Cambium Networks™

INSTALLATION GUIDE

PTP 850GP

Release 13.3

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Contents

Safety Precautions & Declared Material

General Equipment Precautions

Warning:

Use of controls, adjustments, or performing procedures other than those specified herein, may result in hazardous radiation exposure.

Warning:

When working with a Cambium IDU, note the following risk of electric shock and energy hazard: Disconnecting one power supply disconnects only one power supply module. To isolate the unit completely, disconnect all power supplies.

Warning:

Machine noise information order - 3. GPSGV, the highest sound pressure level amounts to 70 dB (A) or less, in accordance with ISO EN 7779.

Caution:

Static electricity may cause body harm, as well as harm to electronic components inside the device.To prevent damage, before touching components inside the device, all electrostatic must be discharged from both personnel and tools.

High Frequency Electromagnetic Fields

Warning:

Exposure to strong high frequency electromagnetic fields may cause thermal damage to personnel. The eye (cornea and lens) is easily exposed.

Any unnecessary exposure is undesirable and should be avoided.

In radio-relay communication installations, ordinary setup for normal operation, the general RF radiation level will be well below the safety limit.

In the antennas and directly in front of them the RF intensity normally will exceed the danger level, within limited portions of space.

Dangerous radiation may be found in the neighborhood of open waveguide flanges or horns where the power is radiated into space.

To avoid dangerous radiation the following precautions must be taken:

- During work within and close to the front of the antenna; make sure that transmitters will remain turned off.
- Before opening coaxial - or waveguide connectors carrying RF power, turn off transmitters.

- Consider any incidentally open RF connector as carrying power, until otherwise proved. Do not look into coaxial connectors at closer than reading distance (1 foot). Do not look into an open waveguide unless you are absolutely sure that the power is turned off.

ESD

Warning:

This equipment contains components which are sensitive to "ESD" (Electro Static Discharge). Therefore, ESD protection measures must be observed when touching the IDU.

Anyone responsible for the installation or maintenance of the Cambium IDU must use an ESD Wrist Strap.

Additional precautions include personnel grounding, grounding of work bench, grounding of tools and instruments as well as transport and storage in special antistatic bags and boxes.

Laser

Warning:

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

The optical interface must only be serviced by qualified personnel, who are aware of the hazards involved to repair laser products.

When handling laser products the following precautions must be taken:

- Never look directly into an open connector or optical cable.
- Before disconnecting an optical cable from the optical transmitter, the power should be switched off. If this is not possible, the cable must be disconnected from the transmitter before it is disconnected from the receiver.
- When the cable is reconnected it must be connected to the receiver before it is connected to the transmitter.

Warning:

- **Grounding:** This equipment is designed to permit connection between the earthed conductor of the DC supply circuit and the earthing conductor at the equipment.

  Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a

commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

- **Restricted Access Area:** DC powered equipment should only be installed in a Restricted Access Area.
- **Installation Codes:** The equipment must be installed according to country national electrical codes. For North America, equipment must be installed in accordance to the US National Electrical Code, Articles 110-16, 110-17 and 110-18, and the Canadian Electrical Code, Section 12.
- **Grounded Supply System:** The equipment shall be connected to a properly grounded supply system. All equipment in the immediate vicinity shall be grounded the same way, and shall not be grounded elsewhere.
- **Local Supply System:** The DC supply system is to be local, i.e. within the same premises as the equipment.
- **Disconnect Device:** A disconnect device is not allowed in the grounded circuit between the DC supply source and the frame/grounded circuit connection.

RoHS Compliance Declaration

Electronic Information Products Declaration of Hazardous/Toxic Substances

Component	**Hazardous Substance**					
	Lead (Pb)	**Mercury (Hg)**	**Cadmium (Cd)**	**Hexavalent Chromium (Cr VI)**	**Polybrominated Biphenyls (PBB)**	**Polybrominated Diphenyl Ethers (PBDE)**
PCB/Circuit Modules	Comply	Comply	Comply	Comply	Comply	Comply
Mechanical Parts	Comply	Comply	Comply	Comply	Comply	Comply
Cables	Comply	Comply	Comply	Comply	Comply	Comply

PTP 850GP Hardware Description

This chapter describes the PTP 850GP IDU and its interfaces.

This chapter includes:

Hardware Architecture

PTP 850GP is a compact unit that fits in a single rack unit, with a passive cooling system that eliminates the need for fans. An PTP 850GP node consists of an PTP 850GP indoor unit (IDU) and up to eight radio carriers.

RFUs and AODUs are connected to the PTP 850GP via optical fiber cables connected to an SFP+ RFU interface on the PTP 850GP. For details, see IDU-RFU Cable Connection.

Note:

PTP 850GP does not support PoE.

An PTP 850GP IDU contains the following interfaces:

- 6 x SFP+ (1/10G)
- 2 x SFP28 (1/10/25G)
- 2 x SFP+ Radio Interfaces
- 2 x SFP+ Dual Use Radio or Ethernet Interfaces (1/2.5/10G)

In addition to the radio and traffic interfaces, PTP 850GP includes the following interfaces:

- MGT/PROT (RJ-45) – Local management. Also used for protection in unit redundancy configurations. Supports 100M.

- Terminal (RJ-45) –A local craft terminal can be connected to the terminal interface for local CLI management of the unit.
- Sync Out (RJ-45) –PPS and TOD out.
- Power interfaces – -48VDC dual-feed power inputs.

PTP 850GP receives an external supply of -48V, with an optional second power interface for power redundancy.

Front Panel Description

This section describes the IP-GP's front panel. The following sections provide detailed descriptions of the IP-GP's interfaces and LEDs.

Figure 1: *PTP 850GP Front Panel and Interfaces*

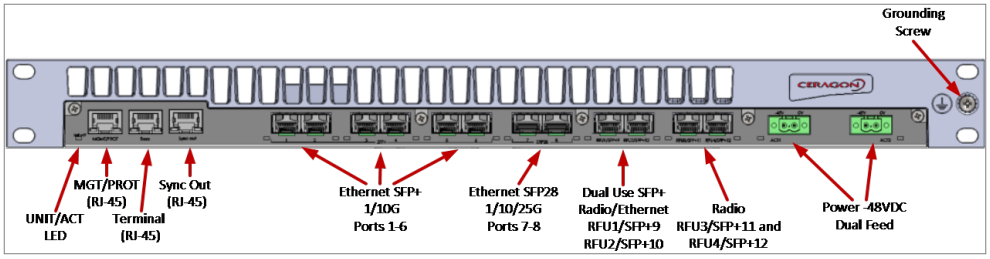


Table 1 *PTP 850GP Interfaces*

Interface	For Further Information
Management/Protection Interface (RJ-45)	Management/Protection Interface
Terminal Interface (RJ-45)	Terminal Interface
Sync Out Interface (RJ-45)	Synchronization Interface
6 x 1/10G Ethernet Interfaces (SFP+)	Ethernet Traffic Interfaces
2 x 1/10/25G Ethernet Interfaces (SFP28)	Ethernet Traffic Interfaces
2 x Dual Use Radio/Ethernet Interfaces (SFP+) **Note**: In the future, these interfaces will also support connection with AODUs.	Ethernet Traffic Interfaces Radio Interfaces
2 x RFU Interfaces1	Radio Interfaces
Dual Feed Power Interface -48V	Power Interface

Ethernet Traffic Interfaces

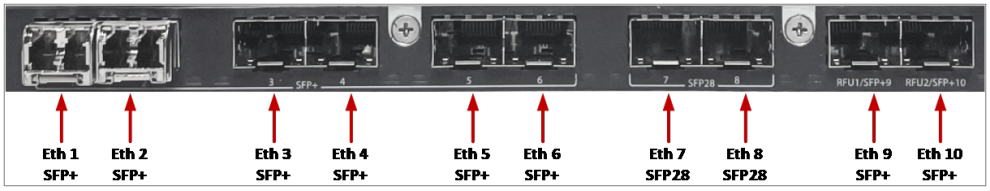
PTP 850GP provides the following ports for Ethernet traffic:

- 6 x SFP+ ports (1-6)
- 2 x SFP28 ports (7-8)
- 2 x SFP+ ports Ethernet or Radio (RFU1/SFP+9 and RFU2/SFP+10)

These ports are shown in Figure 2.

In Figure 2, ports 1 and 2 are shown with SFP cages inserted.

Figure 2: *PTP 850GP Ethernet Traffic Ports*



Ports 1-6 support 1G and 10G (default is 10G).

Ports 7-8 support 1G, 10G, and 25G (default is 10G).

Ports 9-10 support 1G, 2.5G, and 10G (default is 10G when used for Ethernet). These ports can be used as Ethernet or RFU ports (default is RFU).

Note:

Not all ports are supported in the early System Release releases. For details, refer to the Release Notes or Technical Description for the System Release release you are using.

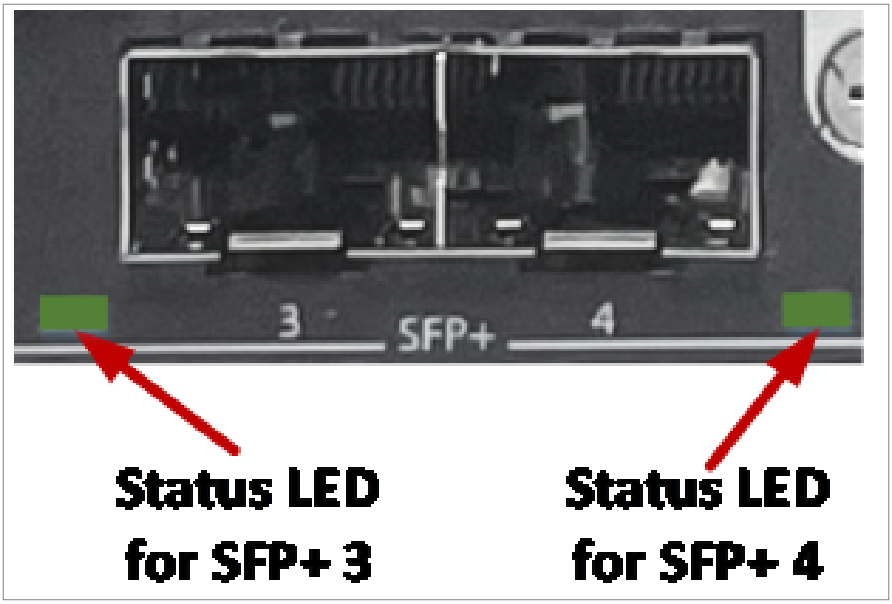
Each Ethernet interface has a Green LED that indicates the interface status. The LEDs are located on the lower left and the lower right of each interface pair, as shown in Figure 3.

- **Off** – The interface is disabled or the cable is disconnected.
- **Green** – A cable is connected to the interface and the Operational status of the link is Up.
- **Blinking Green** – The interface is operational and traffic is passing on the interface.

