



## QUICK START GUIDE

### Fiber OLT and ONT

Release 1.1.1



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# Introduction

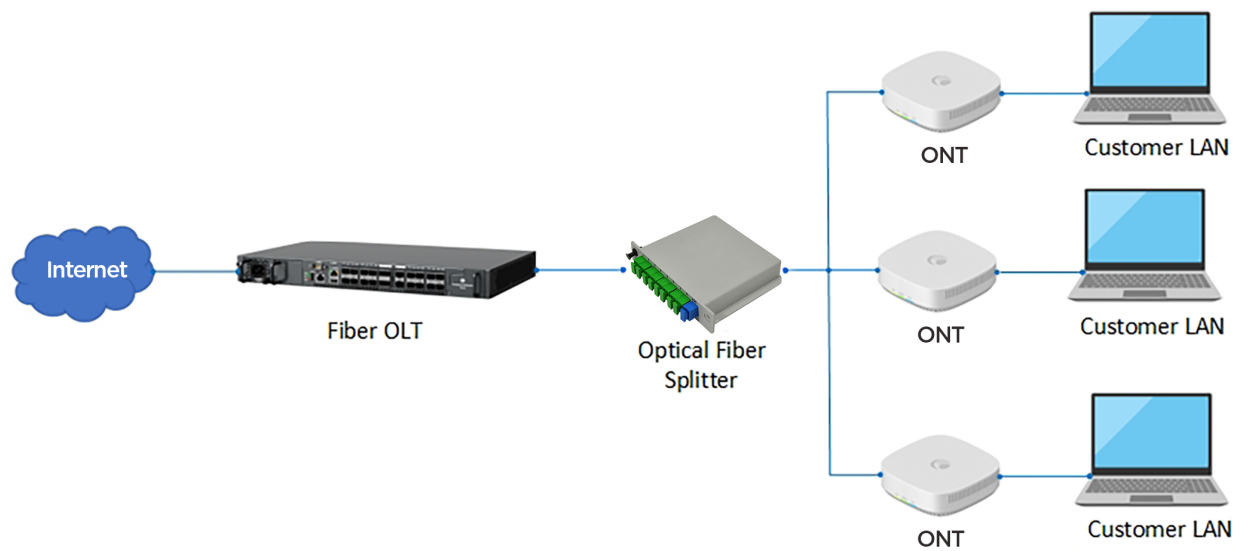
Fiber Optical Line Terminal (OLT) from Cambium Networks is a Passive Optical Network (PON), which connects to a core switch by an Ethernet cable or a fiber cable.

The primary functions of Fiber OLT are:

- To convert, frame and transmit, and receive signal for the Passive Optical Network (PON), 10-Gigabit Symmetrical Passive Optical Network (XGS-PON), and combo-PON networks
- To coordinate the Optical Network Terminals (ONT) multiplexing for the shared upstream transmission

Figure 1 is an example of the PON network architecture.

Figure 1: The PON network architecture



## The All-In-One (AIO) PON technology

Fiber OLT has the AIO PON port capacity to support multiple ITU-T PON technologies such as Gigabit Passive Optical Network (GPON), XGS-PON, and Combo-PON (GPON co-existing with XGS-PON). Fiber OLT supports eight AIO PON ports and each AIO PON port can be configured individually to use different downlink technology.

# Product Description

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Fiber OLT is a GPON, XGS-PON, and Combo PON (GPON co-existing with XGS-PON) Optical Defined Networking (ODN) access OLT. Its high-performance access design focuses on SDN deployments. It provides an open interface to all control management functions for an easy integration with an SDN environment.

Fiber OLT includes eight AIO PON interfaces to support multiple PON technologies, simultaneously. It is used to develop the network with GPON using User Network Interface (UNI) ports. Fiber OLT is a part of the GPON solution network used for delivering broadband data , high-quality voice, and IP television through the following devices:

- Fiber to the curb (FTTC) connections for standalone VDSL Outside Plant (OSP) Multi-Dwelling Unit (MDU) devices.
- Fiber to the building (FTTP) or neighborhood (FTTN) connections for chassis-based MDU devices.
- Fiber to the home (FTTH) connections for ONT subscriber devices.

The carrier-grade, temperature-hardened compact hardware design of Fiber OLT provides service providers deployment flexibility for diverse environments. With this design, you can create network, achieve market goals of Fiber OLT, and satisfy future network needs.

Fiber OLT with the temperature-hardened hardware has the following design features:

- Redundant AC or DC power module options
- A resilient 4+1 fan module with side-to-side and left-to-right airflow
- 260 mm depth
- All front access interfaces allow flexible installation, ranging from data centers to street-cabinets in remote locations.

This topic contains the following sections:

- [Front panel view of OLT](#)
- [Front panel view of ONTs](#)

## Fiber OLT

Figure 2 shows the front panel view of Fiber OLT.

Figure 2: Front panel view of Fiber OLT

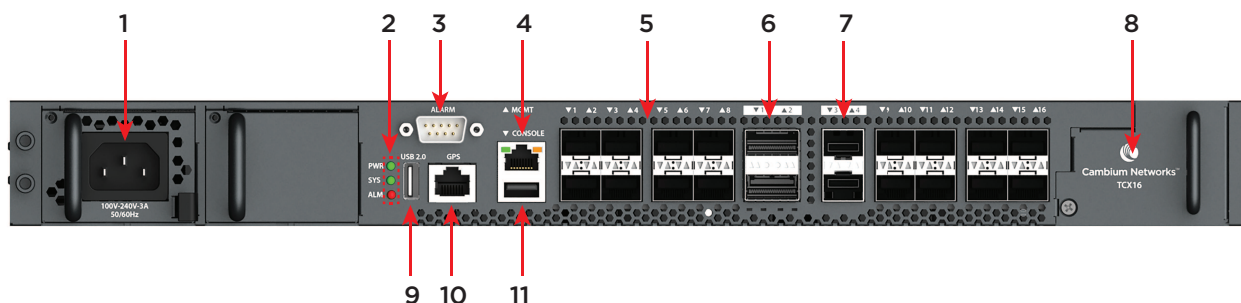


Table 1 lists and describes the components of Fiber OLT.

Table 1: Fiber OLT components

Item	Component	Description
1	Dual Power Modules	<p>Dual power module slots are used for redundancy. Connect AC/DC power sources to the modules.</p> <p><b>AC power module</b></p> <p><b>Operating voltage:</b> 100 to 240 VAC, 50/60 Hz 3.5 Amps maximum.</p> <p><b>Fuse:</b> T6.3A 250 VAC.</p> <p><b>DC power module</b></p> <p><b>Operating voltage:</b> -38.4 to -72 V DC, normal -48 V input. There is no tolerance for the DC input voltage.</p> <p><b>Maximum DC input current:</b> 290 Watts; 7.56 Amps at -38.4 V DC.</p> <p><b>Fuse:</b> T10A 250 VAC.</p>
2	LEDs	Indicates the status of the system.
3	Alarm	Use this male 9-pin external alarm input/output connector to connect mechanical cabinet parts with the management networks for remote monitoring.
4	Management port	Use an Ethernet cable to connect the system to the RJ-45 out-band management port for local configuration.
5	1-16 AIO PON Downlink	16 AIO PON SFP+ slots, each slot supports a GPON, XGS-PON, or Combo-PON (GPON co-existing with XGS-PON) transceiver.
6	1-2 (QSFP28 Uplink)	Two QSFP28 slots. Each supporting 1 x 100 GbE or 1 x 40 GbE.
7	3-4 (SFP28 Uplink)	Two SFP28 slots. Each supporting 1 x 25 GbE or 1 x 10 GbE.

Item	Component	Description
8	Swappable fan module	Swappable fan module to reduce the heat inside the Fiber OLT.
9	USB port 2.0	Use USB disk with this USB 2.0 interface to upgrade software and transfer files to the Type-7 COM Express module.
10	GPS	Reserved for future use. One RJ-45 (RS422) connector used to connect a GPS receiver to provide Time-of-Day (ToD) and 1 Pulse-per-second (1 pps) timing information.
11	Console	Use an USB type A cable to connect the system for local serial configuration.

shows specifications for Fiber OLT.

Specification	Description
Wire gauge specifications	<b>Ground wires:</b> 18 AWG or larger (for multicore cables). <b>Power wires:</b> 16 AWG or larger.
Operating environment	<b>Temperature:</b> -40°C to +65°C (-40°F to +149°F).



#### Note

The 1-16 AIO interface is applicable to 16-port OLT and the 1-8 AIO interface is applicable to 8-port OLT.

For more information, refer to the *Fiber OLT and ONT User Guide*.

## PON Ports

Fiber OLT is provided with 8 PON (Downstream) SFP ports (1 through 8) and 16 PON (Downstream) SFP ports (1 through 16). These ports can be used with PON, XGS-PON, and combo-PON technology.

## Characteristics of GPON

The following are the characteristics of GPON:

- Data rate of 1.244 Gbps in upstream
- Data rate of 2.48 Gbps in downstream
- Maximum split ratio of 1:128
- AES-128 bit encryption downstream (upstream not supported)
- Rogue ONT detection
- Forward Error Correction (FEC) downstream and upstream
- PON detection type B
- Supports up to 1024 GPON T-CONT/Alloc-ID per PON port
- Supports up to 4096 GPON GEM port-IDs per PON port

## Characteristics of XGS-PON

The following are the characteristics of XGS-PON:

- Data rate of 10 Gbps (9953 Mbps) upstream
- Data rate of 10 Gbps (9953 Mbps) downstream
- Maximum split ratio of 1:256
- AES-128 bit Encryption downstream and upstream
- Rogue xONT detection
- FEC downstream and upstream
- PON port protection type B
- Supports 2048 T-CONT/Alloc-ID per PON port
- Supports up to 8192 XGEM port-IDs per PON port

## NNI Ports

Fiber OLT is equipped with two QSFP28 ports and other two SFP28 NNI (upstream) ports for fiber. These ports connectivity and are intended for use with SFP modules (recommended by Cambium Networks).

### Characteristics of NNI ports

The following are the characteristics of NNI port:

- 2 x QSFP28 ports support:
  - 1 x 100 GbE
  - 1 x 40 GbE
  - 4 x 25 GbE (through breakout cable )
  - 4 x 10 GbE (through breakout cable )
- 2 x SFP28 ports support:
  - 1 x 25 GbE
  - 1 x 10 GbE
- Option to use some of the uplink interfaces for sub-tending to co-located OLT devices
- QSFP28 or SFP28 port supports FEC capabilities

## An alarm interface

An alarm interface is a 9 pin D-type connector that provides external communication with other devices to generate alarms. [Figure 3](#) shows the pin assignment of the alarm port. [Table 2](#) and [Table 3](#) describe the pins and descriptions.

Figure 3: Pin assignments of alarm port

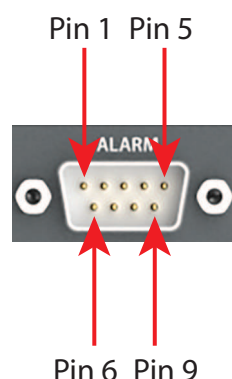


Table 2: Alarm input pin assignments

Alarm input	Description
1	An open circuit for pins 3 and 7 indicating that there is no alarm on the connected device. Fiber OLT registers an alarm when the connected device closes the circuit.
2	An open circuit for pins 3 and 8, indicating that there is no alarm on the connected device. Fiber OLT registers an alarm when the connected device closes the circuit.
3	An open circuit for pins 4 and 9, indicating that there is no alarm on the connected device. Fiber OLT registers an alarm when the connected device closes the circuit.
4	An open circuit for pins 4 and 5, indicating that there is no alarm on the connected device. Fiber OLT registers an alarm when the connected device closes the circuit.

