Cambium Networks™

INSTALLATION GUIDE

PTP 820A

Release 13.1

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Contents

Before You Start

Important Notes

- For the warranty to be honored, install the unit in accordance with the instructions in this manual.
- Any changes or modifications of equipment not expressly approved by the manufacturer could void the user's authority to operate the equipment and the warranty for such equipment.
- PTP 820A is intended for installation in a restricted access location.
- PTP 820A must be installed and permanently connected to protective earth by qualified service personnel in accordance with applicable national electrical codes.
- Site grounding is the responsibility of the operator or owner of the site. It is critical that all site components be properly grounded in accordance with the specific site requirements and applicable industry standards and best practices. Ground resistance must be no more than 5 ohms. Any higher resistance may lead to equipment malfunction and affect the product's warranty.

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.

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 (30 cm). Do not look into an open waveguide unless you are absolutely sure that the power is turned off.

ESD

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

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.

Special Requirements for North America

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.

Overcurrent Protection: A readily accessible listed branch circuit overcurrent protective device, rated 15 A, must be incorporated in the building wiring.

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.

Special Requirements for Norway and Sweden:

Equipment connected to the protective earthing of the building installation through the mains connection or through other equipment with a connection to protective earthing – and to a

cable distribution system using coaxial cable, may in some circumstances create a fire hazard. Connection to a cable distribution system has therefore to be provided through a device providing electrical isolation below a certain frequency range (galvanic isolator, see EN 60728-11).

Utstyr som er koplet til beskyttelsesjord via nettplugg og/eller via annet jordtilkoplet utstyr – og er tilkoplet et kabel-TV nett, kan forårsake brannfare. For å unngå dette skal det ved tilkopling av utstyret til kabel-TV nettet installeres en galvanisk isolator mellom utstyret og kabel- TV nettet.

Utrustning som är kopplad till skyddsjord via jordat vägguttag och/eller via annan utrustning och samtidigt är kopplad till kabel-TV nät kan i vissa fall medföra risk för brand. För att undvika detta skall vid anslutning av utrustningen till kabel-TV nät galvanisk isolator finnas mellan utrustningen och kabel-TV nätet.

Précautions générales relatives à l'équipement

AVERTISSEMENT :

L’utilisation de commandes ou de réglages ou l'exécution de procédures autres que celles spécifiées dans les présentes peut engendrer une exposition dangereuse aux rayonnements.

AVERTISSEMENT :

L’usage de Cambium IDU s’accompagne du risque suivant d'électrocution et de danger électrique: le débranchement d'une alimentation électrique ne déconnecte qu'un module d'alimentation électrique. Pour isoler complètement l'unité, il faut débrancher toutes les alimentations électriques.

AVERTISSEMENT :

Bruit de machine d’ordre - 3. GPSGV, le plus haut niveau de pression sonore s'élève à 70 dB (A) au maximum, dans le respect de la norme ISO EN 7779.

Allgemeine Vorsichtsmaßnahmen für die Anlage

WARNUNG:

Wenn andere Steuerelemente verwendet, Einstellungen vorgenommen oder Verfahren durchgeführt werden als die hier angegebenen, kann dies gefährliche Strahlung verursachen.

WARNUNG:

Beachten Sie beim Arbeiten mit PTP 850C das folgende Stromschlag- und Gefahrenrisiko: Durch Abtrennen einer Stromquelle wird nur ein Stromversorgungsmodul abgetrennt. Um die Einheit vollständig zu isolieren, trennen Sie alle Stromversorgungen ab.

WARNUNG:

Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70 dB(A) oder weniger gemäß EN ISO 7779.

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

Pre-Installation Instructions

Packing

The equipment should be packed and sealed in moisture absorbing bags.

Transportation and 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 transportation, in accordance with ETS 300 019-1-2, Class 2.3. For sea-transport, deck-side shipment is not permitted. Carrier-owned cargo containers should be used.

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

If intermediate storage is required, the packed equipment must be stored in a dry and cool environment, and out of direct sunlight, in accordance with ETS 300 019-1-1, Class 1.2.

Unpacking

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. The following details should be marked:

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

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.

PTP 820A Hardware Overview

PTP 820A is a modular unit based on a 1RU or 2RU chassis into which a variety of cards can be inserted for traffic, radio interface, management, and power supply. The PTP 820A backplane provides connectivity among the slots in the chassis for management, power distribution, and traffic aggregation.

An PTP 820A chassis and the cards it contains are managed by a Traffic Control Card (TCC). A 2RU PTP 820A can contain two TCCs for TCC Redundancy. TCCs also include GbE Ethernet traffic and FE management interfaces.

Note:

TCC Redundancy can be implemented with any type of TCC, but both TCCs must be the same type.

When TCC Redundancy is enabled, only the optical GbE traffic interfaces on the TCC can be used.