Note:

The blinking state is not supported in the initial release.

Figure 3: *Ethernet Interface LEDs*



Note:

For the LED functionality of RFU1/SFP+9 and RFU2/RFU+10 when used as radio interfaces, see Radio Interfaces.

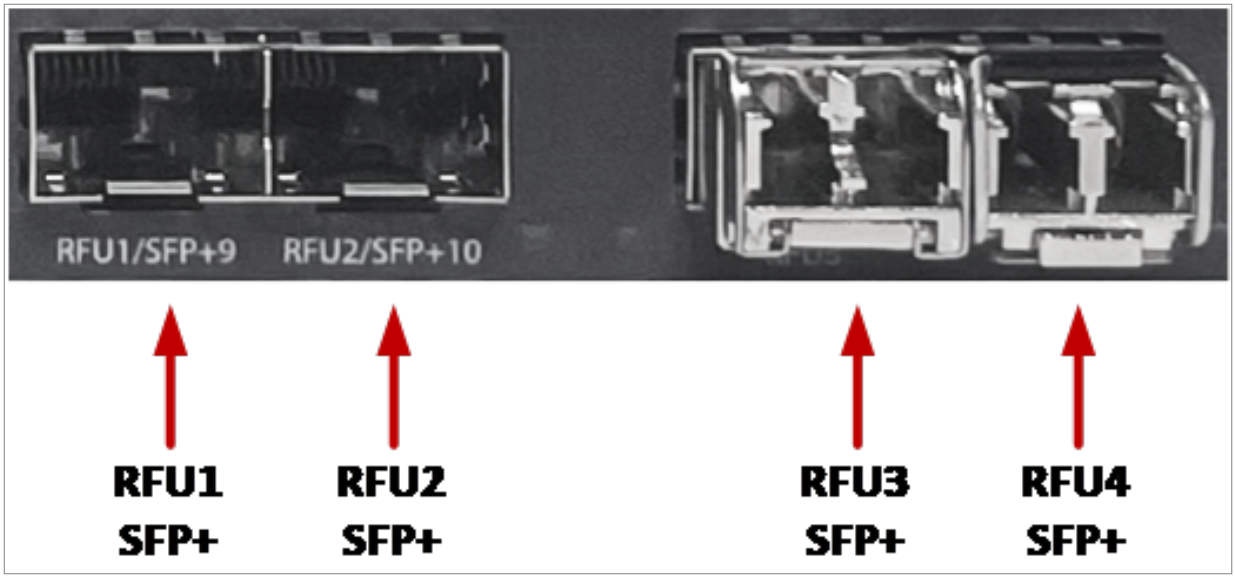
Radio Interfaces

PTP 850GP provides the following radio interfaces:

- 2 x SFP+ ports Ethernet or Radio (RFU1/SFP+9 and RFU2/SFP+10)
- 2 x SFP+ Radio (RFU) ports (RFU3/SFP+11 and RFU4/SFP+12)

These ports are shown in Figure 4. In Figure 4, RFU3 and RFU4 are shown with SFP cages inserted.

Figure 4: *PTP 850GP Radio Interfaces*



Note:

Not all radio interfaces are supported in the early System Release releases. For details, refer to the Release Notes or Technical Description for the System Release release you are using.

The radio interfaces (RFU1 through RFU4) require 2.5 GbE SFP+ transceivers. For RFU1 and RFU2, this is only true when they are used as radio interfaces, but not when they are used as Ethernet interfaces (SFP+ 9 and SFP+ 10).

Note:

For a list of supported SFP+ transceivers, refer to *Approved SFP Transceivers,* in the Technical Description for PTP 850GP.

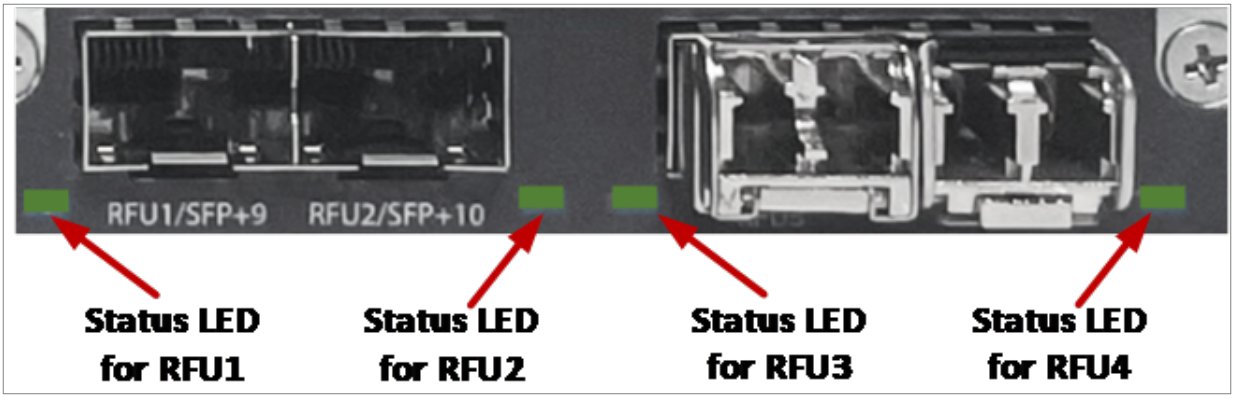
Each radio interface has a Green LED that indicates the status of the IDU-RFU connection. The LEDs are located on the lower left and the lower right of each interface pair, as shown in Figure 5.

Note:

For the LED functionality of RFU1/SFP+9 and RFU2/RFU+10 when used as Ethernet interfaces, see Ethernet Traffic Interfaces.

- **Off** – The status of the radio interface is Disabled or the cable is disconnected.
- **Green** – A cable is connected between the radio interface and the RFU and communication between the IDU and RFU has been established.
- **Slow Blinking Green** – A cable is connected between the interface and the RFU, but communication has not been established between the IDU and the RFU. This can be a temporary state while IDU-RFU communication is being established.
- **Fast Blinking Green** – A cable is connected between the radio interface and the RFU and communication between the IDU and RFU has been established, but there is an alarm relating to the RFU.

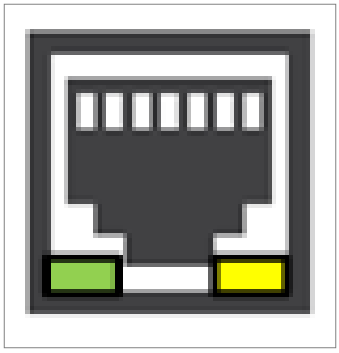
Figure 5: *Radio Interface LEDs*



Management/Protection Interface

The management/protection port is an RJ-45 port connected internally to both the management and the protection interface. The management interface is used for local management. In unit redundancy configurations, the protection interface is used to connect the active and standby units. Local management can also be used in unit redundancy configurations using a special splitter cable, as described in PTP 850GP Unit Redundancy.

Figure 6: *Management/Protection Interface*



Note:

Unit redundancy is not supported in the initial release.

There are two LEDs next to the management/protection interface, a Green LED to the left of the interface and a Yellow LED to the right of the interface.

The Green LED indicates the status of the management interface:

- **Off** – Admin is not operational (Down).
- **Green** – Admin is operational (Up).
- **Blinking Green** – The interface is operational and management traffic is passing through the interface (TX, RX, or both).

If the port is being used for protection, the Yellow LED indicates the status of the protection interface:

- **Off** – The interface is not operational (Down).
- **Yellow** – The interface is operational (Up).
- **Blinking Yellow** – The interface is operational, *and* there is traffic on the interface (TX, RX, or both).

Table 2 describes the management/protection interface pinouts.

Table 2 *PTP 850GP Management/Protection Interface Pinouts*

Pin Number	Description
1	MGMT Tx P
2	MGMT Tx N
3	MGMT Rx P
4	PROT Tx P
5	PROT Tx N
6	MGMT Rx N
7	PROT Rx P
8	PROT Rx N

Power Interface

PTP 850GP receives an external supply of -48V voltage via a dual-feed power interface, which can be connected to two separate power sources for power redundancy. The PTP 850GP monitors the power supply for undervoltage and overvoltage and includes reverse polarity protection, so that if the positive (+) and negative (-) inputs are mixed up, the system remains shut down.

The power interface on the right is the primary power interface. That means if two power sources are connected to the device and both are providing power within the defined thresholds, the device uses the primary (right) interface. If only one power source is connected, the device uses whichever interface is connected to the power source.

The allowed power input range for the PTP 850GP is -40V to -60V. An under voltage alarm is triggered if the power goes below a defined threshold, and an overvoltage alarm is triggered if the power goes above a defined threshold. The default thresholds are:

- Undervoltage Raise Threshold: -40V
- Undervoltage Clear Threshold: -42V
- Overvoltage Raise Threshold: -60V
- Overvoltage Clear Threshold: -58V

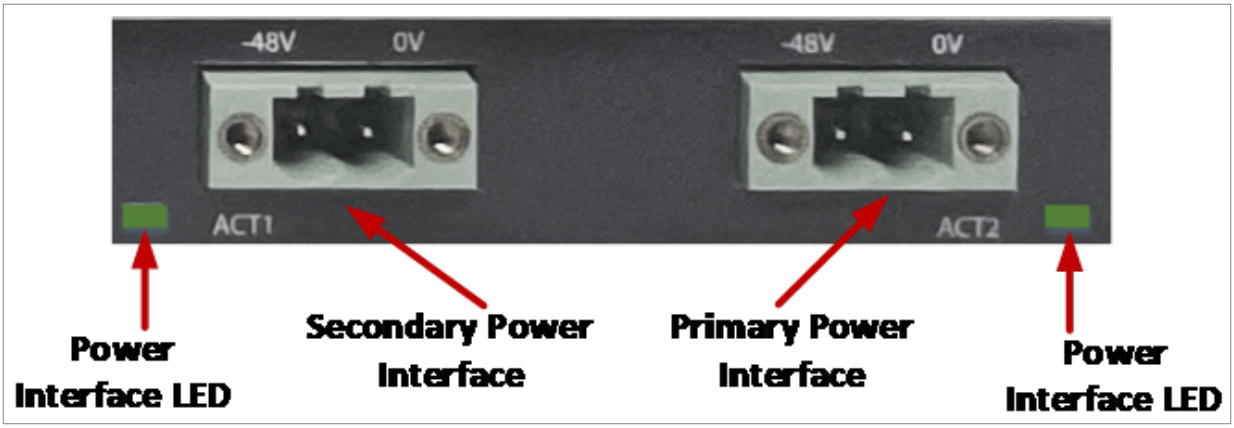
These thresholds are configurable.

As an additional protection for the device, if the power goes above or below the operating range of -40V to -60V, the power input is shut down. If there are two inputs and the primary power interface goes out of

range, the primary interface is shut off and the secondary interface takes over. This interface continues to operate as long as the power input is within range.