Table 3: Alarm output pin assignments

Alarm output	Description
Alarm out asserted	Fiber OLT closes the circuit for pins 2 and 6 to indicate an alarm status to a connected device or piece of equipment.
Alarm out deasserted	Fiber OLT closes the circuit for pins 1 and 6 to indicate a no-alarm status to a connected device or piece of equipment.

## The GPS interface

The GPS interface enables the Fiber OLT to connect to an external GPS device. It is also used to monitor the geographical location of the Fiber OLT. [Table 4](#) describes the GPS port pins and corresponding descriptions. An RJ-45 (RS422) connector is used to connect a GPS receiver to provide Time-of-Day (ToD) and 1 Pulse-per-Second (1pps) timing information, which is reserved for future use. [Figure 4](#) shows the GPS connector pin layout.

Figure 4: GPS interface

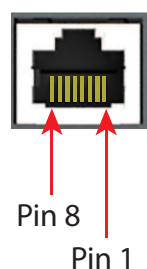


Table 4: GPS connector pin details

PIN number	Signal name	Description
1	Data out N	Reserved.
2	Data out P	Reserved.
3	Sync in N	Gets 1 PPS information through GPS antenna.
4	GND	Connects to ground.
5	GND	Connects to ground.
6	Sync in P	Gets 1 PPS information through GPS antenna.
7	Data in N	Gets ToD information through GPS antenna.
8	Data in P	Gets ToD information through GPS antenna.

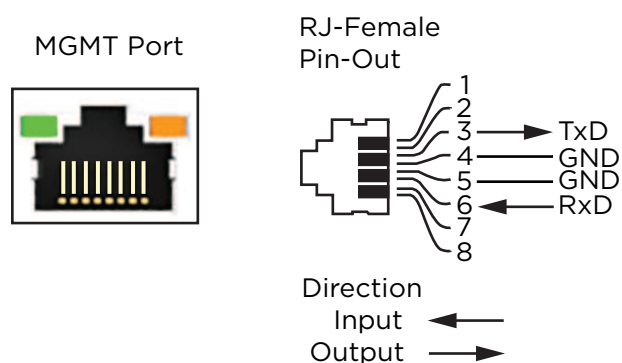
## The USB 2.0 interface

The USB 2.0 interface in the front panel is for the x86 module, and is used for backing up and uploading configuration files.

## The management interface

The management interface is an out-band management 100/1000-baseT Ethernet port (RJ45). It is used for local management and can be connected directly using an Ethernet cable. The default out-band IP address of the management port is 192.168.0.1 with a subnet mask of 255.255.255.0. [Figure 5](#) shows the management port.

Figure 5: The Management interface

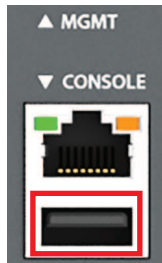




## The console port

The USB console port provides a serial console access. Use a USB console port cable provided with the Fiber OLT package to connect the console port to a USB port on the system. [Figure 6](#) shows the console port of the Fiber OLT.

[Figure 6:](#) *The Console port*



For the local management, use a system with terminal emulation software configured with the following parameters:

- VT100
- Terminal emulation
- 115200 bps
- No parity, 8 data bits, 1 stop bit
- No flow control
- UTF-8.

## Light Emitting Diodes (LEDs)

Three LED indicators are provided on the front panel of Fiber OLT to indicate the Power status (PWR), System Status (SYS), and an Alarm (ALM). [Figure 7](#) shows the LEDs in Fiber OLT. [Table 5](#) describes the system LED indications and their status.

[Figure 7:](#) *LEDs in Fiber OLT*



Table 5: Cambium Fiber OLT - LED indications

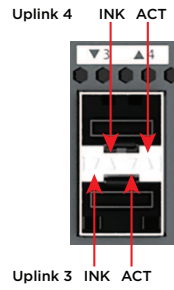
LED	Color	Status	Description
PWR	Green	ON	The power is ON.
		OFF	The power is OFF or there is a power failure.

LED	Color	Status	Description
SYS	Green	ON	Device is ON and it is functioning.
		Blinking	Device is booting.
		OFF	Device is not ready or failed.
ALM	Red	ON	Hardware failure is detected or an external alarm is received.
		OFF	Device is functioning normally.
Uplink 1 and 2	Green	ON	Uplink interfaces 1 and 2, each has four parallel data transmission lanes. Uplink interface 1 has lanes 0-3 when starting from 0 or 1-4 when starting from 1. Uplink interface 2 has lanes 4-7 when starting from 0 or 5-8 when starting from 1. Each lane has an LED that displays the uplink state. The lane is linked up, as shown in <a href="#">Figure 8</a> .
		OFF	The lane is not linked up.
Uplink 3 and 4 Link	Green	ON	Uplink interfaces 3 and 4, each has a link (LNK) LED and an activity (ACT) LED. A 25 GbE or 10 GbE link is up, as shown in <a href="#">Figure 9</a>
		OFF	The Ethernet link is down.
Uplink 3 and 4 Activity	Green	Blinking	The interface is transmitting or receiving Ethernet traffic.
		OFF	The interface is not transmitting or receiving Ethernet traffic.
PON 1-16	Administrative status - Green (Left)	ON	Port is enabled.
		OFF	Port is administratively disabled or no link.
	Port status - Green (Right)	ON	Link is established.
		Blinking	Port is transmitting or receiving data.
		OFF	No link is established.
MGMT	Green (Left)	Blinking	The port is transmitting/to or receiving from an Ethernet device.
		ON	The port is connected at 1000 Mbps.
		OFF	The port is not connected at 1000 Mbps or to an Ethernet device.
	Amber (Right)	Blinking	The port is transmitting/to or receiving from an Ethernet device.
		ON	The port is connected at 100 Mbps.
		OFF	The port is not connected at 100 Mbps or to an Ethernet device.

Figure 8: Uplink 1 and 2 lane LEDs



Figure 9: Uplink 3 and 4 LNK and ACT LEDs



# Cambium Fiber ONTs

Cambium Fiber ONTs terminate an Optical Access Network (OAN) providing a subscriber port intended for a single subscriber. This topic contains the following sections:

- [Indoor ONT](#)
- [Outdoor ONT](#)
- [Interfaces of indoor ONT](#)
- [Interfaces of outdoor ONT](#)
- [LEDs on ONT](#)

## Indoor ONT

Figure 10 shows the front view of indoor ONT.

Figure 10: Front view of indoor ONT

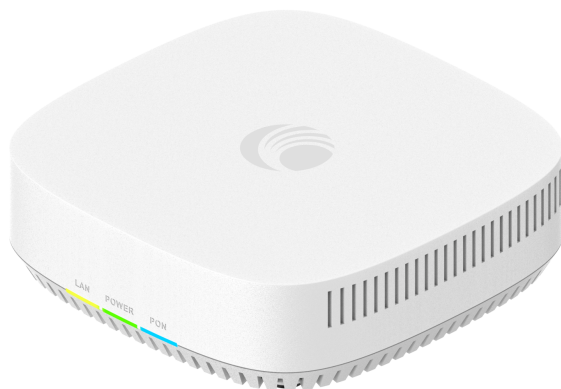


Figure 11 shows the rear view of the indoor ONT.

Figure 11: Rear view of indoor ONT

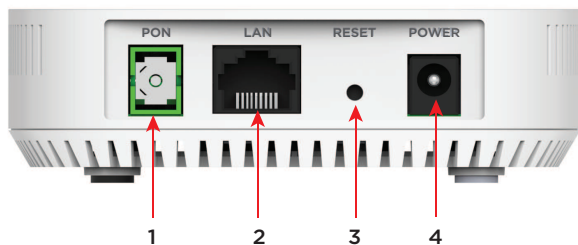


Table 6: Fiber indoor ONT components

Ports	Component	Description	
		GPON ONT (SGX Series)	XGS-PON ONT (SXX Series)
1	PON	GPON	XGS-PON
2	LAN	1 Gigabit Ethernet	2.5 Gigabit Ethernet

Ports	Component	Description	
		GPON ONT (SGX Series)	XGS-PON ONT (SXX Series)
3	RESET	Reset button	Reset button
4	POWER	Power button	Power button

Outdoor ONT

Figure 12 shows the front view of outdoor ONT.

Figure 12: Front view of outdoor ONT



Figure 13 shows the ports of outdoor ONT.

Figure 13: Outdoor ONT ports

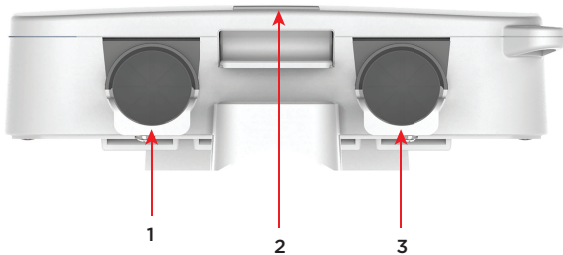


Table 7: Fiber outdoor ONT interfaces

Ports	Interfaces	Description	
		GPON ONT (SGT Series)	XGS-PON ONT (SXT Series)
1	PoE Ethernet Port	Power over Ethernet (PoE)	Power over Ethernet (PoE)
2	RESET	Reset button	Reset button
3	PON port	GPON	XGS-PON

## LEDs on ONT

Three LED indicators are provided on the front panel of ONTs to indicate the status of power, PON, and LAN. [Table 8](#) describes the system LED indications and the status of GPON ONT.

Table 8: System LED indications for GPON ONT

LED	Color	Status	Description
POWER	Green	ON	The power is ON.
		OFF	The power is OFF or there is a power failure.
		Blinking	Booting.
PON	Blue/Red	Blue ON	PON link to O5 (Operational).
		Blue OFF	PON link down or no link is connected.
		Blue blinking	PON is attempting to link.
		Red ON	Optical transmitter of the device is powered off.
		Red blinking	Received optical power of the device is lower than the optical receiver sensitivity.
LAN	Green/Red	Green ON	1G link is up.
		Green OFF	Link is down.
		Green blinking	Indicates traffic.
		Red ON	10M/100M link is up.
		Red OFF	Link is down.
		Red blinking	Indicates traffic.

[Table 9](#) describes the system LED indications and the status of XGS-PON ONT.

Table 9: System LED indications for XGS-PON ONT

LED	Color	Status	Description
POWER	Green	ON	The power is ON.
		OFF	The power is OFF or there is a power failure.
		Blinking	Booting.
PON	Blue/Red	Blue ON	PON link to O5 (Operational).
		Blue OFF	PON link down or no link is connected.
		Blue blinking	PON is attempting to link.
		Red ON	Optical transmitter of the device is powered off.
		Red blinking	Received optical power of the device is lower than the optical receiver sensitivity.
LAN	Green/Red	Green ON	1G/2.5G link is up.
		Green OFF	Link is down.
		Green blinking	Indicates traffic.
		Red ON	10M/100M link is up.
		Red OFF	Link is down.
		Red blinking	Indicates traffic.



# Installation of OLT and ONTs

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This topic explains about the installations procedures of Fiber OLT and ONTs.

This topic contains the following sections:

- [Installing the OLT](#)
- [Installing the ONTs](#)

## Installing the OLT

This section explains the installation procedures of the Fiber OLT hardware appliance using the available mounting options. Fiber OLT is shipped with an accessory kit that includes the equipment needed to install the OLT in a standard, 19-inch Telco rack.

