



Technical Specifications

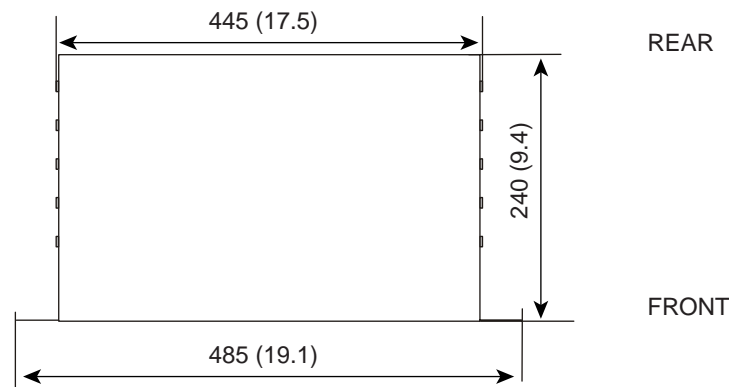
This chapter provides Technical Specifications of the Cisco ONS 15302.

6.1 Mechanical Overview

The equipment is provided as a subrack suitable for mounting within a 485mm (19-in.) and 600mm (23.6-in) equipment cabinet.

Figure 6-1 shows the outer dimensions of the ONS 15302 system equipment.

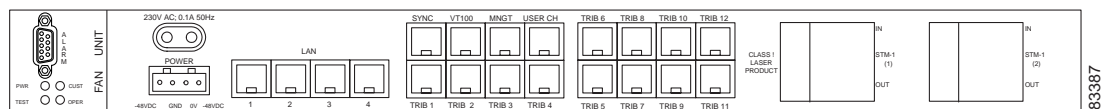
Figure 6-1 Outer Dimensions of the ONS 15302 System



All dimensions are in mm (and in.) 83496

Figure 6-2 and Figure 6-3 display the two different views of the ONS 15302 with the different LEDs and connectors.

Figure 6-2 View of the ONS 15302 with the Connector Array in Front



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Figure 6-3 View of the ONS 15302 with the WAN Module in Front



6.2 Interfaces

The table below show the relationship between the type of interface and the logical names use in this document.

Table 6-1 ONS 15302 Interfaces

| Interface | No. of interfaces | Logical name |
|--------------------|-------------------|---|
| Optical/Electrical | 2 | Aggregate Port |
| Tributary | 12 | Tributary Port |
| Ethernet | 5 | LAN Ports and Management Port |
| (Ethernet) | 4 | WAN ports |
| Alarm | 6 | 4 alarm input and 2 alarm out |
| Synchronization | 1 | Sync Port |
| EIA/TIA 232 | 1 | ONSCLI Port |
| Power supply | 2 | -48V DC and 230V AC |
| User Channel | 1 | User Channel Port |
| Indicators | 8 | 4 Traffic Indicators, Power Indicator, Operator Indicator, Customer Indicator, Test Indicator |

6.3 Light Emitting Diodes (LEDs)

The LED indicators are used to visualize the ONS 15302 status:

Table 6-2 LED Functionality on the WAN Module Side

| Identity | Color | State On | State Flashing | State Off |
|---------------------|--------|--|--------------------------------|---|
| PWR (Power) | Green | Presence of power | NA | Power failure |
| OPER (Operation) | Red | Alarm detected on aggregate interface | NA | No alarm detected on aggregate interface |
| CUST (Customer) | Red | Alarm detected on tributary or LAN interface | NA | No alarm detected on tributary or LAN interface |
| TEST (Test) | Yellow | | One or more test are activated | |

Table 6-2 LED Functionality on the WAN Module Side (continued)

| Identity | Color | State On | State Flashing | State Off |
|----------|-------|-----------------|--------------------|-----------|
| LAN 1 | Green | Link is present | Traffic is present | Link down |
| LAN 2 | Green | Link is present | Traffic is present | Link down |
| LAN 3 | Green | Link is present | Traffic is present | Link down |
| LAN 4 | Green | Link is present | Traffic is present | Link down |