If both the primary and the secondary power interfaces are out of range, the device shuts down. The device comes back up automatically once either or both of the power inputs are within the allowed range.

Figure 7: *Power Interfaces and LEDs*



When selecting a power source, the following must be considered:

- Voltage range: -40 VDC to -60 VDC.
- Recommended: Availability of a UPS (Uninterrupted Power Source), battery backup, and emergency power generator.
- The power source must be grounded.
- The unit has more than one supply connection - Remove all power from the unit for servicing.

Note:

Make sure to use a circuit breaker with a maximum current of 4A to protect the circuit from damage by short or overload. In a building installation, the circuit breaker shall be readily accessible and incorporated external to the equipment.

Each power interface has a LED, as shown in Figure 7.

Table 3 shows the possible LED state combinations for the primary and secondary power interfaces.

Table 3 *Power Interface LEDs*

Primary Interface	Secondary Interface	Primary LED Color	Secondary LED Color	System State
Not connected/ power off	Not connected/ power off	Off	Off	Off
Not connected/ power off	Connected and active	Off	Green	On
Not connected/ power off	Connected and faulty	Off	Red	Off

Primary Interface	Secondary Interface	Primary LED Color	Secondary LED Color	System State
Connected and active	Not connected/ power off	Green	Off	On
Connected and active	Connected and not active	Green	Red	On
Connected and active	Connected and faulty	Green	Red	On
Connected and faulty	Not connected/ power off	Red	Off	Off
Connected and faulty	Connected and active	Red	Green	On
Connected and faulty	Connected and faulty	Red	Red	Off

Overvoltage and undervoltage alarms are only raised for the active power input.

In addition, PTP 850GP provides PMs that indicate, per 15-minute and 24-hour periods:

- The number of seconds the unit was in an undervoltage state during the measured period.
- The number of seconds the unit was in an overvoltage state during the measured period.
- The lowest voltage during the measured period.
- The highest voltage during the measured period.

PMs are only displayed for the active power input. In the event of switchover from one power interface to the other, PMs are collected for the currently active power input, with no indication of the switchover in the PMs.

Synchronization Interface

PTP 850GP includes an RJ-45 synchronization interface for 1PPS and ToD output. This interface is labelled Sync Out.

Figure 8: *Synchronization Interface*

There are two LEDs next to the synchronization interface, a Green LED to the left of the interface and a Yellow LED to the right of the interface.

In the initial release, these LEDs are not operational.

describes the synchronization interface pinouts.

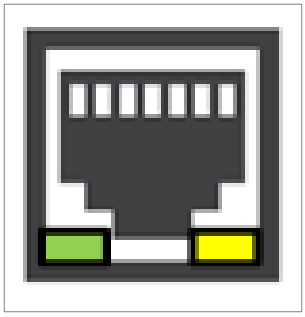
Table 4 *Synchronization Interface Pinouts*

Pin Number	Function	Name	Description
1	NA		
2	NA		
3	1PPS_P	1PPS_out_p	RS485
4	NA		
5	NA		
6	1PPS_N	1PPS_out_p	RS485
7	TOD_P	TOD_out_P	RS485
8	TOD_N	TOD_out_N	RS485
9	Shield	GND	
10	Shield	GND	

Terminal Interface

PTP 850GP includes an RJ-45 terminal interface (RS-232). A local craft terminal can be connected to the terminal interface for local CLI management of the unit.

Figure 9: *Terminal Interface*



The Terminal interface contains two LEDs. The Green LED indicates the connection status of the interface.

- **Off** – The interface is Down (cable is disconnected or the connection is invalid).
- **On** – The interface is up (cable is connected and the connection is valid).

Table 5 describes the Terminal interface pinouts.

Table 5 *Terminal Interface Pinouts*

Pin Number	Function	Name	Description
1	NA		

Pin Number	Function	Name	Description
2	NA		
3	NA		
4	Common	GND	
5	Terminal	TXD	CPU TX
6	Terminal	RXD	CPU RX
7	NA		
8	NA		
9	Shield	GND	
10	Shield	GND	

Unit/ACT LED

A general ACT LED for the unit is located on the lower left of the front panel. This LED is labeled UNIT/ACT, and indicates the general status of the unit, as follows:

- **Off** – Power is off.
- **Green** – Unit is up with no critical or major alarms.
- **Red** – Unit is in initialization stage.
- **Red blinking**– Unit has critical or major alarms.

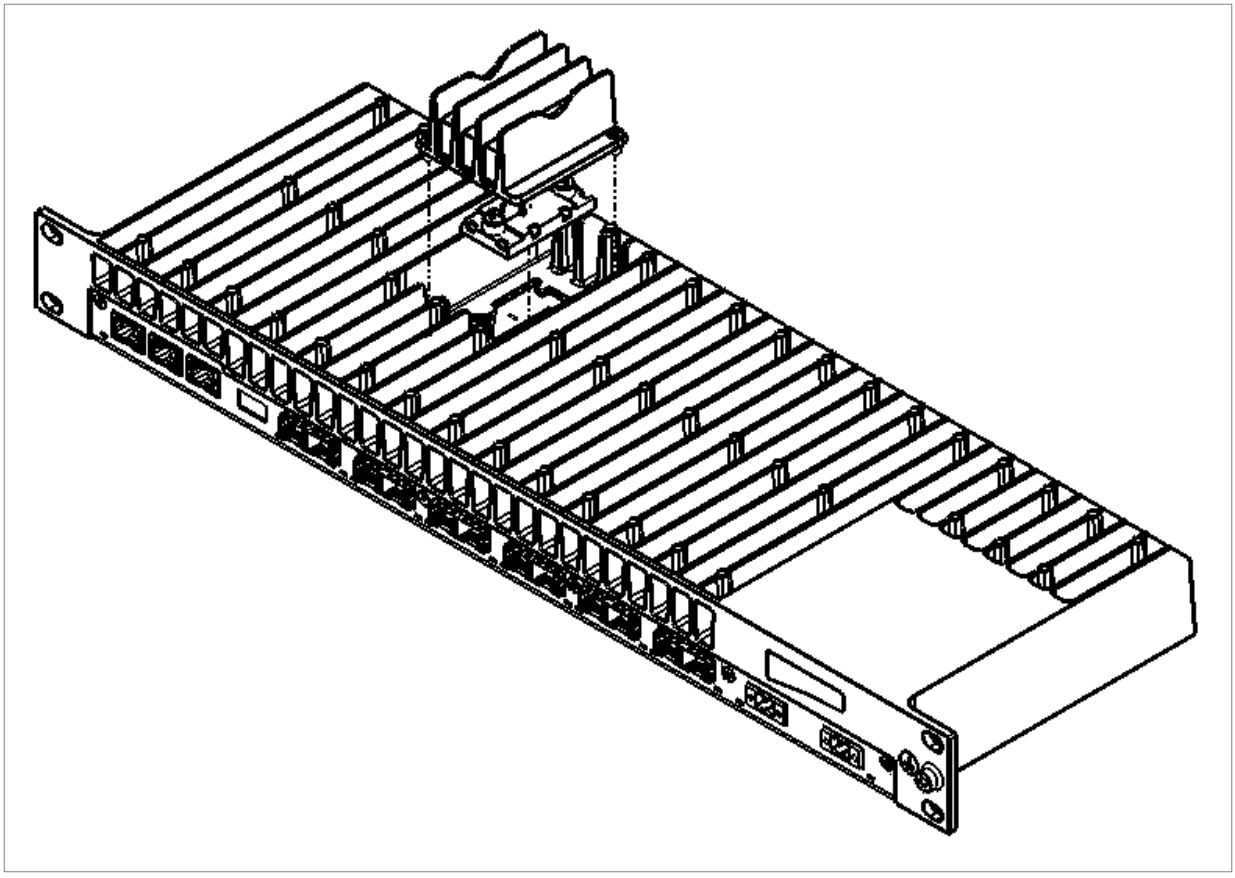
Figure 10: *Unit/ACT LED*

Storage Memory Card

Each PTP 850GP device includes a Storage Memory card (SM card). The SM card holds the configuration and software for the IDU. The SM card is embedded in the SM card cover. In the event of IDU replacement, re-using the existing SM card cover is necessary to ensure that the unit's software and configuration is maintained.

An SM card is pre-installed inside each PTP 850GP unit. It can also be ordered as a separate item (e.g., as a spare unit).

Figure 11: *SM Card and Cover*



Preparing for Installation

This section provides instructions for transporting, inspecting, and unpacking the equipment for an PTP 850GP system prior to installation.

Transportation/Storage

The equipment cases are prepared for shipment by air, truck, railway and sea, suitable for handling by forklift trucks and slings. The cargo must be kept dry during transport and storage.

For sea-transport, deck-side shipment is not permitted. Carrier-owned cargo containers should be used.

It is recommended that the equipment is transported to the installation site in its original packing cases.

If any intermediate storing is required, all cases must be stored under dry and cool conditions and out of direct sunlight.

Inspection

Check the packing lists and ensure that correct parts numbers quantities of goods have arrived.

Inspect for any damage on the cases and equipment. Report any damage or discrepancy to a Cambium representative, by e-mail or fax.

Unpacking Equipment at the Site

The equipment is packed in sealed plastic bags and moisture absorbing bags are inserted. Any separate sensitive product, i.e. printed boards, are packed in anti-static handling bags. The equipment is further packed in special designed cases.

Marking is done according to standard practice unless otherwise specified by customers.

- Customers address
- Contract No
- Site name (if known)
- Case No

Dimensions and weight of each case are specified in the packing specification issued for the respective shipment.

Caution:

It is essential that whenever unpacking or disassembling the equipment and handling printed circuit boards, special precautions should be taken to avoid ESD (Electrostatic Static Discharge). Generally, units with static discharge protection should not be unpacked until the installation takes place.

Ensure you are properly grounded at a controlled ESD point before and during unpacking

and handling of any sensitive component.

To avoid malfunctioning or personnel injuries, equipment or accessories/kits/plug-in unit installation, requires qualified and trained personnel.

Changes or modifications not expressly approved by Cambium Networks could void the user's authority to operate the equipment

Where special cables, shields, adapters and grounding kits are supplied or described in this manual, these items must be used, to comply with the relevant regulations.

PTP 850GP Unit Redundancy

Note:

Unit redundancy is not supported in the initial release.

Unit redundancy utilizes two PTP 850GP devices to provide hardware protection for the PTP 850GP IDU. Each device is connected to a different RFU for radio protection. Ethernet traffic is sent to each device via an optical splitter for Ethernet protection.

In unit redundancy configurations, one PTP 850GP device operates in active mode and the other operates in standby mode. If a protection switchover occurs, the roles are switched. The standby unit is managed by the active unit. The standby unit's transmitter is muted, but the standby unit's receiver is kept on in order to monitor the link. However, the received signal is terminated at the switch level.