Installing Fiber OLT involves the following procedures:

- [Taking safety precautions](#)
- [Selecting a location](#)
- [Rack mounting](#)
- [Using required tools and equipment](#)
- [Installing Fiber OLT](#)
- [Connecting/Disconnecting the AC power cord](#)
- [Installing a transceiver](#)
- [Connecting a fiber optic cable](#)

## Taking safety precautions

Before installing Fiber OLT, take the following safety precautions:

- Ensure that the rack is correctly and securely installed to prevent it from falling or becoming unstable.
- Dangerous voltage above 240V AC is always present while the power supply module is plugged into an electrical outlet. Remove all rings, jewelry, and other potentially conductive material before working with this device.
- Never insert foreign objects into the chassis, power supply, or any other component even when the power supply is turned OFF, unplugged, or removed.
- Ensure that the main power is fully disconnected from the equipment by unplugging all power cords from their outlets. For safety, verify that the power outlets and plugs are easily reachable by the operator.
- Do not handle electrical cables, which are not insulated including network cables.
- Keep water and other fluids away from the equipment to minimize electrical hazards.

- Comply with electrical grounding standards during all phases of installation and operation of the product. Do not allow the equipment chassis, network ports, power supply, or mounting brackets to contact any device, cable, object, or person attached to a different electrical ground. Also, do not connect the device to external storm grounding sources.
- Perform installation or removal of the chassis or any module in a static-free environment. Proper use of anti-static body straps and mats are strongly recommended.
- Installation must be performed by a trained professional. Use only included/recommended cables, power cords, AC power supplies, and batteries. The power cord should not be used with other electric equipment other than specified by Cambium Networks.
- The product module must be kept in anti-static packaging when it is not installed in the chassis.
- Do not ship or store this product near strong electromagnetic, electrostatic, magnetic, or radioactive fields.
- Do not disassemble the chassis.

## Selecting a location

Consider the following criteria while selecting a location before installing Fiber OLT:

- **Reliable power** - Ensure that the electrical outlet is compatible with Fiber OLT (from Cambium Networks).
- **Cool, non-condensing ventilation** - For proper operation, Fiber OLT requires an environment with an ambient air temperature between 0° C and 40° C (32° F and 104° F). Humidity must be kept at non-condensing levels, between 5% and 95%. If a large number of electrical devices are working in the same area, then additional air conditioning or air circulation equipment may be required.
- **Ample space** - For proper air circulation, leave at least 10 cm (4 inches) clearance all around the chassis. Leave additional space in front of the chassis to access power cords, network cables, and indicator LEDs.
- **Limited electromagnetic interference** - For the best operation, keep Fiber OLT, all cords, and cables at minimum 0.7 meters (2 feet) from fluorescent lighting fixtures, and 2 meters (6 feet) from photocopiers, radio transmitters, electric generators, and other sources of strong electromagnetic interference.



### Attention

The qualified service personnel is required to install Fiber OLT in a restricted access area, such as basement of the building or telco room.

## Rack mounting

The Fiber OLT package (from Cambium Networks) includes a rack mounting option. This mounting option allows to mount Fiber OLT on two post 19-inch Telco rack. Use the rack mounting kit and the directions to mount Fiber OLT on an EIA standard size, 19-inch rack or in a wiring closet with other equipment.



### Caution

All installation methods must be in accordance with national and local regulations and practices.

## Using required tools and equipment

Use the following tools and equipment to install Fiber OLT:

- Mounting bracket (x 2), which is included in the kit: Do not use it for table or shelf installation.
- Screws for mounting bracket (x 4): M3 x 6.5 mm Phillips Flat Head Screws (included in the kit).
- Screws for system rack mount (x 4): M6 x 15 mm Phillips Pan Head Screws (included in the kit).
- Suitable Phillips head screwdrivers for all screw types provided in the box (not included in the kit).



### Note

Some racks may require different screws other than the ones included in the kit. Ensure that you have the correct screws before installing Fiber OLT.

## Installing Fiber OLT

This section explains how to install Fiber OLT, connect the power chord, install a transceiver, and connect cables.

### Prerequisites

Consider the following prerequisite tasks before installing Fiber OLT:

- Ensure that the rack can safely support the combined weight of all the equipment.
- Take all necessary precautions to secure the rack before installing the unit. Ensure that the position of Fiber OLT does not make the rack unstable or top-heavy.
- Do not connect any power supplies to Fiber OLT.

### Installation

Perform the following steps to install Fiber OLT on a two post 19-inch Telco rack:

1. Position a mounting bracket on one side of Fiber OLT. Then, align the screw holes on the bracket and the mounting holes on Fiber OLT.



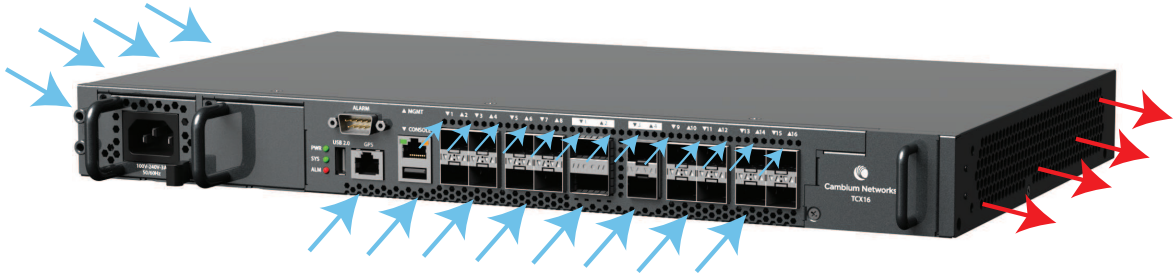
2. Using a #2 Philips screwdriver, install the 4 x M3 flat head screws through the mounting bracket holes into Fiber OLT.
3. Repeat Step 1 and Step 2 to install the second mounting bracket on the other side of Fiber OLT.



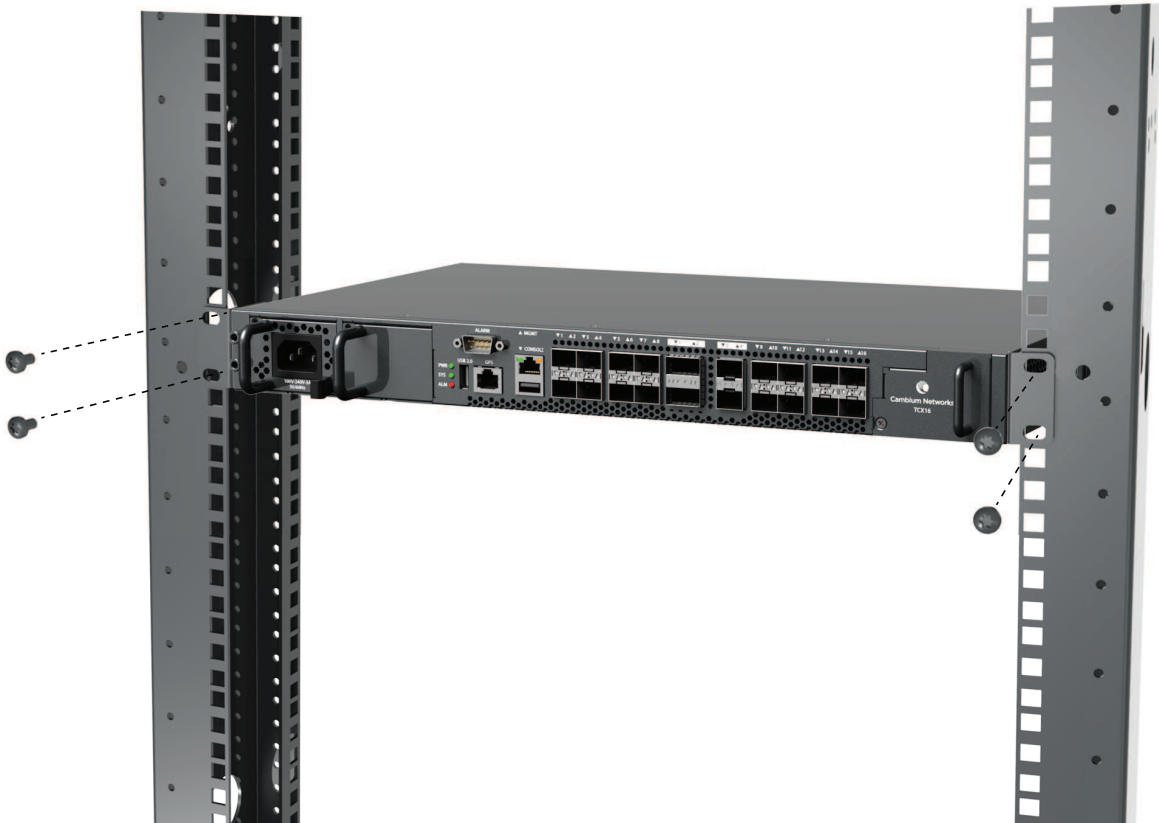
#### Note

Leave a minimum of 10 cm (4 inches) of space on the front, left, and right sides of the equipment for proper airflow and ventilation. Leave additional space at the front of Fiber OLT to access network cables, LED status indicators, and power cords.

Ensure that there are no obstructions to limit the airflow for the left and front side of the unit and the right side exhaust.



4. Use the four screws to install Fiber OLT on the rack.



#### Attention

Two persons are required to mount and secure Fiber OLT on the rack. One person needs to hold Fiber OLT in place, and another person must insert and tighten the screws.

## Grounding

Connect the frame ground of Fiber OLT to a protective earthing terminal to protect against lightning and electrical interference.



### Attention

Qualified service personnel must confirm that the protective earthing terminal is a valid terminal.

Perform the following steps to ground Fiber OLT:

1. Remove one of the M4 ground screws from the front panel of Fiber OLT.
2. Secure the green/yellow ground cable to the front panel of Fiber OLT using the M4 ground screw.
3. Attach other end of the cable to the ground, either to the same ground electrode as the rack where the device is installed or to the main grounding electrode of the building. If suitable grounding is not available, contact the appropriate electrical inspection authority or an electrician.



### Warning

Connect the frame ground before connecting any other cables or wires.

## Connecting/disconnecting the AC power cord

After the installation is complete, power on the device. The device is not equipped with an ON/OFF switch and powers on when the AC power cord is connected to the AC inlet and an AC power outlet. The AC power module has higher priority than the DC power module. When AC and DC power modules are connected simultaneously, the AC power module supplies power to the device. It supports up to two AC power modules and AC + DC power supply combination.

The Power module position is not fixed and either AC or DC power module can be installed on left or right power module slots. The AC power input can be monitored by the I2C to the CPU. It has hot-swappable redundant power modules of 100 VAC to 240VAC single phase, and operates from 50 Hz to 60 Hz.

## Connecting the AC power cord

Perform the following steps to connect the AC power cord to Fiber OLT:

1. Plug in the AC power cord female connector to Fiber OLT power in socket.
2. Insert the three pin AC power cord into the AC power connector on the wall socket.
3. Ensure both the ends of AC power cord are firmly fixed with socket.
4. Power on the wall socket and the device receives the power.

## Disconnecting the AC power cord

Perform the following steps to disconnect the AC power cord from Fiber OLT:

1. Switch off the power source in a socket.
2. Lift the power cord retaining clip off the AC power cord.
3. Pull the AC power cord from the power supply module.

The device turns off.

## Installing a transceiver

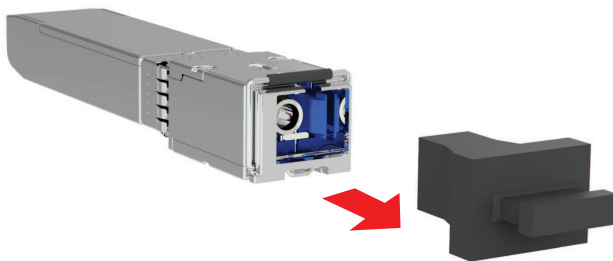


### Warning

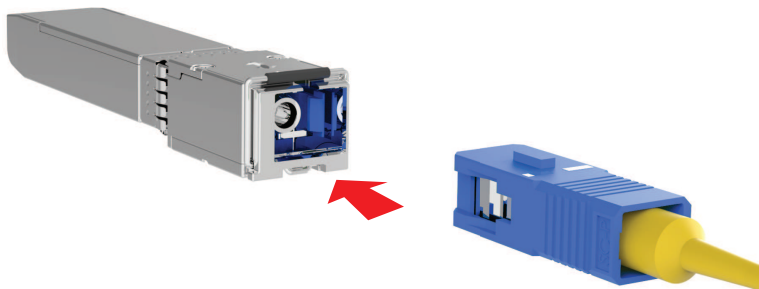
- Avoid looking directly into the ends of Fiber OLT or the SFP modules. This can severely damage your eyes.
- Do not remove the protective caps from the fiber cables or the SFP modules to ensure the connections stay clean.