Table 6-3 LED Functionality on the Connector Array Side

| Identity | Position | Color | State On | State Flashing | State Off |
|------------------|----------|--------|--|--------------------------------|---|
| PWR (Power) | | Green | Presence of power | NA | Power failure |
| OPER (Operation) | | Red | Alarm detected on aggregate interface | NA | No alarm detected on aggregate interface |
| CUST (Customer) | | Red | Alarm detected on tributary or LAN interface | NA | No alarm detected on tributary or LAN interface |
| TEST (Test) | | Yellow | | One or more test are activated | |
| LANn (n-1,2,3,4) | Left | Green | 100 Mbits/s (Mbps) | NA | NA |
| LANn (n-1,2,3,4) | Left | Yellow | 10 Mbits/s (Mbps) | NA | NA |
| LANn (n-1,2,3,4) | Right | Green | Link OK | Ethernet traffic in operation | Link down |

6.4 Optical Aggregate Line Interface

The ONS 15302 aggregate line interface is bidirectional with a transmit (Tx) and a receive (Rx) direction. The two fibre variant is a short haul (SH), ITU-T Rec. G.957 S-1.1 compliant variant. The transmission cable can be either Single Mode (SM) or Multi Mode fibre (MM) type.

ONS 15302 is also available in protected variants with duplicated optical interfaces and protection switching logic to maintain traffic in case of fibre faults.

The optical interfaces are located at connector array side and equipped with SC connectors.

Parameters



Note The definitions of optical parameters and reference points S and R refer to ITU-T G.957. Reference point S means transmit direction while R is the receive direction of the fibre.

Table 6-4 Optical Power Budget ONS 15302

| Parameter | Short Haul (S-1.1) | Unit |
|---|--------------------|------------|
| Type of fibre: ITU-T Rec. G.652 | 10/125 | micrometer |
| Type of fibre: ITU-T Rec. G.651 | 50/125 | micrometer |
| IEC 739-2 | 62.5/125 | micrometer |
| Modulation rate on optical line | 155 520 | kbit/s |
| Wavelength range | 1270 to 1335 | nm |
| Transmitter at reference point S | | |
| Source type | MLM | |
| Spectral characteristics (max. RMS width) | 3 | nm |
| Mean launched power (max.) | -8 | dBm |
| Mean launched power (min.) | -12 | dBm |
| Min. extinction ratio | 8.2 | dB |
| Optical path between S and R | | |
| Attenuation range | 0 to 17 | dB |
| Max. tolerable dispersion | 280 | ps/nm |
| Min. optical return loss | NA | |
| Max. discrete reflectance between S and R | NA | |
| Receiver at reference point R | | |
| Min. sensitivity (BER < 1 in 10 ¹⁰) | -30 | dBm |
| Min. overload | 0 | dBm |
| Max. optical path penalty | 1 | dB |
| Max. reflectance at R | NA | |

Factory testing to Power Budget: Mean Launched Power adjusted to -10 dBm. Receiver sensitivity test: Max. signal level -32 dBm at R point at BER < 1 in 10 exp -10. Initial equipment margin: >3 dB.

Table 6-5 Example of Cable Planning for ONS 15302 (Cable Loss)

| Cable Loss, according to ITU-T Rec. G.957 | Single Mode fibre Acc. to ITU-T G.652 | Multi Mode fibre Acc. to ITU-T G.651 |
|---|---------------------------------------|--------------------------------------|
| Fibre Cable Attenuation | 0.5 dB/km | 1.0 dB/km |
| Cable Margin (Mc) | Incl. in | 3 dB |
| Loss in Optical Distribution Frame | Incl. in | 1 dB |

Table 6-6 Example of Cable Planning for ONS 15302 (Cable Dispersion)

| | | |
|--|--------------|--------------|
| Cable Dispersion: | | |
| Maximum Chromatic Dispersion Coefficient | 3.5 ps/nm km | 6 ps/nm km |
| Modal bandwidth | — | 800 MHz km |
| Overall bandwidth (Requirement >80 MHz) | — | 84 MHz (9km) |

Table 6-7 Typical Link Spans for ONS 15302

| ONS 15302 type of fibre | Mode | Loss Limited Span | Dispersion Limited Span | Overall Link Span |
|-------------------------|------|-------------------|-------------------------|-------------------|
| Short-Haul | SM | 34 km | 80 km | 34 km |
| Short-Haul | MM | 13 km | 9 km | 9 km |

Jitter on the Tx optical output signal is lower than the values specified in ITU-T Rec. G.813, (Table 6-8).