The active and standby units must have the same configuration. The configuration of the active unit can be manually copied to the standby unit. Upon copying, both units are automatically reset. Therefore, it is important to ensure that the units are fully and properly configured when the system is initially brought into service.

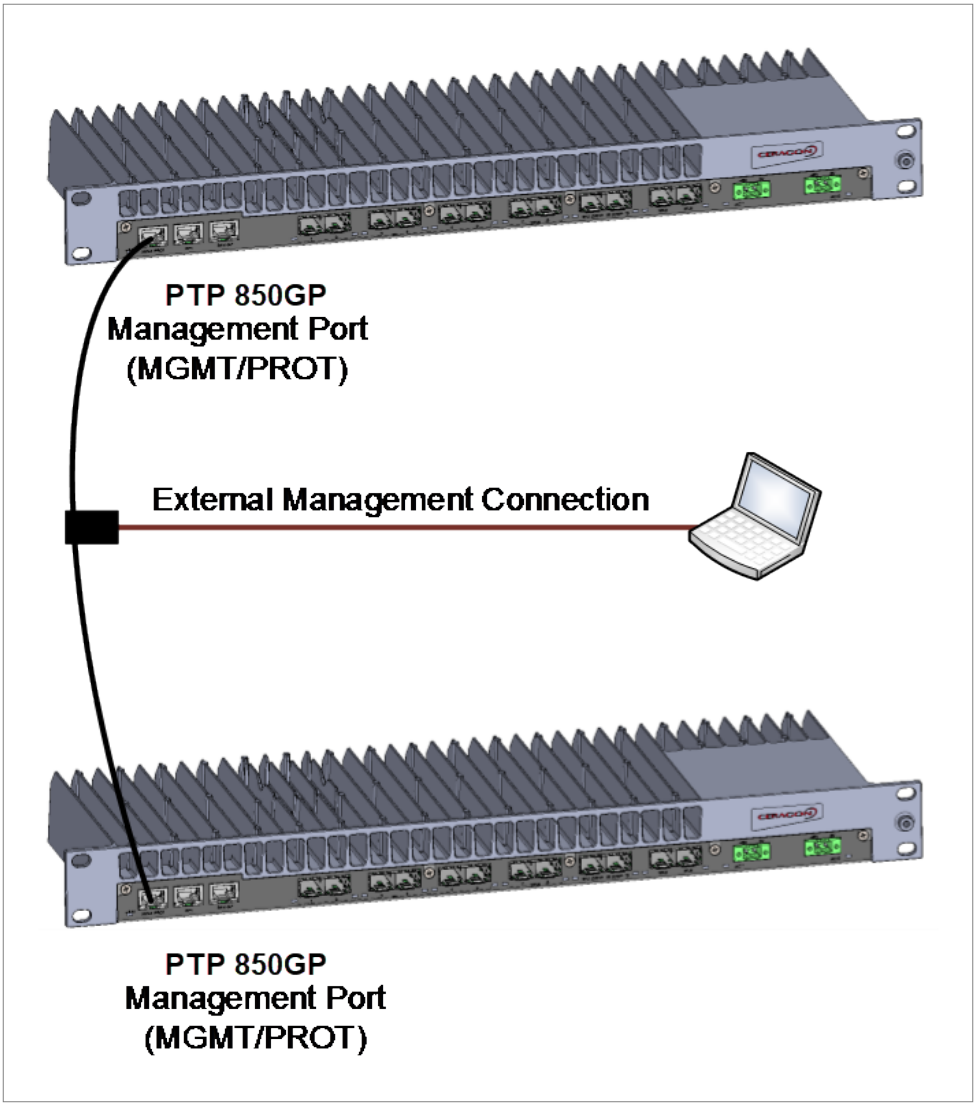
PTP 850GP devices in a unit redundancy configuration must have their CPUs interconnected in order to synchronize their protection status. The same IP address is used for both PTP 850GP devices, to ensure that management is not lost in the event of switchover. A special cable is required to enable this connectivity.

Table 6 *Splitter Cable for Protection and Management*

Part Number	Marketing Model	Description
WA-0720-0	CBL-IP20-EXT-PROT+MGMT	CABLE,RJ45F TO 2XRJ45,1.34M,CAT-5E,WITH MALE TO MALE CONNECTION

The protection and management splitter cable must be connected to the management/protection interfaces of the two PTP 850GP devices using the RJ-45 plug-ends. The third end of the protection splitter cable (RJ-45 socket) is connected to an external management station.

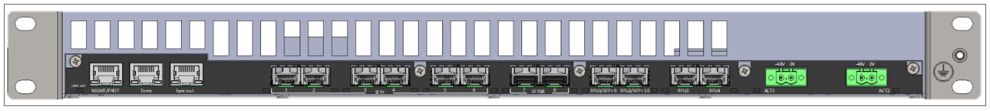
Figure 12: *PTP 850GP with Unit Redundancy – Protection and Management Splitter Connection*



Installing the PTP 850GP IDU

This section provides instructions for installing a PTP 850GP IDU.

Figure 13: *PTP 850GP IDU*



Kits required to perform the installation

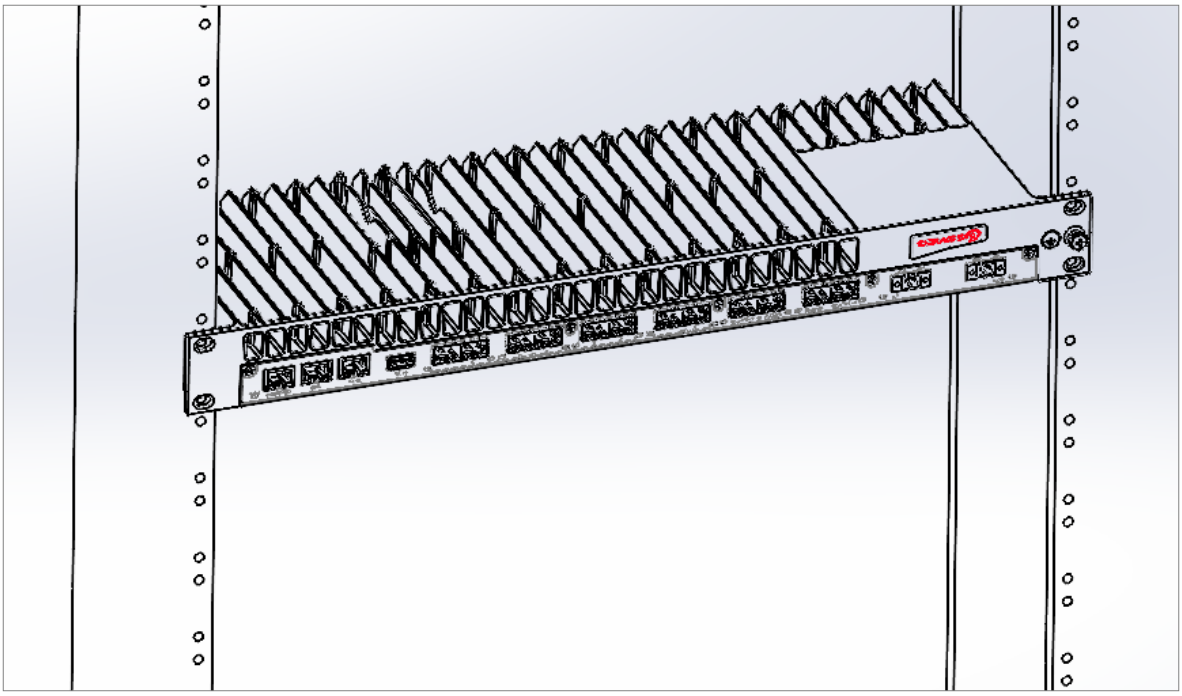
Description	Quantity
PTP 850GP chassis	1
19" rack / sub-rack	1
SM-Card Cover	1

Tools

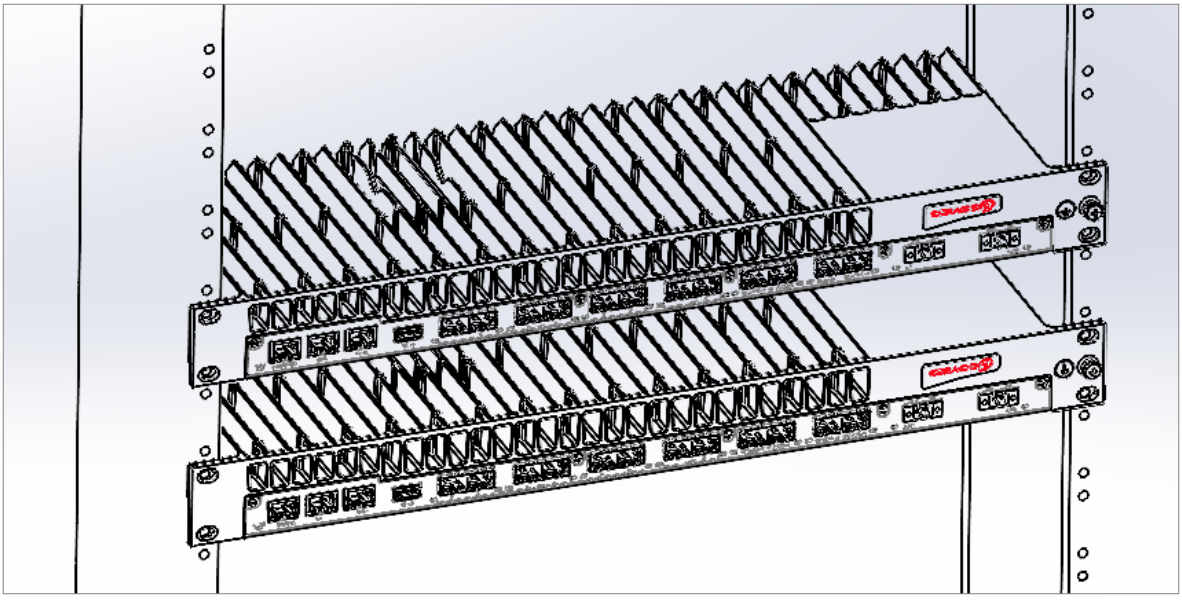
- Philips screwdriver
- Flat screwdriver

Installing the PTP 850GP IDU in the Rack (19")

1. Insert and hold the PTP 850GP IDU in the rack, as shown in the following figures. Use four screws (not supplied with the installation kit) to fasten the IDU to the rack.



2. Make sure to leave a space of 1RU after every PTP 850GP units, as shown in the figure below. This restriction also applies to PTP 850GP units installed in proximity with third party units.