Perform the following steps to install SFP or SFP+ module in a slot:

1. Remove the dust cover from the transceiver.



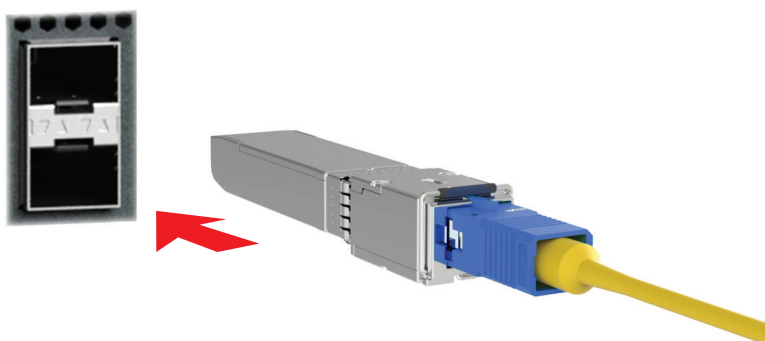
2. For transceivers with a flip-up or flip-down latch, close the latch.
3. Insert the fiber optic cable into the transceiver.



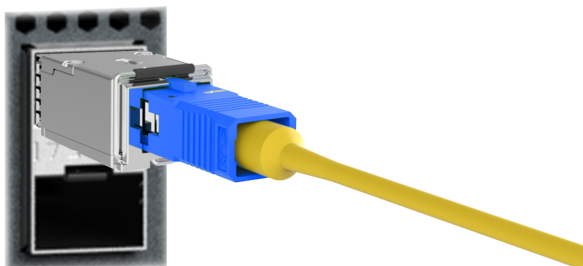
**Note**

You may need to remove a cable dust cover.

4. Insert the transceiver into the slot.



5. Press the transceiver firmly until it fits in its place.

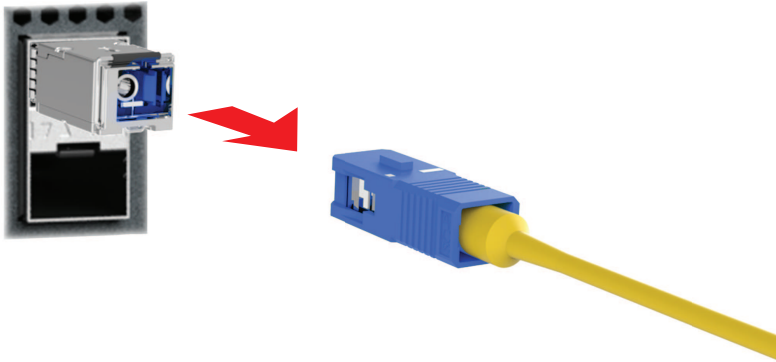




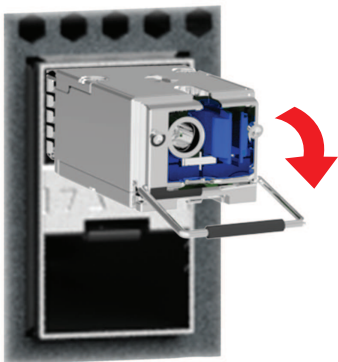
## Removing a transceiver

Perform the following steps to remove an SFP or SFP+ from a slot:

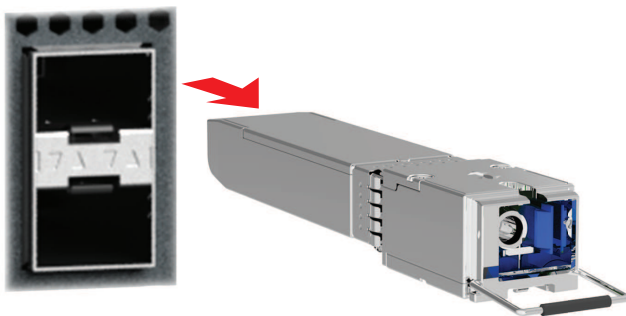
1. Remove the fiber optic cable from the transceiver.



2. Unlock the transceiver latch.



3. Pull the transceiver's out of the slot.



4. Put the transceiver dust cover on the transceiver.

## Connecting a fiber optic cable

Perform the following steps to connect a fiber optic cable to an SFP module:

1. Clean the fiber optic cable connector before inserting it into the SFP module.
2. Insert the fiber optic cable into the SFP module. Ensure that the latch on the cable faces the top of the SFP module.
3. Slide the cable into slot until it is connected, and an audible sound is heard.



## Disconnecting a fiber optic cable

To disconnect the fiber optic cable, depress the transceiver handle to release the latch on the cable and pull the cable out of the port, simultaneously.

## Installing the ONTs

This section explains the installation procedures of ONTs hardware appliance using available mounting options. ONT is shipped with an accessory kit that includes the equipment required to install the ONTs.

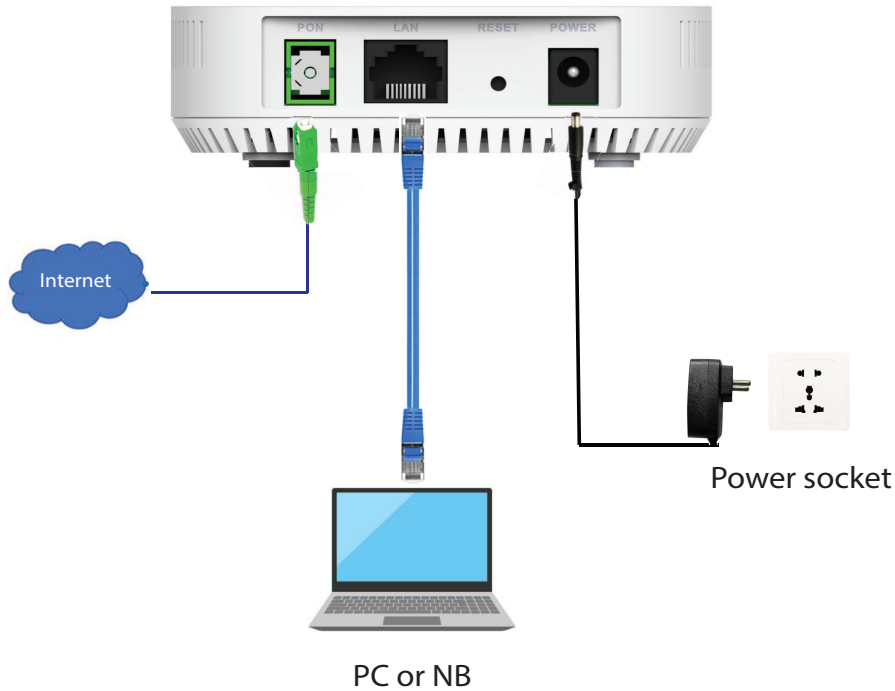
This topic contains the following sections:

- [Installing the indoor ONT](#)
- [Installing the outdoor ONT](#)

## Installing the indoor ONT

Perform the following steps to install the indoor ONT:

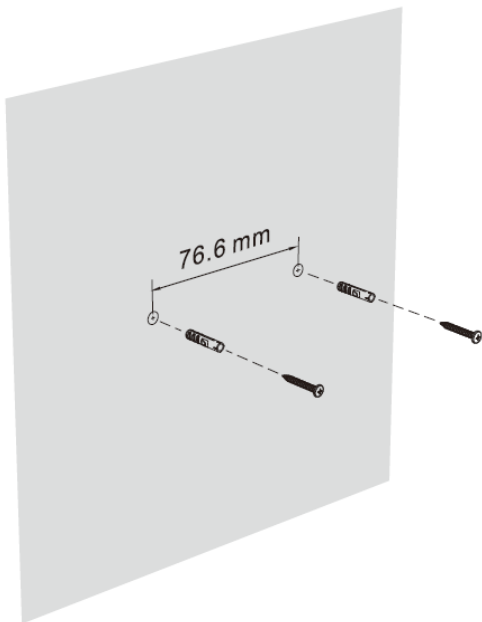
1. Connect internet to the PON port.
2. Connect PC to the LAN port.
3. Connect power socket to the power port.



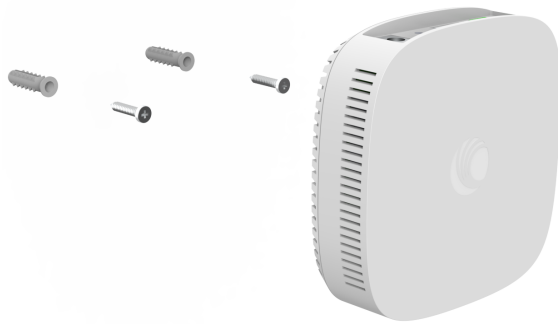
## Wall mounting

Perform the following steps to mount the indoor ONT on the wall:

1. Make two holes on the wall. The gap between the holes must be 76.6 mm.
2. Insert the PE 6.5 x 35 anchors.
3. Insert the M4 x 32 mm screws into the anchors.



4. Hang the ONT on the wall.



## Installing the outdoor ONT



### Attention

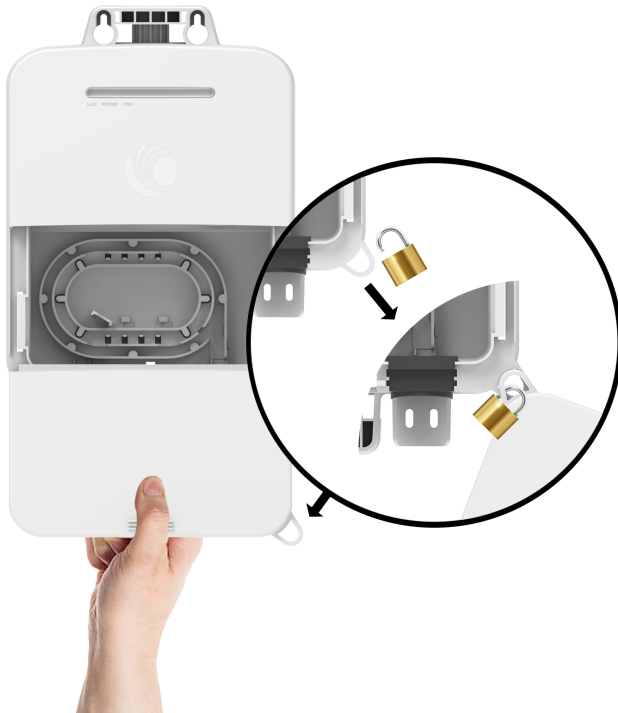
1. Skilled personnel are required to install the outdoor ONT.
2. The equipment should be installed in locations that are not accessible by children.
3. This product is intended to be supplied by a PoE power supply or DC power source marked with **L.P.S. (Limited Power Source)**, rated 30 Vdc, 0.5 A minimum, Tma = 50 degree C minimum, Altitude 3000 m minimum.
4. The mains of power cord of adapter should be connected to a socket-outlet with earthing connection.