Table 6-8 Optical Output Jitter Requirements as given in ITU-T Rec. G.813.

| Filter bandwidth | Jitter limit |
|-------------------|--------------|
| 500 Hz to 1.3 MHz | 0.50 Uipp |
| 65 kHz to 1.3 MHz | 0.10 Uipp |

The input aggregate port tolerates the input jitter and wander specified in ITU-T Rec. G.825, (Table 6-9). This applies in the whole operating optical range of the receiver.

Table 6-9 Maximum Tolerable Input Jitter on the Optical Rx Interface.

| Frequency range | Jitter limit |
|-------------------|---------------------------------------|
| 500 Hz to 6.5 kHz | 1.5 Uipp |
| 6.5 kHz to 65 kHz | Decaying, slope equal to 20 dB/decade |
| 65 kHz to 1.3 MHz | 0.15 Uipp |

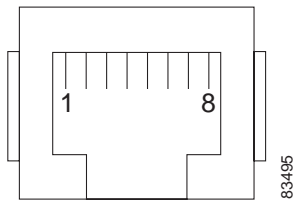
6.5 Tributary Ports

Connectors

The connectors are RJ-45 connectors, with the following pinout

Table 6-10 Pinout Tributary Interface

| Pin | Signal |
|-----|--|
| 1 | RxD+ |
| 2 | RxD- |
| 3 | GND |
| 4 | TxD+ |
| 5 | TxD- |
| 6 | Screen, (the outer screen is always connected to ground) |
| 7 | NC |
| 8 | NC |

Figure 6-4 Tributary 120 Ohm Interface Connector

Parameters

The next tables displays the parameters of the tributary port

[Table 6-11](#) Tributary input jitter parameters is compliant to the ITU-T G.823 02/00 table 16 requirements.

Table 6-11 Tributary Input Jitter Parameters

| Frequency range | Jitter limit |
|-------------------|---------------------------------------|
| 20 Hz to 2.4 kHz | 1.5 Uipp |
| 2.4 kHz to 18 kHz | Decaying, slope equal to 20 dB/decade |
| 18 kHz to 100 kHz | 0.2 Uipp |

[Table 6-12](#) Tributary input reflection loss is complaint to ITU-T G.703

Table 6-12 Tributary Input Reflection Loss

| Frequency range | Reflection loss |
|----------------------|-----------------|
| 51 kHz to 102 kHz | 12 dB |
| 102 kHz to 2048 kHz | 18 dB |
| 2048 kHz to 3072 kHz | 14 dB |

The requirements for output jitter in the absence of input jitter and pointer movements are shown in [Table 6-13](#). The output jitter is complaint to requirements ITU-T G.783.

Table 6-13 Tributary Output Jitter without Pointer Movements

| Filter bandwidth | Jitter output (p-p) |
|-------------------|---------------------|
| 20 Hz to 100 kHz | < 0.25 UI |
| 700 Hz to 100 kHz | < 0.075 UI |

The requirements for output jitter in the absence of input jitter but with pointer movements are shown in [Table 6-14](#). The output jitter is complaint to requirements ITU-T G.783

Table 6-14 Tributary Output Jitter with Pointer Movements

| Filter bandwidth | Jitter output (p-p) |
|-------------------|---------------------|
| 20 Hz to 100 kHz | < 0.4 UI |
| 700 Hz to 100 kHz | < 0.075 UI |

6.6 LAN Ports and Management Port

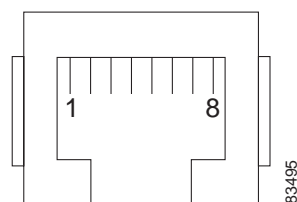
Connectors

The connectors are RJ-45 connectors, with the following pinout:

Table 6-15 Pinout Ethernet Ports

| Pin | Signal |
|-----|--------|
| 1 | TxD+ |
| 2 | TxD- |
| 3 | RxD+ |
| 4 | NC |
| 5 | NC |
| 6 | RxD- |
| 7 | NC |
| 8 | NC |

Figure 6-5 LAN Ports and Management Connector





Note In order to conform to the requirements of EN50081-1 Class B it is recommended to use a STP cable for connection to the Management port. If a UTP cable is used the unit conform to EN50081-1 Class A.