Grounding the PTP 850GP

Cable Grounding

Cables must be grounded as follows:

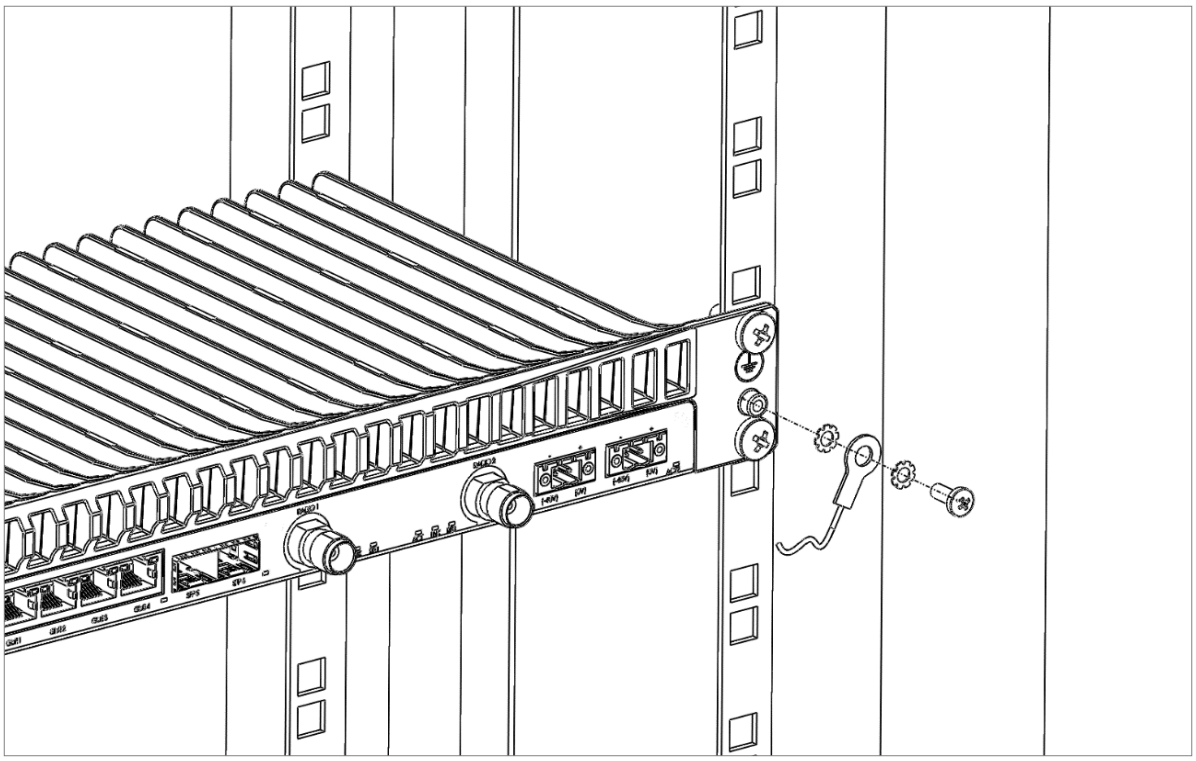
- For fiber cables, no grounding is required.
- For DC power cables, see Connecting the Power Cable.

Grounding the PTP 850GP Chassis

Note:

The unit must be grounded to the main rack grounding. If the grounding cable is 2 meters or less, the cable must have a thickness of at least 12 AWG. If the grounding cable is longer than 2 meters, a 6 AWG cable is required. The recommended resistance between main rack grounding and the PTP 850GP chassis is 5 mΩ or less.

Connect a grounding wire first to the single-point stud shown in the figure below, and then to the rack, using a single screw and two washers. Use torque of 1.6 ± 0.1 Nm.



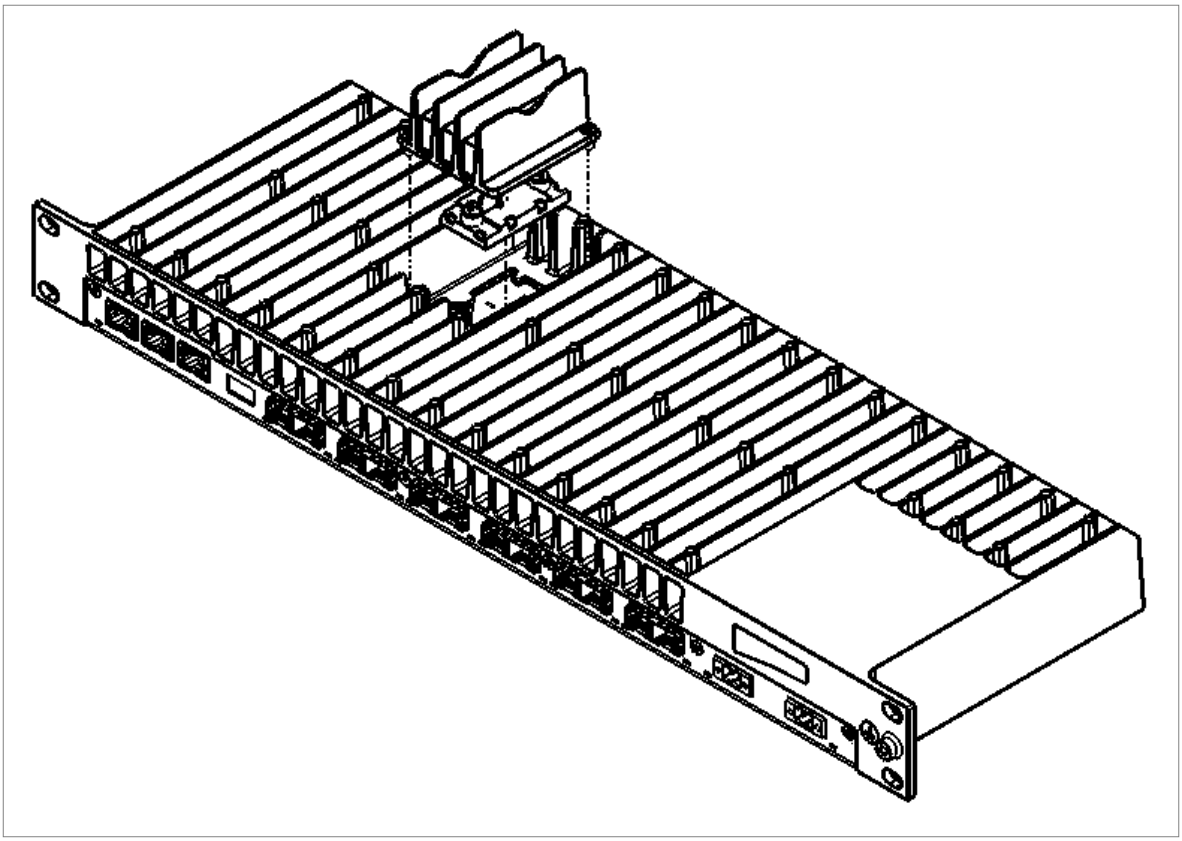
Replacing an PTP 850GP IDU or SM-Card

If you should need to replace the PTP 850GP IDU, you must first remove the SM-Card Cover so that you can insert it into the new IDU.

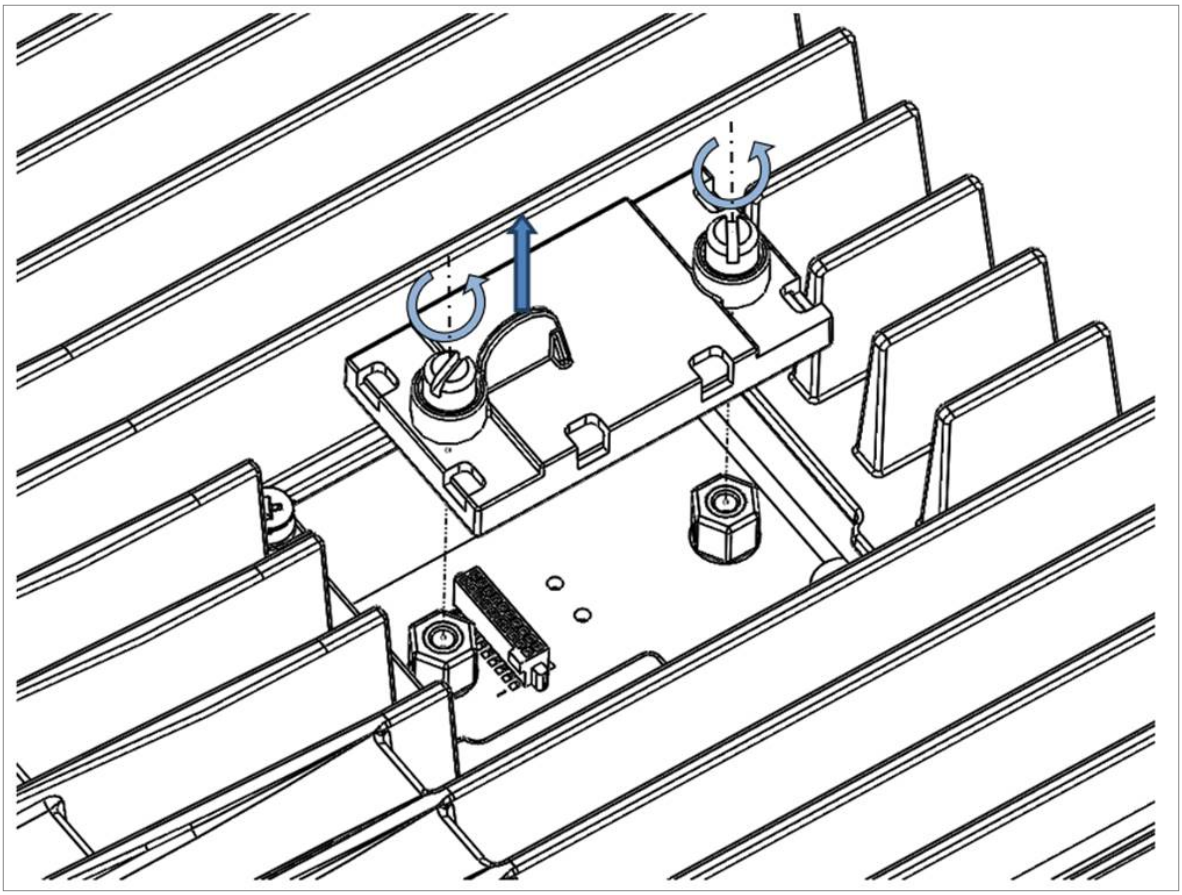
The SM-Card holds the configuration and software for the IDU. The SM-Card is embedded in the SM-Card plastic cover that is located under the SM-card aluminum cover.