Perform the following steps to install outdoor ONT:

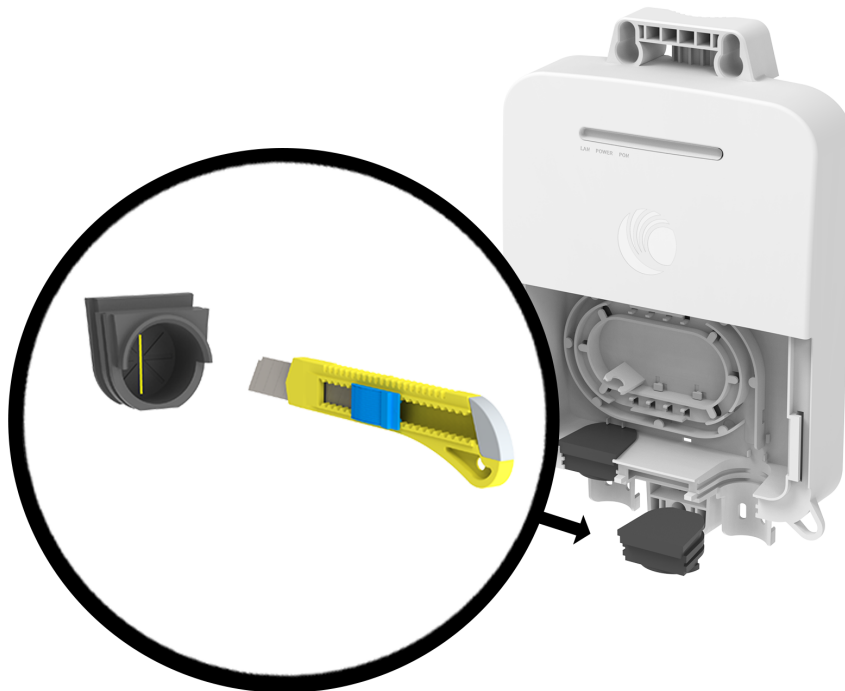
1. Mount the device on a wall with three M4 x 32 mm screws.



2. Slide off the cover and hold it with the main body by a lock.



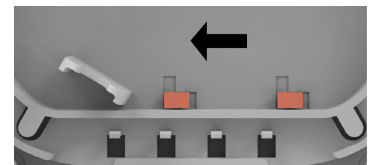
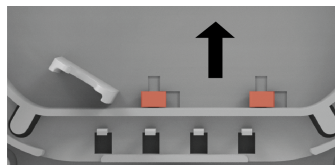
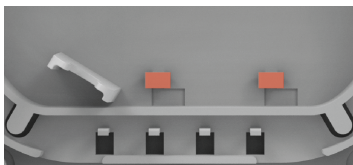
3. Pull up the rubber grommet and cut it with a utility knife.



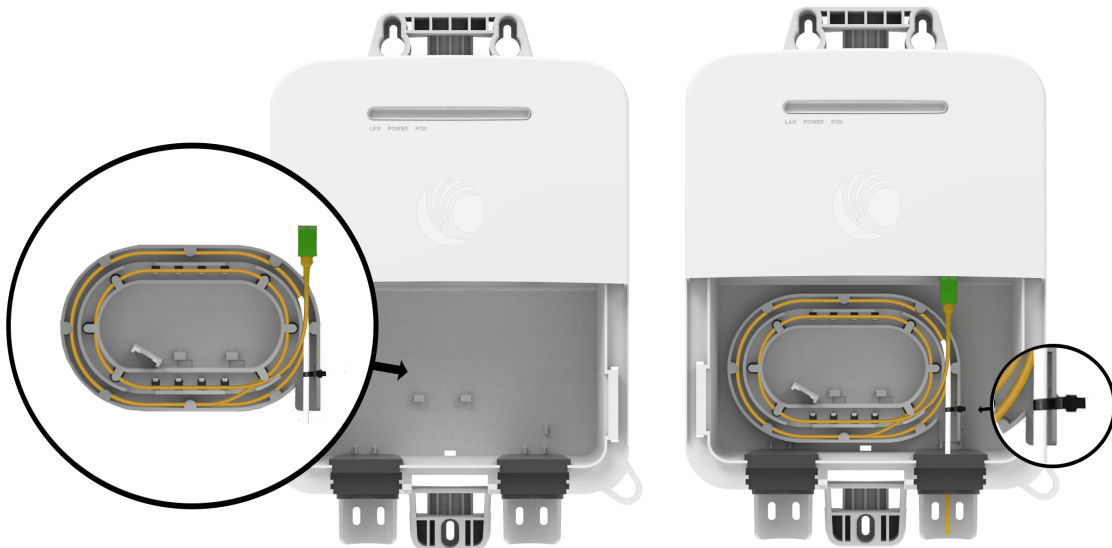
4. Insert the optical fiber cable into a water pipe and rubber grommet, and fix the water pipe to the main body with a hose clamp.



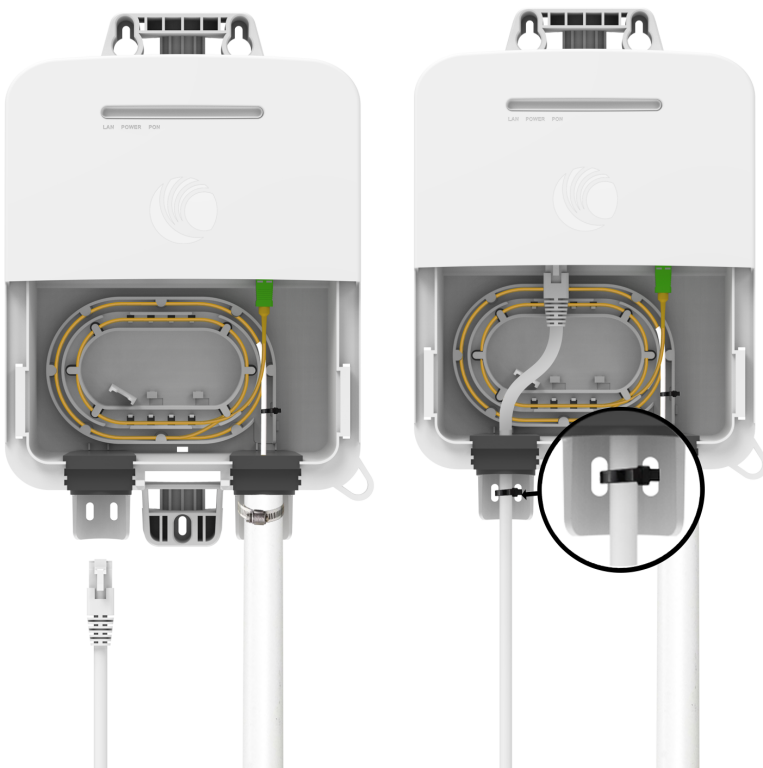
5. Take out the fiber spool.



6. Wind the optical fiber cable to the fiber spool, and fix it to the spool with a cable. Then, plug the cable into the PON port.

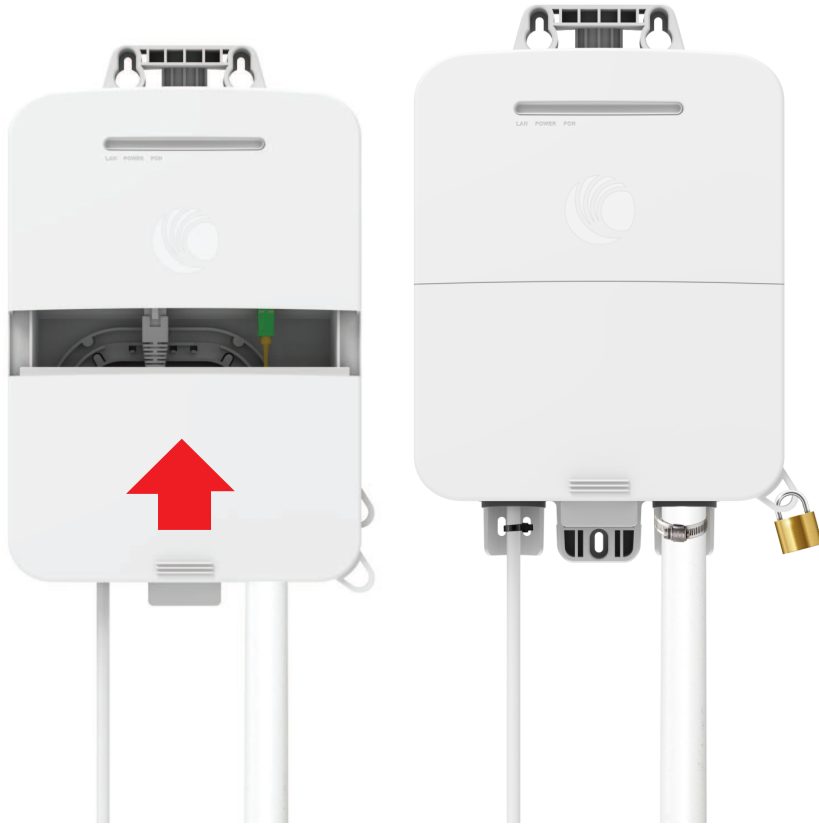


7. Plug in the Ethernet cable to LAN port through the rubber grommet, and fix the cable to the main body with a cable tie.



8. Place the PoE at home, and connect it through RJ45 cable.
9. Close the cover and use a lock to lock it. Use the cable tie on the sliding door to lock the ONT.





# User Interface (UI) Configuration

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This topic explains how to configure the UI of Fiber OLT and ONT.

This topic contains the following sections:

- [OLT UI configuration](#)
- [ONT UI configuration](#)

## OLT UI configuration

This topic explains how to set up the management PC and configure Fiber OLT using the UI.

This topic contains the following sections:

- [Configuring the management PC](#)
- [Logging in to OLT UI](#)
- [Configuring the OLT management IP address](#)
- [Software upgrade](#)
- [Zero touch provisioning](#)
- [Manual onboarding](#)
- [Mapping PON port to NNI port](#)

## Configuring the management PC

You must configure the PC (for example, using Windows PC) or laptop to set up the IP address (169.254.1.100) with a subnet mask of 255.255.0.0 to access the Cambium Fiber OLT on the link local address of 169.254.1.1. This configuration enables the PC to communicate with the OLT and ONTs.

To configure the management PC, perform the following steps:

1. On Windows PC, click **Start > Settings > Network & Internet**.

The **Network Status** page appears with multiple options on the left navigation column.

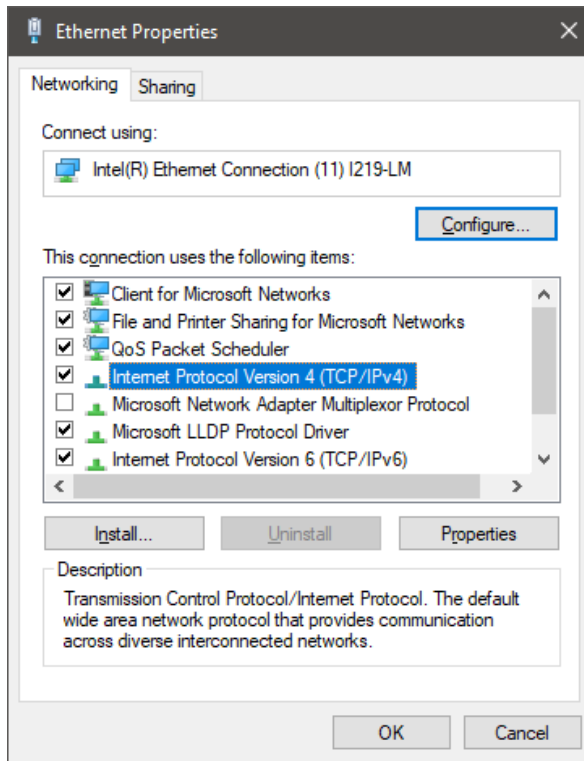
2. Select **Ethernet > Change adapter settings**.

