (–5 to +55 degrees Celsius)
 - I-Temp: –40 to +149 degrees Fahrenheit (–40 to +65 degrees Celsius)
 - Operating humidity: 5 to 85 percent, noncondensing. Operation is guaranteed for 96 hours at 95 percent relative humidity.
 - Power consumption: 9.28 W, 0.19 A, 31.68 BTU/hr
- Dimensions
 - Height: 6.94 in. (167.28 mm)
 - Width: 1.45 in. (36.83 mm)
 - Depth: 8.35 in. (212.09 mm)
 - Weight not including clam shell: 1.6 lb (0.73 kg)

LAN Port

- Supports a 10/100-Mbps Ethernet interface for Cisco Transport Controller/Transaction Language One (CTC/TL1) provisioning.

CRAFT Port

- An EIA/TIA-232 craft interface is provided and is used for TL1 provisioning.
- The craft interface is set to 9600 baud, no parity, and 1 stop bit by default.

A.2.2 Nonvolatile Memory

The ONS 15310-MA SDH nonvolatile memory has a 128 MB Compact Flash card

A.2.3 CE-100T-8 and ML-100T-8 Cards

The CE-100T-8 and ML-100T-8 cards have the following specifications:

- Environmental
 - Operating temperature
 - C-Temp: 0 to +55 degrees Celsius (32 to 131 degrees Fahrenheit)
 - Operating humidity: 5 to 85 percent, noncondensing. Operation is guaranteed for 96 hours at 95 percent relative humidity.
 - Power consumption: 1.10A, 53 W
- Dimensions
 - Height: 176 mm (6.93 in.)

- Width: 34.29 mm (1.35 in.)
- Depth: 238.25 mm (9.38 in.)
- Weight (not including clam shell): 0.499 kg (1.1 lb)

A.2.4 CE-MR-6 Card

The CE-MR-6 card has the following specifications:

- Environmental
 - Operating temperature
 - I-Temp: -40 to +65 degrees Celsius (-40 to +149 degrees Fahrenheit)
 - Operating humidity: 5 to 85 percent, noncondensing. Operation is guaranteed for 96 hours at 95 percent relative humidity.
 - Power consumption: 63.00 W, 1.32 A at -48 V, 214.96 BTU/hr
- Dimensions
 - Height: 176.28 mm (6.94 in.)
 - Width: 34.29 mm (1.35 in.)
 - Depth: 236.68 mm (9.318 in.)
 - Weight (not including clam shell): 0.499 kg (1.1 lb)

A.2.5 E1_21_E3_DS3_3 and E1_63_E3_DS3_3 Cards

The E1_21_E3_DS3_3 and E1_63_E3_DS3_3 cards have the following specifications:

For E1:

- Environmental
 - Operating temperature:
 - I-Temp: -40 to +65 degrees Celsius
 - Operating humidity: 5 to 85 percent, noncondensing. Operation is guaranteed for 96 hours at 95 percent relative humidity.
 - Power consumption:
 - E1_63_E3_DS3_3: 40.00 W, 0.96 A
 - E1_21_E3_DS3_3: 27.60 W, 0.70 A
- Input
 - Bit rate: 2.048 Mbps +/- 50 ppm
 - Frame format: E1_MF, E1_CRCMF, E1 unframed
 - Line code: HDB3
 - Termination: AMP Champ
 - Input impedance: 120 ohms
 - Cable loss: Max 655 feet ABAM #22 or #24 AWG
 - AIS: TR-TSY-000191 compliant

- Output
 - Bit rate: 2.048 Mbps +/- 50 ppm
 - Frame format: E1_MF, E1_CRCMF, E1 unframed
 - Line code: HDB3
 - Termination: AMP Champ
 - Input impedance: 120 ohms
 - Cable loss: Max 655 feet ABAM #22 or #24 AWG
 - AIS: TR-TSY-000191 compliant
 - Power level: 12.5 to 17.9 dBm, centered at 772 KHz, -16.4 to -11.1 dBm centered at 1544 KHz
 - Pulse shape: Telcordia GR-499-CORE Figure 9-5
 - Pulse amplitude: 2.4 to 3.6 V peak-to-peak
 - Loopback modes: Terminal and facility
 - Line build out: 0 - 131 ft., 132 - 262 ft., 263 - 393 ft., 394 - 524 ft., 525 - 655 ft.
- Electrical interface: 64-pin Champ connectors on high-density EIA

For DS3:

- Input
 - Bit rate: 44.736 Mbps +/- 20 ppm
 - Frame format: Unframed, M13, C-bit
 - Line code: B3ZS
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/-5 percent
 - Cable loss: Max 450 feet with 734A or 728A
 - AIS: TR-TSY-000191 compliant
- Output
 - Bit rate: 44.736 Mbps +/- 20 ppm
 - Frame format: Unframed, M13, C-bit
 - Line code: B3ZS
 - Termination: Unbalanced coaxial cable
 - Input impedance: 75 ohms +/-5 percent
 - Cable loss: Max 450 feet with 734A or 728A cable
 - AIS: TR-TSY-000191 compliant
 - Power level: -1.8 to +5.7 dBm
 - Pulse shape: ANSI E1.102-1988 Figure 8
 - Pulse amplitude: 0.36 to 0.85 V peak
 - Loopback modes: Terminal and facility
 - Line build out: 0 to 225 feet, 226 to 450 feet
- Electrical interface: BNC Connectors on high-density EIA

A.2.6 Filler Cards

The 15310-EXP-FILLER card has the following specifications:

- Environmental
 - Operating temperature
I-Temp: –40 to +65 degrees Celsius (–40 to 149 degrees Fahrenheit)
 - Operating humidity: 5 to 85 percent, noncondensing. Operation is guaranteed for 96 hours at 95 percent relative humidity.
- Dimensions
 - Height: 6.93 in. (176 mm)
 - Width: 1.35 in. (34.29 mm)
 - Depth: 9.38 in. (238.25 mm)
 - Card weight (not including clam shell): 0.9 lb (0.45 kg)

The 15310-CTX-FILLER card has the following specifications:

- Environmental
 - Operating temperature
I-Temp: –40 to +65 degrees Celsius (–40 to 149 degrees Fahrenheit)
 - Operating humidity: 5 to 85 percent, noncondensing. Operation is guaranteed for 96 hours at 95 percent relative humidity.
- Dimensions
 - Height: 6.94 in. (167.28 mm)
 - Width: 1.450 in. (36.83 mm)
 - Depth: 8.35 in. (212.09 mm)
 - Weight not including clam shell: 0.51 lb (0.23 kg)

A.3 SFP Specifications

[Table A-2](#) lists specifications for available SFPs that can be used with the 15310E-CTX-K9 card. [Table A-3](#) lists specifications for available SFPs that can be used only with the CE-MR-6 card (ONS 15310-MA only).

The 15310-CL-CTX card does not have a faceplate because it is located inside the chassis; therefore, the two SFP slots are located on the ONS 15310-CL faceplate, just to the left of the LAN port. The two SFP slots on the 15310E-CTX-K9 are located on 15310E-CTX-K9 faceplate.

Table A-2 SFP Specifications

SFP Product ID	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SI-155-L1	OC-3	–5.0 to 0	–34 to –10
ONS-SI-155-L2	OC-3	–5.0 to 0	–34 to –10
ONS-SI-155-I1	OC-3	–15 to –8.0	–28 to –8

Table A-2 SFP Specifications (continued)

SFP Product ID	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SI-622-L1	OC-12	-3.0 to 2.0	-28 to -8
ONS-SI-622-L2	OC-12	-3.0 to 2.0	-28 to -8
ONS-SI-622-I1	OC-12/OC-3	-15 to -8.0	-28 to -8
ONS-SI-155-SR-MM=	OC-3/STM-1	-20 to -14	-30 to -14
ONS-SE-155-1470= through ONS-SE-155-1610=	OC-3	0 to +5	-34 to -3 (at BER 10 ⁻¹⁰)
ONS-SE-622-1470= through ONS-SE-622-1610=	OC-12	0 to +5	-28 to -3 (at BER 10 ⁻¹⁰)
ONS-SI-2G-I1=	OC-48	-5.0 to 0	-18 to -0
ONS-SI-2G-L1=	OC-48	-3 to +2	-27 to -9
ONS-SI-2G-L2=	OC-48	-3 to +2	-28 to -9
ONS-SI-2G-S1=	OC-48	-10 to -3	-18 to -3
ONS-SC-2G-28.7= ¹ through ONS-SC-2G-60.6=	OC-48	0 to +4	-28 to -9
ONS-SE-Z1=	OC-3/STM1 OC-12/STM-4 OC-48/STM-16 Fibre Channel (1 and 2 Gbps) GE	-5 to 0	-18 (OC-48/STM-16) -22 (GE) -23 (OC-12/STM-4) -23 (OC-3/STM-1)
ONS-SI-155-SR-MM=	OC-3, STM-1	-19 to -14	-14 to -5
ONS-SC-155-EL	STM1	—	—

1. ONS-SC-2G-28.7, ONS-SC-2G-33.4, ONS-SC-2G-41.3, ONS-SC-2G-49.3, and ONS-SC-2G-57.3 are supported from Release 8.5 and later.