To remove the SM-Card:

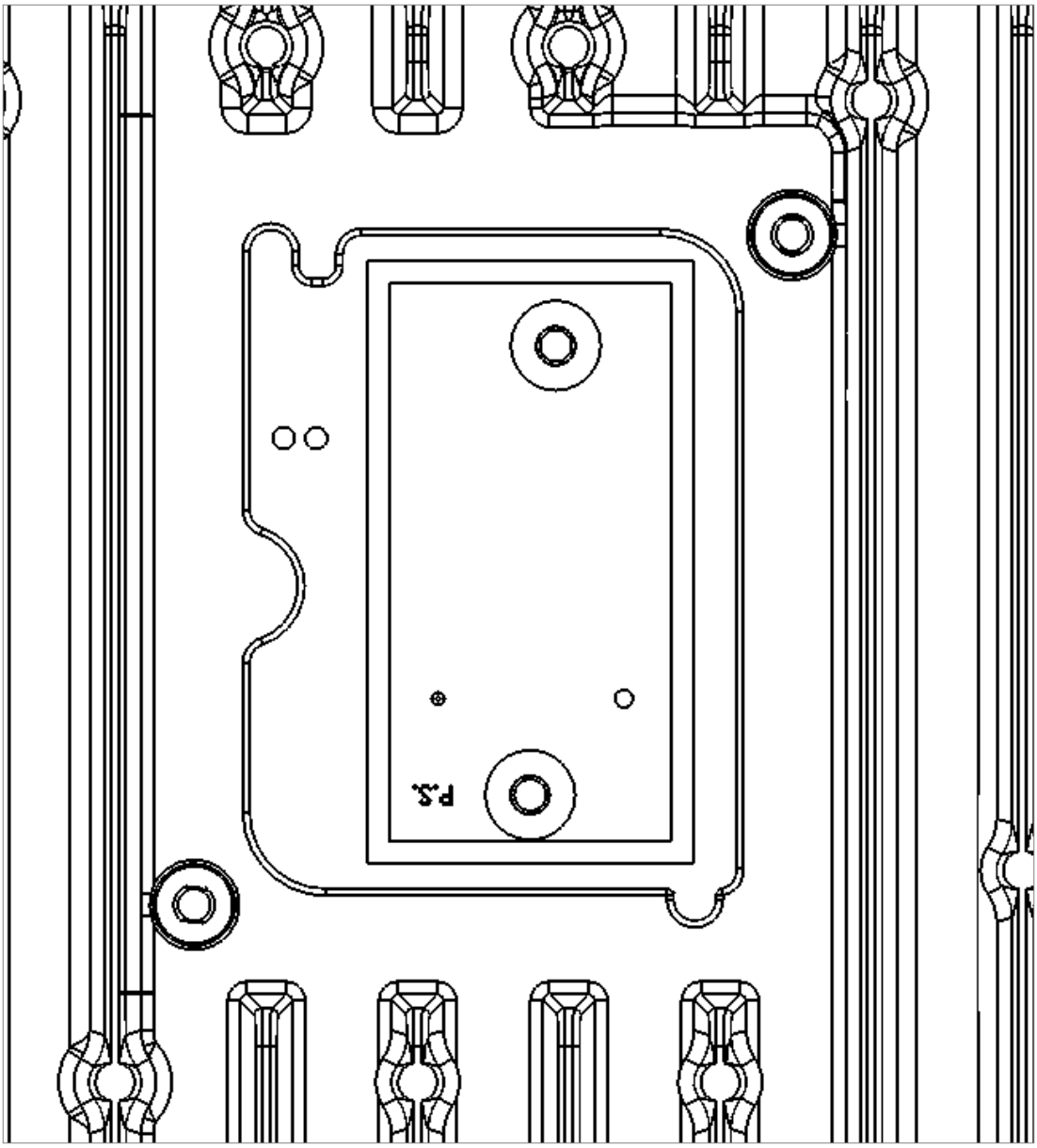
1. Switch the unit power off.
2. Loosen the 2 screws of the SM-Card's aluminum cover and remove it from the IDU.



3. Loosen the 2 screws of the SM-Card Plastic Cover and gently remove it from the IDU.



4. In the new IDU or, if you are upgrading the SM-Card, the old IDU, make sure that there is no foreign matter blocking the sockets in the opening where the SM-Card is installed.



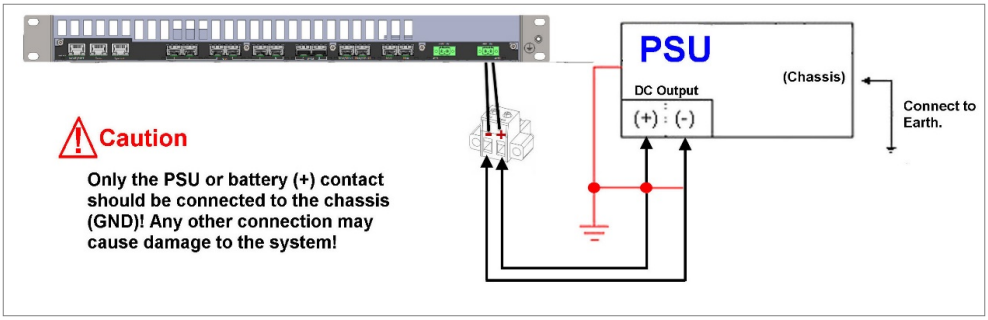
5. Gently place the SM-Card in its place and tighten the 2 screws using torque of 0.34 ± 0.1 Nm.
6. Place the SM-Card's aluminum cover in its place and tighten the 2 screws using torque of 0.72 ± 0.1 Nm.

Connecting the Power Cable

Note:

Before connecting the power supply to the PTP 850GP unit, you must verify that the positive pole in the external power supply is grounded! Power supply grounding should be in according with the following figure:

Figure 14: *Power Supply Grounding*



PTP 850GP utilizes a dual-feed power interface. Two power cable connectors are included with the PTP 850GP unit. When both feeds are connected to a power source, the right feed is the primary feed. The device utilizes the primary feed as long as it is within the allowed voltage range. If it goes out of range, the device switches to the secondary feed (on the left).

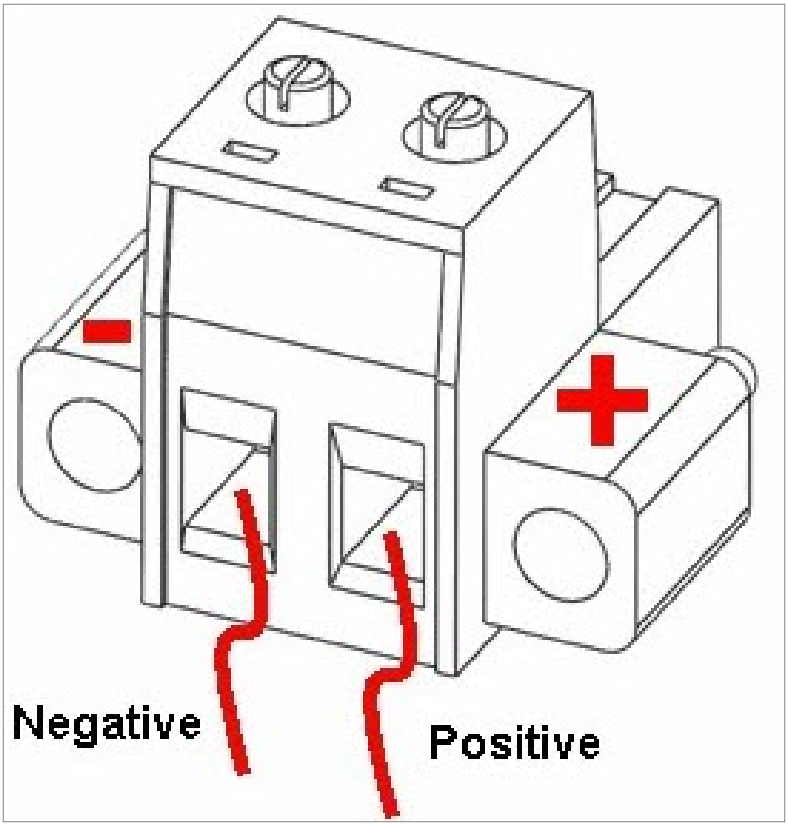
The following power cables are available for use with an PTP 850GP unit:

Marketing Model	Marketing Description
N000082L254A	Power cable Open-end/Open-end, 16A, 2.2m
CBL-PWR-OE-OE-16A-5m	Power cable Open-end/Open-end, 16A, 5m

To connect a power cable to the PTP 850GP:

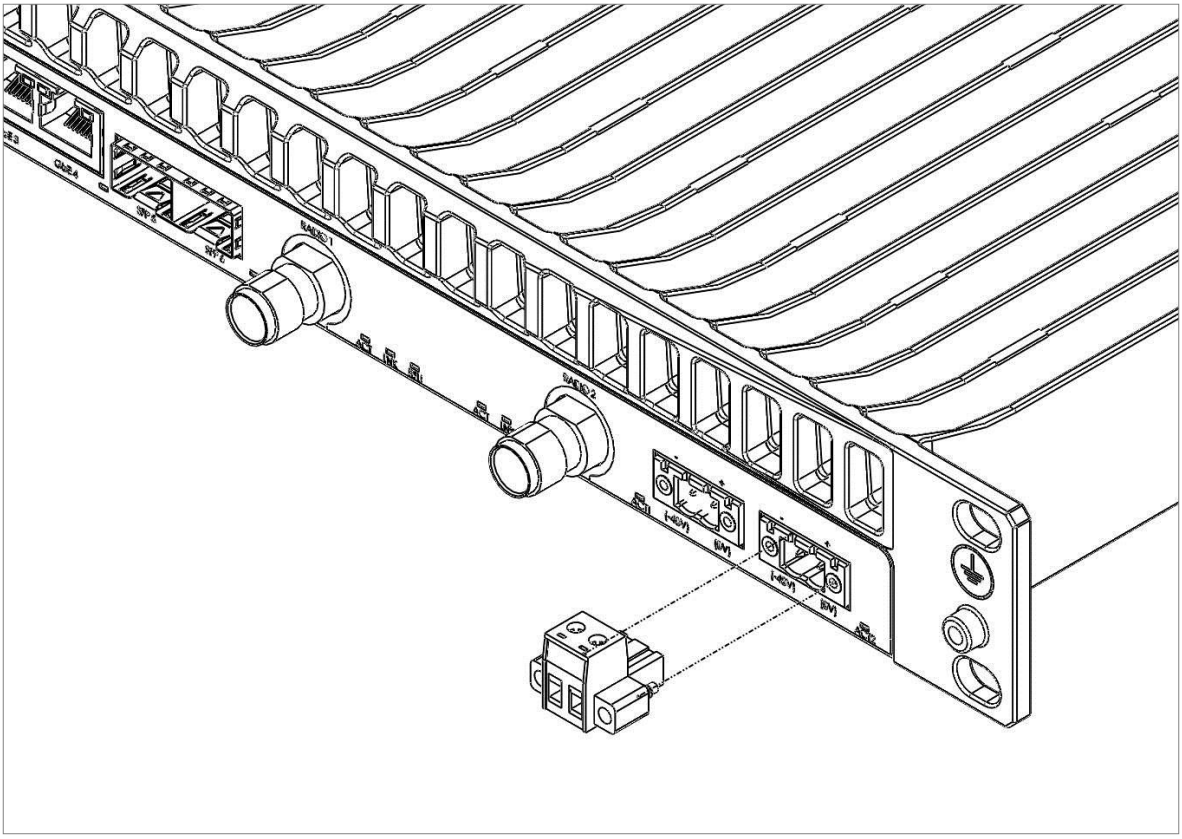
1. Expose the wires of the power cable.
2. Loosen the top two screws on the connector.
3. Verify that the wiring is according to the correct polarity.