The **Network Connections** page appears.

3. Select **Ethernet** and right-click to select **Properties**.

The **Ethernet Properties** dialog box appears with the **Networking** and **Sharing** tabs, as shown in [Figure 14](#).

Figure 14: The Ethernet Properties dialog box



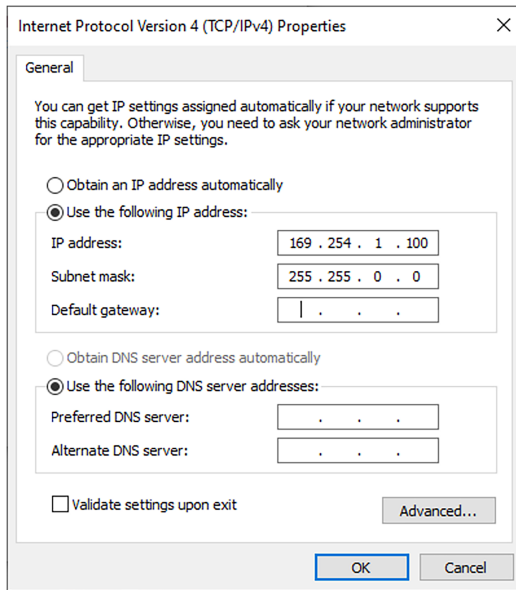
By default, the **Networking** tab is selected.

4. Select **Internet Protocol Version 4 (TCP/IPv4)** from the available list of connections (as shown in Figure 14).
5. Click **Properties**.

The **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog box appears, as shown in Figure 15.

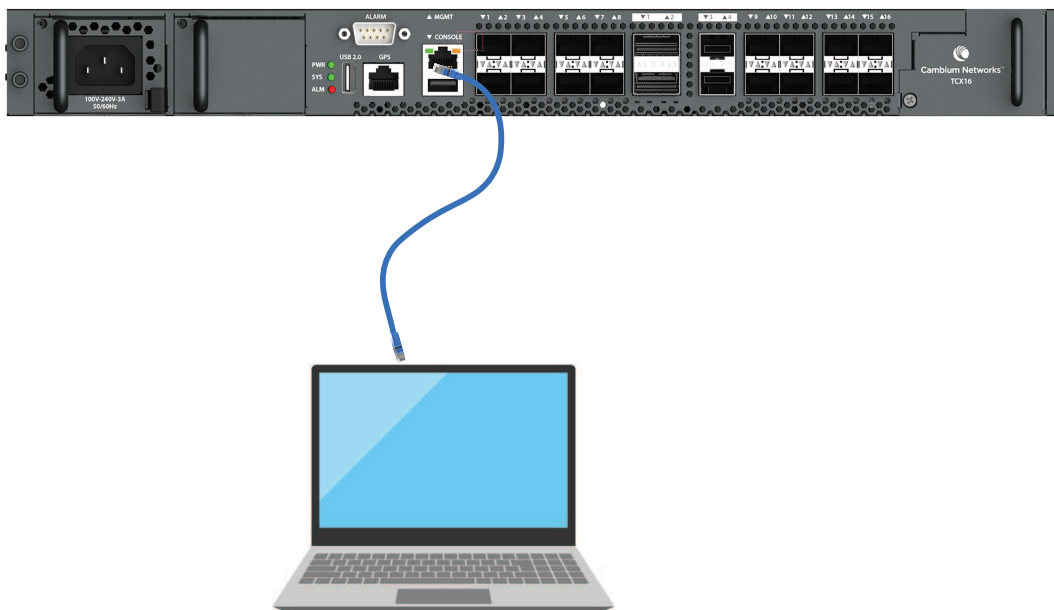
6. In the **Use the following IP address** section, type an appropriate IP address in the IP address text box as 169.254.1.X and a subnet mask as 255.255.0.0, avoiding 169.254.1.1. Example: 169.254.1.100.

Figure 15: The Internet Protocol Version 4 Properties dialog box



7. Leave the **Default gateway** text box blank and click **OK**.
8. Connect the PC to Fiber OLT management interface with an Ethernet cable, as shown in Figure 16.

Figure 16: PC connection with Fiber OLT



9. Ping 169.254.1.1 to confirm connectivity or open a browser and navigate to 169.254.1.1, and verify the Fiber OLT IP is connected.

## Logging in to OLT UI

To log in to Fiber OLT UI, perform the following steps:

1. Open a browser and type <http://169.254.1.1/>.  
The login page appears, as shown in Figure 17.

Figure 17: The login page - Fiber OLT

2. Log in to the OLT UI using the following credentials:

Username: **admin**

Password: **admin**

The dashboard page appears, as shown in Figure 18.

Figure 18: The dashboard page

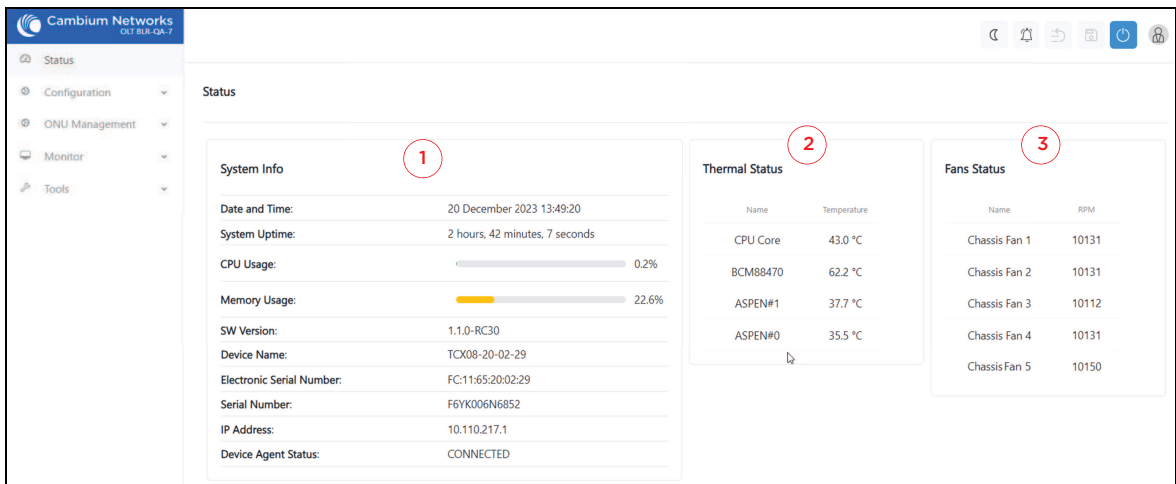


Table 10 lists and describes the components in the dashboard page.

Table 10: The dashboard page components

Item	Component
①	System information
②	Thermal Status information

Item	Component
3	Fan Status information

## Configuring the OLT management IP address

To configure the OLT management IP address, perform the following steps:

1. From the dashboard page, navigate to **Configuration > Network**.

The **Network** page appears, as shown in Figure 19 .

Figure 19: Configuring OLT management IP address

The screenshot shows the Cambium Networks OLT configuration interface. The left sidebar has a 'Network' menu item highlighted. The main content area is titled 'Network' and contains two main sections: 'General' and 'Management Port'.

**General Section:**

- IP Assignment:** Radio buttons for 'Static' (selected) and 'DHCP'.
- IP Address:** Text field containing '10.115.217.6/24'.
- Gateway:** Text field containing '10.115.217.254'.
- Gateway IPv6:** Text field containing 'Gateway IPv6'.
- DNS:** Text field containing 'Select Object(s), Select Object(s)'.

**Management Port Section:**

- Management Port:** Radio buttons for 'Management Port' (selected) and 'Local'.
- Management Port Duplex:** Radio buttons for 'Full' (selected) and 'Half'.
- Management Port Speed:** Radio buttons for 'Auto' (selected), '10M', '100M', and '1G'.
- Management Port Description:** Text field containing 'Management port'.
- Management VLAN:** Radio buttons for 'Default' (selected) and 'VLAN'.
- Management VLAN ID:** Text field containing '1'.
- Management VLAN Priority:** Text field containing '0'.

**Uplink Ports Section:**


Switch View - Details

Uplink Port	Enable Port	Port #	Inband Management	VLAN ID	PTC	Speed	Description
Uplink Port:	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	4001	Auto	100G	Uplink port #1
	<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	4002	Auto	100G	Uplink port #2
	<input checked="" type="checkbox"/>	3	<input checked="" type="checkbox"/>	4003	Auto	10G	Uplink port #3
	<input checked="" type="checkbox"/>	4	<input checked="" type="checkbox"/>	4004	Auto	10G	Uplink port #4

2. In the **General** section, select **Static** as the value for the **IP Assignment** parameter, as shown in Figure 20.

Figure 20: The General table

The screenshot shows a configuration interface titled "General". It contains several fields for setting up the Fiber OLT's network configuration. The "IP Assignment" section has two radio buttons: "Static" (selected) and "DHCP". Below this is a field labeled "IPv4/IPv6 with mask:" which contains the text "192.168.0.1/24" and a plus sign button. The "Gateway:" field contains the text "Gateway". The "Gateway IPv6:" field contains the text "Gateway IPv6". The "DNS:" field contains the text "DNS".

3. In the **IPv4/IPv6 with mask** text box, type IPv4/IPv6 address of Fiber OLT.
4. In the **Gateway** text box, type the gateway address of Fiber OLT.
5. In the **Gateway IPv6** text box, type the gateway IP address of Fiber OLT.
6. In the **DNS** text box, type the DNS IP address based on your network requirements.
7. Click **Save** (  ) at the top-right corner.

You have now configured the management IP address for Fiber OLT.

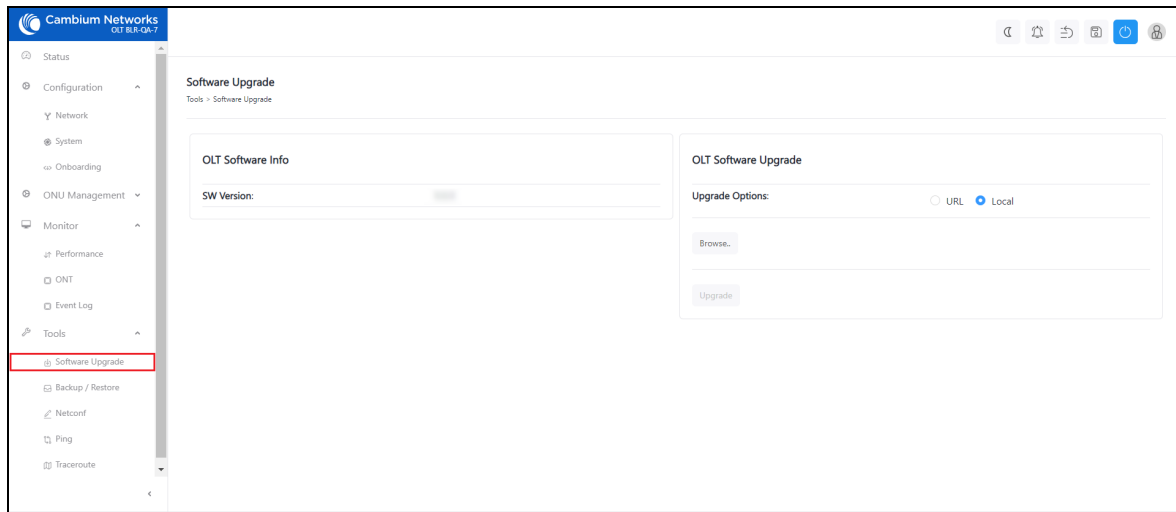
## Software upgrade

To upgrade the Fiber OLT software, perform the following steps:

1. From the dashboard page, navigate to **Tools > Software Upgrade**.

The **Software Upgrade** page appears, as shows in [Figure 21](#).