6.7 Alarm Interface

Connectors

The alarm interface connector is a DS-9 connector, with the following pinout

Table 6-16 Pinout Alarm Interface

| Pin | Signal |
|-----|-----------------------|
| 1 | Gnd |
| 2 | Alarm input 1 (aux 1) |
| 3 | Alarm input 2 (aux 2) |
| 4 | Alarm input 3 (aux 3) |
| 5 | Alarm input 4 (aux 4) |
| 6 | Alarm input return |
| 7 | Alarm output 1 |
| 8 | Alarm output return |
| 9 | Alarm output 2 |

Parameters

Table 6-17 Electrical Specification at Alarm Input

| Parameter | Value |
|-----------------------------------|----------|
| Nominal open contact voltage | 3.3 V |
| Nominal closed contact current | 1 mA |
| Maximum closed contact resistance | 0.8 kohm |
| Minimum open contact resistance | 10 kohm |

Table 6-18 Electrical Specification at Alarm Output

| Parameter | Value |
|---|-----------|
| Maximum load bias referred to common return | +/- 75 V |
| Maximum load current | 50 mA |
| Common return to earth | +/- 250 V |
| Maximum contact resistance | 50 ohm |

6.8 Synchronization Port

ONS 15302 has one 2048 kHz synchronization output port and input port.

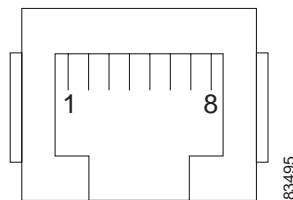
Connectors

Both input and output is provided on 8 pin RJ-45 connector, with the following pinout

Table 6-19 Pinout Synchronization Port

| Pin | Signal |
|-----|---|
| 1 | Sync input + |
| 2 | Sync input – |
| 3 | GND |
| 4 | Sync output + |
| 5 | Sync output – |
| 6 | Screen (the outer screen is always connected to ground) |
| 7 | NC |
| 8 | NC |

Figure 6-6 Synchronization Connector



Parameters

Table 6-20 Synchronization Input Jitter Parameters

| Frequency range | Jitter limit |
|-------------------|---------------------------------------|
| 20 Hz to 2.4 kHz | 1.5 U _{ipp} |
| 2.4 kHz to 18 kHz | Decaying, slope equal to 20 dB/decade |
| 18 kHz to 100 kHz | 0.2 U _{ipp} |

Table 6-21 Synchronization Input Reflection Loss Parameters

| Frequency | Reflection loss |
|-----------|-----------------|
| 2048 kHz | 15 dB |

Table 6-22 Synchronization Output Jitter Parameters

| Filter bandwidth | Jitter output (p-p) |
|------------------|---------------------|
| 20 Hz to 100 kHz | < 0.05UI |

6.9 ONSCLI Port

The ONSCLI Port is accessible from both side of the unit by means of two parallel connectors.

Connectors

The EIA/TIA 232 interface for ONS 15302 is provided using a RJ-45 connector, with the following pinout [Table 6-13](#).

Table 6-23 Pinout CLI Connector

| Pin | Signal |
|-----|---|
| 1 | GND |
| 2 | TxD |
| 3 | RxD |
| 4 | DB_TxD (are only used for debug purposes) |
| 5 | NC |
| 6 | RTS |
| 7 | DB_RxD (are only used for debug purposes) |
| 8 | NC |

Figure 6-7 ONSCLI Port Connector

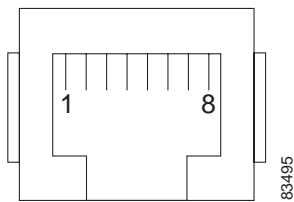


Table 6-24 CLI Connector Pinout (RJ-45 to DS-9)

| RJ-45 Connector | | DS-9 Connector | |
|-----------------|-----|----------------|----|
| Pin 1 | GND | Pin 5 | NC |
| Pin 2 | Tx | Pin 2 | Rx |
| Pin 3 | Rx | Pin 3 | Tx |
| Pin 4 | NC | | |
| Pin 5 | NC | | |

Table 6-24 CLI Connector Pinout (RJ-45 to DS-9) (continued)

| RJ-45 Connector | | DS-9 Connector | |
|-----------------|-----|----------------|-----|
| Pin 6 | CTS | Pin 8 | CTS |
| Pin 7 | NC | | |
| Pin 8 | RTS | Pin7 | RTS |

Pin 4 and 7 are only used for debug purposes.