Figure 15: *Correct Wiring of Power Connector*



4. Insert the wires into the connector.
5. Secure the wires in the connector with the screws.
6. Plug the connector into the PTP 850GP power interface and tighten the two screws on the sides of the connector to secure the connector.

Figure 16: *Connecting the Power Cable*



IDU-RFU Cable Connection

RFUs can be connected to the IDU with optical fiber cables via one of the RFU ports on the front panel of the IDU. See Radio Interfaces.

An external DC power cable is required to supply power to the RFU.

For cable specifications, refer to the Technical Description for PTP 850GP.

Performing Initial Configuration

This section describes how to establish a management connection with the PTP 850GP unit and lists the configuration steps that should be performed in order to enable basic radio connectivity. For detailed configuration instructions, refer to the User Guide for PTP 850GP.

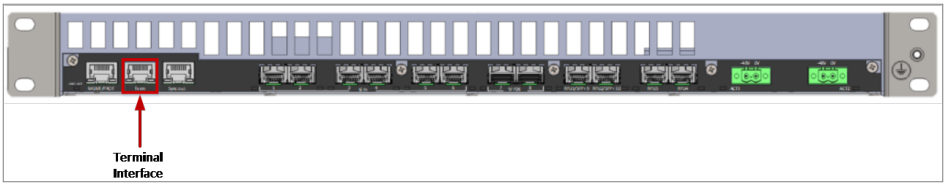
Establishing a Connection

You can connect to the PTP 850GP unit using a TP cable with a LAN connection or using a Serial RS-232 cable.

Connecting to the Unit with a Serial Connection

1. Connect an RS-232 cable with an RJ-45 interface from your management device (laptop, PC, etc.) to the Terminal Interface on the PTP 850GP front panel.

   Figure 17: *Terminal Interface*

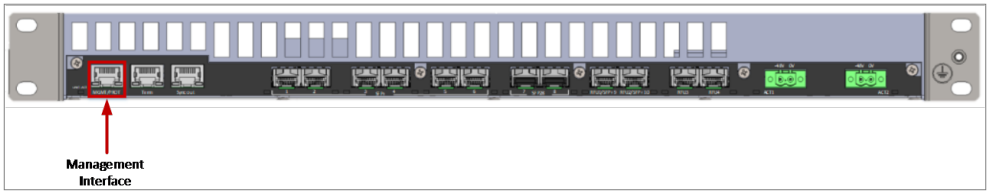
   

2. Configure the following settings for the COM port you are using on your management device:
   - Bits per Second – 115,200
   - Data Bits – 8
   - Parity – None
   - Stop Bits – 1
   - Flow Control - None

Connecting to the Unit with a LAN Connection

PTP 850GP includes an RJ-45 management interface (MGMT/PROT) on its front panel. To manage the device using a LAN connection, connect an Ethernet cable to this management interface and to the LAN port on your management device.

Figure 18: *Management Interface*



To establish a connection between the management device and the PTP 850GP unit, it is necessary to have an IP address on the management device within the same subnet as the unit. The default IP address of the PTP 850GP unit is 192.168.1.1. Set the PC address to e.g. 192.168.1.10 and subnet mask to 255.255.255.0. Note the initial settings before changing.

Note:

The chassis IP address, as well as password, should be changed before the system is set in operation. For more information on these procedures, refer to the User Guide for PTP 850GP.

1. Select Control Panel> All Control Panel Items >Network and Sharing Center.
2. Click Change adapter settings.
3. Select Local Area Connection> Properties> Internet Protocol Version 4 (TCP/IP).
   - IP address: 192.168.1.10
   - Subnet mask 255.255.255.0
   - No default gateway
4. Press **OK** to apply the settings.

Logging On

1. Open an Internet browser (Microsoft Edge, Mozilla Firefox, or Google Chrome).
2. Type in the default IP address "**192.168.1.1**" in the Address Bar.

   Login Window

3. Enter the following values:
   - User Name: admin
   - Password: admin
4. Click **Apply**.

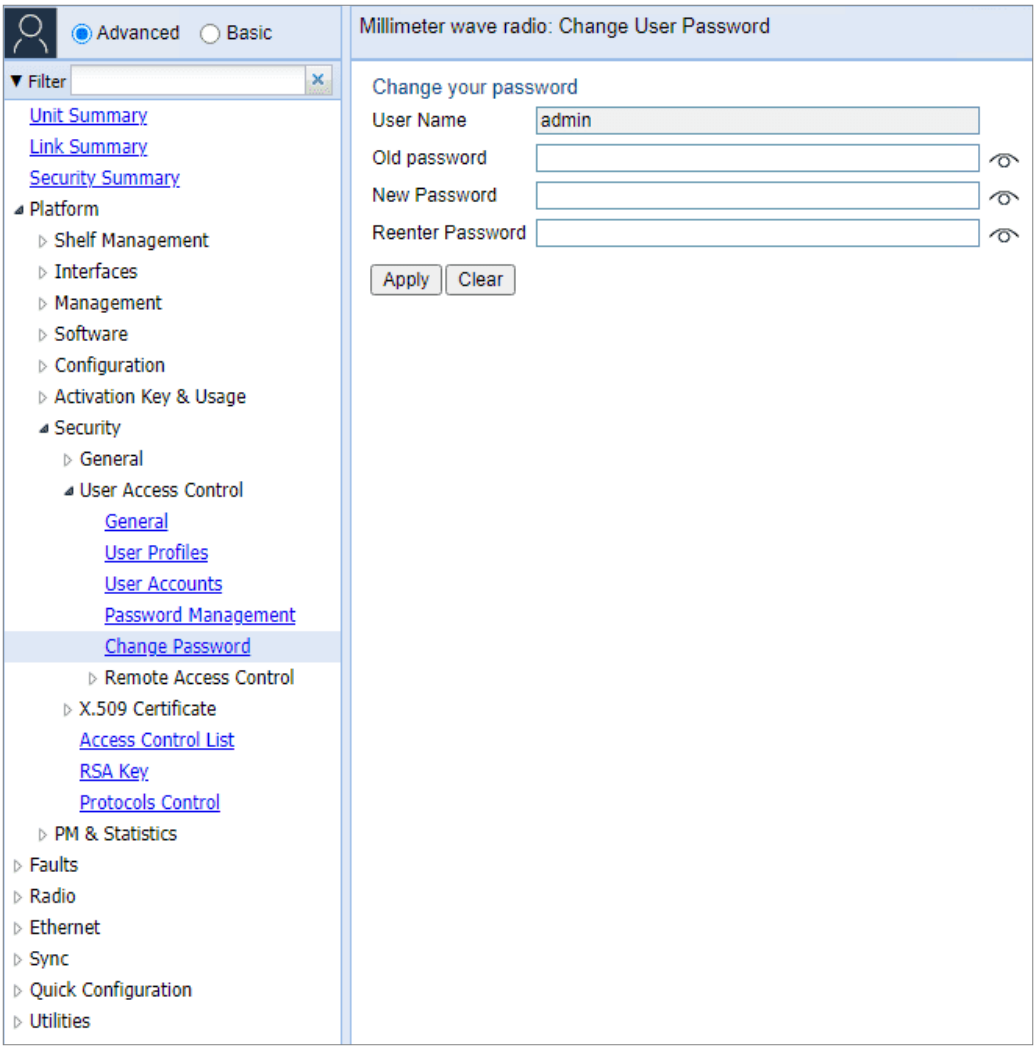
Changing Your Password

It is recommended to change your default Admin password as soon as you have logged into the system.

To change your password:

1. Select Platform > Security > Access Control > Change Password. The Change User Password page opens.

Figure 19: *Change User Password Page*



2. In the Old password field, enter the current password. For example, upon initial login, enter the default password (admin).
3. In the New password field, enter a new password. If Enforce Password Strength is activated, the password must meet the following criteria:
4. In the New password field, enter a new password. If Enforce Password Strength is activated, the password must meet the following criteria:
   - Password length must be at least eight characters.
   - Password must include characters of at least three of the following character types: lower case letters, upper case letters, digits, and special characters.
   - No character can be repeated three times, e.g., aaa, ###, 333.

- No more than two consecutive characters can be used, e.g., ABC, DEF, 123.
- The user name string cannot appear in the password, either in order or in reverse order. For example, if the user name is “admin”, neither of the following passwords are allowed: *%Asreadmin!df23* and *%Asrenimda!df23*.

5. Click Apply.

In addition to the Admin password, there is an additional password protected user account, “root user”, which is configured in the system. The root user password and instructions for changing this password are available from Cambium Customer Support. It is strongly recommended to change this password.

Configuration

Before connection over the radio hop is established, it is of high importance that the elements are assigned a dedicated IP address, according to an IP plan for the total network.

Note:

If connection over the hop is established with identical IP addresses, an IP address conflict will occur, and remote connection to the element on the other side of the hop may be lost.

By default all elements have the same IP settings:

- IP address: 192.168.1.1
- Subnet mask: 255.255.255.0

Note:

After the new IP address is set, the contact with the element will be lost. In order to reconnect, the PC must have an IP address within the same subnet as the element.

In addition to setting the IP addresses, the following configuration steps should be performed in order to establish basic connectivity. For a detailed description of these procedures, refer to the User Guide for PTP 850GP.

- Enable the Radio Interfaces
- Set the Radio Frequencies
- Configure the License
- Unmute the Radio

Acceptance & Commissioning Procedures

This chapter provides Cambium's recommended Acceptance and Commissioning Procedure for PTP 850GP. Acceptance and commissioning should be performed after initial setup is complete.

The purpose of this procedure is to verify correct installation and operation of the installed link and the interoperability with customer end equipment.

Cambium's Acceptance and Commissioning procedure includes the following stages:

- Site Acceptance Procedure
- Commissioning of radio link

The Site Acceptance Procedure is a checklist that summarizes the installation requirements of the site at which the products were installed.

The commissioning tests cover the required configuration information that should be recorded, and the tests that should be performed on the radio link.