Figure 21: The Software Upgrade page



2. If you are upgrading the software using the URL, then select the **URL** option as the value of the **Update Options** parameter in the OLT Software Upgrade section. Then, type the URL of the location where you want to download the software.
3. If you are upgrading the software using the downloaded software image file, then select the **Local** option. Browse the folder and select the upgrade software image file.
4. Click **Upgrade** to start the upgrade process.
5. After upgrading the OLT software, reboot Fiber OLT.

## Zero touch provisioning

Fiber OLT from Cambium Networks supports zero touch provisioning. The auto discover of ONTs option is available in OLT after it is connected to the PON ports using splitters and the optical cable. To view the discovered ONT list, navigate to **Monitor > ONT** from the dashboard page.

Figure 22 shows the ONT list and the serial numbers. You can note down the ONT serial number from this page and use them for whitelisting.

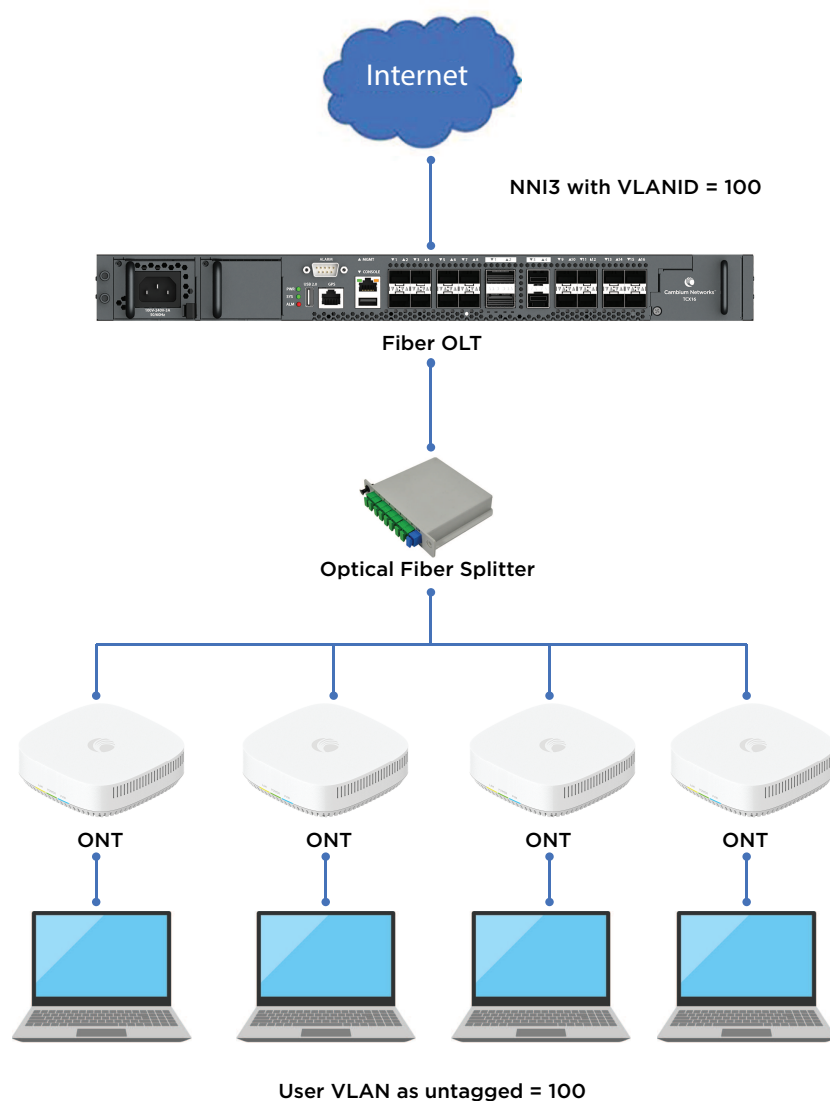


Figure 22: List of ONTs on the OLT UI page

ONT List						
<div>Switch View - Details</div>						
Serial Number	MAC	OLT Port	Distance	HW Type	PON UL Signal	PON DL Signal
CMBM000000B0	fc:11:65:00:01:80	1	0.01 Km	GPON	-24.2 dBm	1.9 dBm
CMBM00000097	fc:11:65:00:01:34	1	0.01 Km	GPON	-23.6 dBm	1.8 dBm
CMBM000000D2	fc:11:65:00:01:aa	2	0.01 Km	GPON	-21.1 dBm	2.1 dBm
CMBM000000D3	fc:11:65:00:01:ac	2	0.01 Km	GPON	-22.1 dBm	2.0 dBm
CMBM00000091	fc:11:65:00:01:28	3	0.01 Km	GPON	-23.0 dBm	1.8 dBm
CMBM000000AA	fc:11:65:00:01:5a	3	0.01 Km	GPON	-22.0 dBm	2.0 dBm
CMBM00000196	fc:11:65:00:02:fe	4	0.01 Km	GPON	-22.8 dBm	2.1 dBm

By default, Fiber OLT is configured with **VLAN 100** for the **NNI3** port. The **ONT LAN 100** port supports **untagged** user traffic, as shown in [Figure 23](#).

Figure 23: Untagged user traffic



## Manual onboarding

You can define the NNI side VLAN and whitelist ONTs using the **Configuration > Onboarding** tab.

For manual onboarding, perform the following steps:

1. From the dashboard page of the Fiber OLT UI, navigate to **Configuration > Onboarding**.

The **Onboarding** page appears, as shown in [Figure 24](#).

Figure 24: The Onboarding page

The screenshot displays the Cambium Networks OLT TCX08-20-09-94 interface. The left sidebar contains navigation links: Status, Configuration, Network, System, Onboarding, ONU Management, Monitor, and Tools. The main content area is titled 'Onboarding' with a breadcrumb 'Configuration > Onboarding'. The 'Onboarding' section includes the following settings:



- Auto Onboarding:** A toggle switch set to 'Enable', highlighted with a red box.
- Max Distance:** Radio buttons for '20 Km' (selected) and '40 Km'.
- Vlan Mode:** Radio buttons for 'Membership VLAN Unique per ONU (VLAN Passthrough)', 'Unique Data VLAN per ONU', and 'Common Data VLAN for ONUs' (selected).
- ONU Data VLAN ID:** A text box containing '700', with a range of 'min: 2 max: 4094'.
- DHCP Option 82:** A toggle switch set to 'Enable'.
- DHCP Option 82 Circuit ID format:** A dropdown menu showing 'OLT Serial Number and PON Port'.
- DHCP Option 82 Circuit ID value:** A text box containing 'DHCP Option 82 Circuit ID value'.
- DHCP Option 82 Remote ID format:** A dropdown menu showing 'ONU Serial'.
- DHCP Option 82 Remote ID value:** A text box containing 'DHCP Option 82 Remote ID value'.
- SN-Whitelist:** A button with a '+' icon.
- Switch View - Details:** A button at the bottom right.

2. In the Onboarding section, select the **Auto Onboarding** parameter option as **Enable**.
3. For the **Max Distance** parameter, select the required maximum distance (20 Km or 40 Km).
4. For the **Vlan Mode** parameter, select the required option.
5. In the **Vlan ID** text box, type the required VLAN ID.
6. By default, **OLT Serial Number and PON Port** is selected for the **DHCP Option 82 Circuit ID format** parameter and DHCP Option 82 Circuit ID value is dynamically generated. To type the DHCP Option 82 circuit ID value manually, select **Custom** option for **DHCP Option 82 Circuit ID format** parameter as shown in Figure 25.
7. Similarly, **ONT Serial** is selected for the **DHCP Option 82 Remote ID format** parameter by default. To type the DHCP Option 82 remote ID value manually, select **Custom** option for the **DHCP Option 82 Remote ID format** parameter as shown in Figure 25.

Figure 25: The DHCP Option 82 parameters

The screenshot shows the 'Onboarding' configuration page. It includes the following fields and controls:

- Auto Onboarding:** A toggle switch set to 'Enable'.
- Max Distance:** Radio buttons for '20 Km' (selected) and '40 Km'.
- Vlan Mode:** A dropdown menu set to 'SingleVlan-Untagged'.
- Vlan ID:** A text input field containing '100', with a range indicator 'min: 2 max: 4094' below it.
- DHCP Option 82:** A toggle switch set to 'Enable'.
- DHCP Option 82 Circuit ID format:** A dropdown menu set to 'Custom'.
- DHCP Option 82 Circuit ID value:** A text input field containing '20000'.
- DHCP Option 82 Remote ID format:** A dropdown menu set to 'Custom'.
- DHCP Option 82 Remote ID value:** A text input field containing '20000'.
- SN-Whitelist:** A button with a '+' icon to add entries.
- Switch View - Details:** A button with a list icon to toggle between summary and detailed views.

8. To add the whitelisted ONTs in Fiber OLT, click **Add** (  ) and type the ONT serial number in the **SN-Whitelist** field.
9. Click **Save** (  ) at the top-right corner to apply the changes.

## Mapping PON port to NNI port

By default, all PON ports are mapped to NNI3 port. This can be customized by using the **PON to NNI** tab.

To map PON port to NNI port, perform the following steps:

1. From the dashboard page, navigate to **Configuration > Onboarding**.

The **Onboarding** page appears, as shown in Figure 26.

Figure 26: The Onboarding page

**Cambium Networks**  
OLT BLR-QA-7

Navigation: Status, Configuration, Network, System, **Onboarding**, ONU Management, Monitor, Tools

### Onboarding

Auto Onboarding: ☒ Enable

Max Distance: ☒ 20 Km ☐ 40 Km

Vlan Mode: SingleVlan-Untagged

Vlan ID: 700  
min: 2 max: 4094

DHCP Option 82: ☒ Enable

DHCP Option 82 Circuit ID format: OLT Serial Number and PON Port

DHCP Option 82 Circuit ID value: 200000

DHCP Option 82 Remote ID format: ONU Serial

DHCP Option 82 Remote ID value: 200000

SN-Whitelist: +

Switch View - Details

PON To NNI:

NNI Port	PON Port
1	<input type="text"/>
2	<input type="text"/>
4	<input type="text"/>
3	<input type="text"/>
1	<input type="text"/>
4	<input type="text"/>
5	<input type="text"/>
6	<input type="text"/>
7	<input type="text"/>
8	<input type="text"/>


2. In the **PON To NNI** parameter section, click on the **Edit** icon (  ) of the required PON port.
3. Clear the required **PON** port value under the **NNI** port column, as shown in Figure 27.

Figure 27: Disabling the PON port

The screenshot shows the 'Onboarding' configuration page. The 'Auto Onboarding' toggle is set to 'Enable'. 'Max Distance' is set to '20 Km'. 'Vlan Mode' is 'SingleVlan-Untagged'. 'Vlan ID' is '100'. 'DHCP Option 82' is 'Enable'. 'DHCP Option 82 Circuit ID format' is 'Custom'. 'DHCP Option 82 Circuit ID value' is '20000'. 'DHCP Option 82 Remote ID format' is 'Custom'. 'DHCP Option 82 Remote ID value' is '20000'. A dropdown menu is open for the 'DHCP Option 82 Remote ID value', showing a list of values from 1 to 8. The value '4' is highlighted with a red box. At the bottom, there is a 'Switch View - Details' button and a 'PON Port' dropdown menu.

Field	Value
Auto Onboarding:	Enable
Max Distance:	20 Km
Vlan Mode:	SingleVlan-Untagged
Vlan ID:	100
DHCP Option 82:	Enable
DHCP Option 82 Circuit ID format:	Custom
DHCP Option 82 Circuit ID value:	20000
DHCP Option 82 Remote ID format:	Custom
DHCP Option 82 Remote ID value:	20000
SN-Whitelist:	+

Switch View - Details

NNI Port PON Port


4. Click **Edit** (  ) for other NNI ports to which you want to map the PON port. For example, the PON port 4 is mapped to NNI4 port in Figure 28.