Parameters

The interface is running at a data rate of 19.200 baud.

6.10 Power Supply

ONS 15302 supports two different power supplies:

- Single phase 230 V 50 Hz AC mains supply
- -48 V DC supply

Connectors

The -48V DC supply input on the ONS 15302 is provided via a 4 pin power connector, with the following pinout [Table 6-25](#).

Table 6-25 Pinout Power Supply Connector

| Pin | Signal |
|-----|------------------|
| 1 | -48V (supply 1) |
| 2 | GND |
| 3 | 0V (-48V return) |
| 4 | -48V (Supply 2) |

The 230V mains supply input on the ONS 15302 is provided via a standard connector according to EN60320.

Parameters

The -48V DC input and the 230V mains input are according to the specifications given in the table below

Table 6-26 Power Supply Parameters

| Parameter | Limit |
|-------------------|---------------|
| Power dissipation | Less than 40W |
| Fuse | 1.5A |

Table 6-26 Power Supply Parameters (continued)

| Parameter | Limit |
|-----------------------|-----------------|
| Battery voltage range | -36 to -72 V DC |
| Mains voltage | 230V AC +/- 10% |

6.11 User Channel

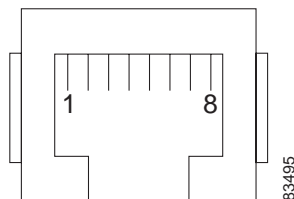
A user channel is provided for transportation of general data. The port is balanced V.11 and support synchronous 64 kBit/s or asynchronous 19.2 kBit/s by configuration.

Connectors

The user channel interface for ONS 15302 is provided using a RJ-45 connector, with the following pinout [Table 6-27](#)

Table 6-27 Pinout User Channel Connector

| Pin | Signal |
|-----|--------|
| 1 | TxD+ |
| 2 | TxD- |
| 3 | RxD+ |
| 4 | TxCLK- |
| 5 | TxCLK+ |
| 6 | RxD- |
| 7 | RxCLK+ |
| 8 | RxCLK- |

Figure 6-8 User Channel Port Connector

6.12 Fan Unit

The main feature of the fan unit is to ventilate the 19"/ 1U cabinet used for ONS 15302. The fan unit is a plug in device consisting of a circuit board with two fans. The air is sucked in via two circular openings in the left sidewall, and emerges via holes in the right side cabinet wall. Two fans are used to improve reliability and give a lifetime of 10 years for this module.



Note Make sure that there is minimum 10 cm free space around the air intake (placed in the left sidewall)

Parameters

Fan operation is shown in the table below. Threshold temperatures are approximate and depend on ventilation conditions.



Note The ventilation holes must not be blocked.

Table 6-28 Fan Operation and Alarm

| Conditions | Behavior | Alarms |
|--|--|------------|
| Ambient temperature below 50 to 60 degrees C | Normal operation | No Alarm |
| Failure of a fan, no fan tray present or fans stopped by obstruction | Trying to start the other fan or no fan is running | FAN alarm |
| Ambient temperature above 50 to 60 degrees C | Fan running on full speed | TEMP alarm |
| Every ~24-hours | Working fan is interleaved with the other fan | |



Note The TEMP alarm will always be cleared if ambient temperature fall below 45 degrees C

6.13 Reliability

The overall error ratio of a tributary channel is better than $10 \exp -10$.

According to MIL-HDBK-217F with a correction factor adjustment related to the following conditions:

- Ground benign
- +35 degrees C ambient temperature
- Stress value 0.5

Table 6-29 Reliability

| Equipment | MTBF [Years] |
|--------------------------------|--------------|
| ONS 15302 non-redundant optics | 40 |
| ONS 15302 redundant optics | 47 |