Table A-3 CE-MR-6 SFP Specifications

SFP Product ID	Interface	Transmitter Output Power Min/Max (dBm)	Receiver Input Power Min/Max (dBm)
ONS-SI-GE-SX	GE	-9.5 to 0	-17 to 0
ONS-SI-GE-LX	GE	-9.5 to -3	-19 to -3
ONS-SI-GE-ZX	GE	0 to 5	-23 to -3
ONS-SI-100-FX	FE	—	—
ONS-SI-100-LX10	FE	—	—
ONS-SE-ZE-EL ¹	E, FE, or GE	—	—
ONS-SE-100-BX10U	FE	-14 to -8	-28.2 to -7
ONS-SE-100-BX10D	FE	-14 to -8	-28.2 to -7

1. Due to mechanical constraints related to the dimensions of the pluggable device, two ONS-SE-ZE-EL copper SFPs cannot be inserted in the same SFP double cage receptacle. They can only be inserted into slots 1 or 2, 3 or 4, and 5 or 6. Upto three ONS-SE-ZE-EL copper SFPs can be inserted in one CE-MR-6 card.

Table A-4 provides cabling specifications for the single-mode fiber (SMF) SFPs that can be used with the ONS 15310-MA CTX-2500. The ports of the listed SFPs have LC-type connectors. **Table A-5** provides cabling specifications for multimode fiber (MMF) SFPs that can only be used with the ONS 15310-MA CTX-2500 card.

Table A-4 Single-Mode Fiber SFP Port Cabling Specifications

SFP Product ID	Wavelength ¹	Fiber Type	Cable Distance
ONS-SI-155-L1 Long Reach	1310 nm	9 micro SMF	50 km (31.07 miles)
ONS-SI-155-L2 Long Reach	1550 nm	9 micro SMF	100 km (62.15 miles)
ONS-SI-155-I1 Intermediate Reach	1310 nm	9 micro SMF	21 km (13.05 miles)
ONS-SI-622-L1 Long Reach	1310 nm	9 micron SMF	42 km (26.10 miles)
ONS-SI-622-L2 Long Reach	1550 nm	9 micron SMF	85 km (52.82 miles)
ONS-SI-622-I1 Intermediate Reach	1310 nm	9 micron SMF	21 km (13.05 miles)
ONS-SE-155-1470 through ONS-SE-155-1610 (CWDM)	1470 nm through 1610 nm, according to the wavelength indicated in the SFP's product ID	9 micron SMF	120 km (74.56 miles)
ONS-SE-622-1470 through ONS-SE-622-1610 (CWDM)	1470 nm through 1610 nm, according to the wavelength indicated in the SFP's product ID	9 micron SMF	100 km (62.14 miles)
ONS-SI-2G-I1	1310 nm	9 micron SMF	15 km (9.3 miles)
ONS-SI-2G-L1	1310 nm	9 micron SMF	40 km (25.80 miles)
ONS-SI-2G-L2	1550 nm	9 micron SMF	80 km (49.71 miles)
ONS-SI-2G-S1	1310 nm	9 micron SMF	2 km (1.2 miles)
ONS-SC-2G-28.7 ² through ONS-SC-2G-60.6 (DWDM) When using ONS-SC-2G-xx.x on CTX-2500 the Cisco ONS 15310-MA operating temperature specification is limited to -5 to +55 degrees Celsius (+23 to +131 degrees Fahrenheit).	1528.77 nm through 1560.60 nm, according to the wavelength indicated in the SFP's product ID	9 micron SMF	N/A ³

1. Typical loss on a 1310-nm wavelength SMF is 0.6 dB/km.
2. ONS-SC-2G-28.7, ONS-SC-2G-33.4, ONS-SC-2G-41.3, ONS-SC-2G-49.3, and ONS-SC-2G-57.3 are supported from Release 8.5 and later.
3. ONS-SC-2G-xx.x cable distance varies depending on DWDM system installation.

Table A-5 *Multimode Fiber SFP Port Cabling Specifications*

SFP Product ID	Wavelength	Fiber Type	Cable Distance
ONS-SI-155-SR-MM= Intermediate Reach	1310 nm	62.5/125 micron MMF	2 km (1.2 miles)