Site Acceptance Procedure

The purpose of the following procedures is to verify that all installation requirements were noted and checked. Following this procedure will ensure proper, long-lasting, and safe operation of the product.

The checklist below summarizes the installation requirements of the site.

SITE ACCEPTANCE CHECKLIST	
1. SITE INFORMATION	
Customer:	
Radio model:	
Site name:	
Site code:	
Radio link code:	
Site address:	
2. ANTENNA MOUNTING	
Antenna mount type:	
Mount is of sufficient height to clear local obstructions	OK
Mount is safely positioned to not cause a safety hazard	OK
Mount is secure and perpendicular	OK
Mount is grounded as per site specifications	OK

SITE ACCEPTANCE CHECKLIST	
All steelwork is Galvanized or Stainless Steel as appropriate	OK
3. ANTENNA	
Antenna type (model and size):	
Antenna is securely fixed to mount	OK
Antenna is grounded as per site specifications	OK
Antenna sway braces are installed correctly (where applicable)	OK
Antenna Radome is securely fitted (where applicable)	OK
Water drain plugs are fitted and removed, as appropriate	OK
Antenna sealing O-Ring is properly fitted and not damaged	OK
Antenna/Launch unit polarization is as per link requirements	OK
4. RADIO FREQUENCY UNIT (RFU)	
Type of RFU mount:	(Direct or Remote mount)
RFU is securely mounted to the antenna or pole	OK
RFU is grounded as per installation instructions	OK
RFU's polarization is as per link requirements	OK
RFU is installed properly and has no physical damage	OK
For Remote-Mount Only:	
Remote mount kit is securely mounted to the pole	OK
Flexible waveguide has no physical damage and connectors are sealed	OK
All flexible waveguide bolts are secured using washers and lock-washers, as appropriate	OK
Flexible waveguide is secured to the pole	OK
6. Optical CABLE	
Overall cable length:	
Cable type:	
Cable connected securely to RFU and IDU	OK
Cable connector is weather-proofed (sealed) at the RFU	OK
At the RFU, cable has a service/drip loop to prevent moisture from entering the connector	OK

SITE ACCEPTANCE CHECKLIST	
Cable is secured using suitable restraints to fixed points at regular intervals (0.5 m recommended)	OK
Cable has no sharp bends, kinks, or crushed areas. All bends are per manufacturer specifications	OK
Cable point-of-entry to building/shelter is weather-proof	OK
Cable point-of-entry to building/shelter is weather-proof	OK
Cable ends are properly labeled	OK
7. FLEXIBLE WAVEGUIDE	
Overall flexible WG length:	
Flexible WG type:	
Flexible WG is connected securely to ODU and Antenna	OK
Flexible WG connector is weather-proofed (sealed) at the ODU	OK
At the RFU, the flexible WG has a service/drip loop to prevent moisture from entering the connector	OK
Flexible WG is secured using suitable restraints to fixed points at regular intervals (0.5 m recommended)	OK
Flexible WG has no sharp bends, kinks, or crushed areas. All bends are per manufacturer specifications	OK
Flexible WG point-of-entry to building/shelter is weather-proof	OK
Flexible WG ends are properly labeled	
8. INDOOR UNIT	
IDU is securely mounted to the rack	OK
IDU is located in a properly ventilated environment	OK
IDU fans are functional and air flow to the fans is not disrupted	OK
IDU and rack are grounded as per site specifications	OK
Traffic cables and connections are properly terminated as per manufacturer/cable instructions	OK
All cabling is secured, tidy, and visibly labeled	OK
9. DC POWER SUPPLY - Two Inputs	
Measured DC voltage input to the IDU:	(-40.5 to -60 VDC)
Power-Supply maximum current:	(at least 3 Ampere per carrier)

SITE ACCEPTANCE CHECKLIST	
Power-Supply is properly grounded	OK
DC power backup type:	
IDU DC connector is secure and the DC input leads are correctly terminated (no bare wires are visible)	OK
IDU DC connector (+) and (GND) leads are shorted and GND is grounded	OK
10. RACK INSTALLATION	
Rack is mounted to the shelter floor with four screws	
Rack is mounted to the shelter wall with two screws	
11. REMARKS/NOTES	
12. GENERAL INFORMATION	Name:
Site accepted by:	Title:
	Company:
	Signature:
	Date:
Site approved by:	Name:
	Title:
	Company:
	Signature:
	Date:

Site Acceptance Checklist Notes

The following notes provide important additional information about the Site Acceptance Checklist.

1. Antenna Mounting
    - Mounting pole is of sufficient height to clear local obstructions, such as parapets, window cleaning gantries, and lift housings.

- Mounting Pole is of sufficient height, and is safely positioned, so as not to cause a safety hazard. No person should be able to walk in front of, or look directly into the path of the microwave radio beam. Where possible, the pole should be away from the edge of the building.
- Mounting pole is secure and perpendicular. A pole that is not perpendicular may cause problems during antenna alignment.
- Mounting pole is grounded as per site specifications. All operators and site owners have specific requirements regarding the grounding of installations. As a minimum, typical requirements are such that any metal structure must be connected to the existing lightning protection ground of the building. Where it extends beyond the 45 degree cone of protection of existing lightning conductors, additional lightning protectors should be installed.
- All steelwork is Galvanized or Stainless Steel, as appropriate to prevent corrosion.

2. Antenna
    - Antenna is grounded as per site specifications. See the third point in the Antenna Mounting section above.
    - Antenna sway braces are fitted and installed correctly, where applicable. Typically, for an antenna of 1.2 m or larger, an extra sway brace is fitted to the mounting frame of the antenna. This sway brace should not be mounted to the same pole as the antenna, but should be installed directly back to the tower or an alternative point.
    - Antenna Water Drain Plugs are fitted and removed, where appropriate. Some antennas have moisture drain plugs installed at various points around the antenna. The purpose of these plugs is to allow any moisture that forms on the inside of the antenna or radome to drip out and prevent a pool within the antenna. Only the plugs at the bottom of the antenna, after installation, should be removed. All other plugs should be left in position.
3. RFU (Outdoor Unit)
    - The RFU is grounded as per installation instructions. See the third point in the Antenna Mounting section above.
    - The RFU polarization is as per link requirements and matches the polarization of the antenna.
4. Indoor Unit
    - The main traffic connections are correctly terminated and crimped as per cable and connector manufacturer instructions. All fiber optic patch leads should be routed carefully and efficiently, using conduits to prevent damage to the cables.
    - All other user terminations are secure and correctly terminated.
    - All labeling is complete as per site requirements. Labeling is specific to each customer. At a site with only one installation, labeling may be unnecessary. However, at sites with multiple installations, correct and adequate labeling is essential for future maintenance operations.

Typical labeling requirements include:

Antenna labels - for link identity and bearing

RFU labels - for link identity, frequency, and polarization

Coax cable labels - for link identity, close to the RFU, IDU, and either end of any joint

IDU labels - for link identity

Radio Link Commissioning Procedure

Scope

This section describes the recommended commissioning tests for PTP 850GP radio link in a 1+0 configuration.

The purpose of the commissioning tests is to verify correct and proper operation of the product.

Commissioning Test

The following tests should be performed on each installed link.

Link Verification

- Received Signal Level (RSL) is up to +/- 4 dB from the expected (calculated) level at both ends of the link.
- Radio Bit Error Rate (BER) is 10E-11 or lower.
- If working with ATPC, ATPC is operating as expected (RSL = reference level).

Ethernet Line Interfaces Test

- Connect Ethernet Packet Analyzer to the GbE port. Use physical loop at remote end (or connect second analyzer). Run Packet Loss test for at least one hour (load rate as per Cambium's specifications for the chosen MRMC).
- Connect Ethernet Packet Analyzer to the FE port. Use physical loop at remote end (or connect second analyzer). Run Packet Loss test for at least one hour (load rate as per Cambium's specifications for the chosen MRMC).

Interoperability Verification

- Connect customer end equipment to the line interfaces, and verify correct operation.
- Further interoperability tests should be performed in accordance with the specific requirements of the connected end equipment.

Management Verification

- Launch the HTTP management and verify that you can manage the link and that you are able to perform changes to the link configuration (frequency channel, Tx power, system name, time & date, etc.)
- Verify that correct parameters are reported when performing the above.

- Verify that there are no active alarms on the link.
- If the management station is located at a remote site (Network Operation Center), verify that the management station can manage the link and receive traps.

PTP 850GP Commissioning Log

The Commissioning Log is an integral part of the commissioning procedure and should be filled in for each installed link.

The Commissioning Log gathers all relevant information regarding the installed link and contains a checklist of all recommended commissioning tests.

Maintaining the Commissioning Log is important for tracking your installations, and to provide essential data for Cambium Networks.

Upon completing the Commissioning Log, send the log to Cambium support center at support@Cambium.com.

PTP 850GP LINK COMMISSIONING LOG		
1. GENERAL INFORMATION		
Customer:		
Radio model:		
Configuration:		
Radio link code:		
Site 1 name & add:		
Site 2 name & add:		
2. RFU	Site 1	Site 2
RFU model:		
RFU p/n:		
RFU s/n:		
RFU SW:		
Tx frequency (MHz):		
Rx frequency (MHz):		
Link ID:		
Tx power (dBm):		
ATPC on/off:		
ATPC ref level:		

PTP 850GP LINK COMMISSIONING LOG		
RFU Polarization:		
3. ANTENNA AND ODU MOUNT		
Antenna vendor and model:		
Antenna size:		
Mounting type:		
Mounting losses:		
4. LINK PARAMETERS		
Link distance:		
Rain zone:		
Expected RSL (dBm):		
Expected Diversity RSL (dBm):		
RSL Main (dBm):		
RSL Diversity (dBm):		
Deviation from exp?		
RSL ≤4 dB?		
5. COMMISSIONING TESTS		
Line loopback:	Pass	Pass
RFU loopback:	Pass	Pass
Radio BER:	Pass	Pass
FE test:	Pass	Pass
GbE test:	Pass	Pass
6. MANAGEMENT CONFIGURATION		
Eth IP Address:		
Eth IP mask:		
Default router:		
In-band VLAN		
7. REMARKS/NOTES		

PTP 850GP LINK COMMISSIONING LOG		
8. INSTALLATION INFORMATION		
Installed by:	Name:	
	Company:	
	Signature:	
	Date:	
Commissioned by:	Name:	
	Company:	
	Signature:	
	Date:	

Cambium Networks

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 Connected Partners 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.

Support website	https://support.cambiumnetworks.com
Support enquiries	
Technical training	https://learning.cambiumnetworks.com/learn
Main website	https://www.cambiumnetworks.com
Sales enquiries	solutions@cambiumnetworks.com
Warranty	https://www.cambiumnetworks.com/support/standard-warranty/
Telephone number list	https://www.cambiumnetworks.com/contact-us/
User Guides	https://www.cambiumnetworks.com/guides
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