Figure 28: Mapping of PON port

The screenshot displays the 'Onboarding' configuration page for an ONT. The page includes several configuration sections: 'Auto Onboarding' (enabled), 'Max Distance' (20 Km), 'Vlan Mode' (SingleVlan-Untagged), 'Vlan ID' (100), 'DHCP Option 82' (enabled), 'DHCP Option 82 Circuit ID format' (Custom), 'DHCP Option 82 Remote ID format' (Custom), and 'SN-Whitelist' (+). A dropdown menu is open for 'DHCP Option 82 Remote ID value', showing options 1 through 8, with option 4 selected and highlighted in red. Below the dropdown, the 'PON To NNI' mapping table shows NNI Port 4 mapped to PON Port 4.

PN	NI	NI Port	PON Port
1	4	4	4
2		Select ^	
4		Select ^	
3		Select ^	

5. Reboot Fiber OLT to apply the changes.

## ONT UI configuration

This topic explains how to log in to the ONT UI and perform the required configurations.

This topic contains the following sections:

- [Logging in to ONT UI](#)
- [Software upgrade](#)

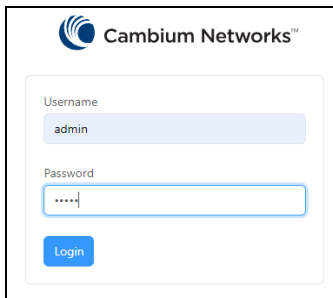
### Logging in to ONT UI

To log in to ONT UI, perform the following steps:

1. Open a browser, and type <http://169.254.1.1/>.

The login page appears, as shown in Figure 29.

Figure 29: The ONT login page



The image shows the ONT login page for Cambium Networks. It features the Cambium Networks logo at the top. Below the logo, there is a login form with two input fields: 'Username' and 'Password'. The 'Username' field contains the text 'admin'. The 'Password' field contains five dots, indicating a masked password. Below the password field is a blue 'Login' button.

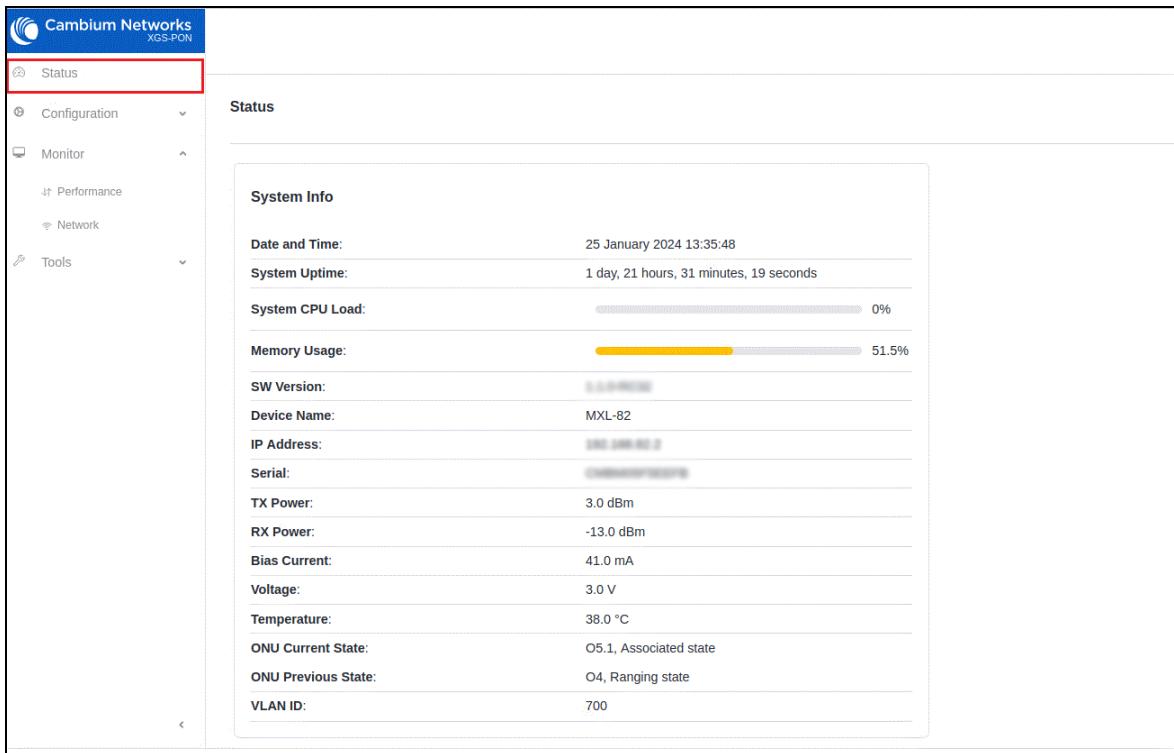
2. Log in to the ONT UI using the following credentials:

Username: **admin**

Password: **admin**

The dashboard page appears, as shown in [Figure 30](#).

Figure 30: The dashboard page - ONT UI



The image shows the ONT UI dashboard. On the left is a sidebar with a menu containing 'Status', 'Configuration', 'Monitor', 'Performance', 'Network', and 'Tools'. The 'Status' item is highlighted with a red box. The main content area is titled 'Status' and displays 'System Info'. The system information is presented in a table-like format with various metrics and their values.

System Info	
Date and Time:	25 January 2024 13:35:48
System Uptime:	1 day, 21 hours, 31 minutes, 19 seconds
System CPU Load:	0%
Memory Usage:	51.5%
SW Version:	5.0.0-00000
Device Name:	MXL-82
IP Address:	192.168.80.2
Serial:	0000000000000000
TX Power:	3.0 dBm
RX Power:	-13.0 dBm
Bias Current:	41.0 mA
Voltage:	3.0 V
Temperature:	38.0 °C
ONU Current State:	O5.1, Associated state
ONU Previous State:	O4, Ranging state
VLAN ID:	700

The dashboard page displays the system information of Fiber ONT.



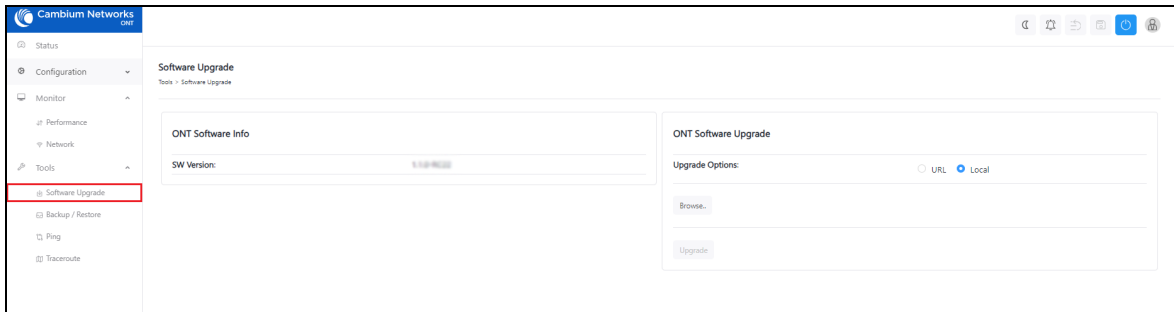
## Software upgrade - Fiber ONT

To upgrade the ONT software, perform the following steps:

1. From the dashboard page of Fiber ONT, navigate to **Tools > Software Upgrade**.

The **Software Upgrade** page appears, as shown in [Figure 31](#).

**Figure 31:** The Software Upgrade page

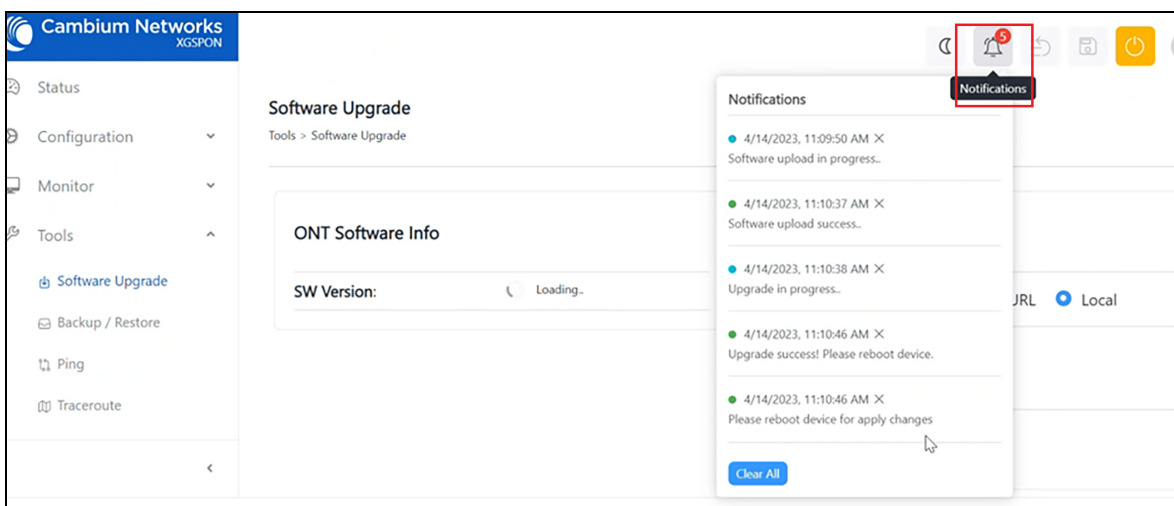


The **ONT Software Info** section displays the current software version of Fiber ONT.

2. If you are upgrading the software using the URL, then select the **URL** option as the value of the **Update Options** parameter in the ONT Software Upgrade section. Then, type the URL of the location where you want to download the software.
3. If you are upgrading the software using the downloaded software image file, then select the **Local** option. Browse the folder and select the upgrade software image file.
4. Click **Upgrade** to start the upgrade process.

5. Click on the **Notifications** icon (🔔) to view the status of the upgrade process as shown in [Figure 32](#).

**Figure 32:** Software upgrade notifications



6. After upgrading the ONT software, reboot Fiber ONT.

# Electrical Safety Instructions

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This topic lists the instructions specific to electrical safety.

Consider the following electrical safety instructions:

- Compliance is required with respect to voltage, frequency, and current requirements indicated on the manufacturer's label. Connection to a different power source than those specified may result in improper operation, damage to the equipment or pose a fire hazard if the limitations are not followed.
- There are no operator serviceable parts inside this equipment. Service should be provided only by a qualified service technician.
- This equipment is provided with a detachable power cord which has an integral safety ground wire intended for connection to a grounded safety outlet.
  - Do not substitute the power cord with the one that is not provided and approved. Never use an adapter plug to connect to a 2-wire outlet as this defeats the continuity of the grounding wire.
  - The equipment requires the use of the ground wire as a part of the safety certification, modification or misuse can provide a shock hazard that can result in serious injury or death.
  - Contact a qualified electrician or the manufacturer if there are questions about the installation prior to connecting the equipment.
  - Protective earthing is provided by a listed AC power module. Building installation provides an appropriate short-circuit backup protection. That is protective bonding must be installed in accordance with the local national wiring rules and regulations.

# Cambium Networks

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Cambium Networks delivers wireless communications that work for businesses, communities, and cities worldwide. Millions of our radios are deployed to connect people, places and things with a unified wireless fabric that spans multiple standards and frequencies of fixed wireless and Wi-Fi, all managed centrally via the cloud. Our multi-gigabit wireless fabric offers a compelling value proposition over traditional fiber and alternative wireless solutions. We work with our Cambium certified ConnectedPartners to deliver purpose-built networks for service provider, enterprise, industrial, and government connectivity solutions in urban, suburban, and rural environments, with wireless that just works.

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