Note:

For the availability of TCC Redundancy with TCC-U, check the Release Notes for the System Release version you are using.

Two types of radio cards are available to provide the interface between the PTP 820A and the RFU:

- Radio Modem Card (RMC) – Provides the modem interface with the RFU-C and RFU-HP/1500HP.
- Radio Interface Card (RIC) – Interfaces with the RFU-D, RFU-D-HP, RFU-E, and RFU-S.

A 1RU PTP 820A can contain up to five RMCs and/or RICs. A 2RU PTP 820A can contain up to ten RMCs or up to eight RICs.

Line Interface Cards (LICs) can be added to provide additional traffic interfaces. Ethernet and TDM LICs can be used. A 2RU chassis can contain up to ten LICs, up to two of which can be Ethernet LICs. A 1RU chassis can contain up to five LICs, one of which can be an Ethernet LIC.

PTP 820A receives an external supply of -48v via a Power Distribution Card (PDC). For power redundancy, a 1RU chassis can contain a dual-feed PDC that can be connected to separate power sources. A 2RU chassis can contain two PDCs connected to separate power sources. The PDC or PDCs distribute the power via the backplane to all the modules in the chassis.

PTP 820A provides two basic chassis options:

- 1RU – Fits in a single 19” rack slot, with one Main Traffic and Control Card (TCC), five universal slots for a combination of up to five Radio Modem Cards (RMCs) and/or Radio Interface Cards (RICs) and/or Line Cards for traffic (LICs). Additional slots are provided for a Power Distribution Card (PDC) and a fans tray.
- 2RU – Fits in two 19” rack slots, with two Main Traffic and Control Cards (TCCs), ten universal slots for a combination of up to ten Radio Modem Cards (RMCs) and/or Radio Interface Cards (RICs) and/or Line Cards for traffic (LICs). Additional slots are provided for two Power Distribution Cards (PDCs) and a fans tray.

Chassis Slots and Card Population Guidelines

The Figure 1 show the 1RU and 2RU chassis slot numbers.

Figure 1: *1RU Chassis Slot Numbering*

Figure 2: *2RU Chassis Slot Numbering*

The following tables list the card types that can be placed in each slot:

Table 1 *Card Types Allowed Per Slot – 1RU*

Slot Number	Allowed Card Type	Notes
1	• TCC	
2	• RMC-A, RMC-B, RIC-D • Ethernet LIC • TDM LIC	Does not include LIC-STM1/OC3-RST (1 x STM1/OC-3)
3-6	• RMC-A, RMC-B, RMC-E, RIC-D	Multi-Carrier ABC Group 1 must include the card in Slot 3, or Slot 3 must be left unpopulated if a Multi-Carrier ABC group with the group number 1 is configured on the unit.

Slot Number	Allowed Card Type	Notes
	• TDM LIC	

Table 2 *Card Types Allowed Per Slot – 2RU*

Slot Number	Allowed Card Type	Notes
1	• TCC	
2,12	• RMC-A, RMC-B, RIC-D • Ethernet LIC • TDM LIC	Does not include LIC-STM1/OC3-RST (1 x STM1/OC-3)
3 - 10	• RMC-A, RMC-B, RMC-E, RIC-D • TDM LIC	Multi-Carrier ABC Group 1 must include the card in Slot 3, or Slot 3 must be left unpopulated if a Multi-Carrier ABC group with the group number 1 is configured on the unit.
11	• TCC	Only valid when TCC redundancy is enabled.

TCC GbE Interface Limitations

TCC GbE Interface Limitations with TCC-U

When using TCC-U, the second RFU interface (RFU2/2.5GE2) can be used on RIC-D cards that are placed in slots 5 through 10. However, this is subject to the following limitations:

- If the first electrical RFU/Ethernet port (RFU1/Eth7) on the TCC-U is being used, RFU2 cannot be used on a RIC-D in slot 7 and vice versa.
- If the second electrical RFU/Ethernet port (RFU2/Eth8) on the TCC-U is being used, RFU2 cannot be used on a RIC-D in slot 8.

Note:

Use of RFU2/2.5GE2 in slots 7 and 8 is subject to other limitations. See Radio Interface Cards (RIC).

TCC GbE Interface Limitations with TCC-B2 and TCC-B2-XG-MC

When using a TCC-B2 or TCC-B2-XG-MC, you should avoid placing any type of traffic cards (Ethernet LIC, TDM LIC, RMC, and RIC) in certain slots. If you place a traffic card in one of these slots, some interfaces on the TCC-B2 or TCC-B2-XG-MC cannot be used, as described in the following table.

Table 3 *Slot Limitations When Used with TCC-B2 or TCC-B2-XG-MC*

Traffic Card in Slot:	TCC-B2/TCC-B2-XG-MC Interfaces Not Available for Use:
9	GbE5
10	GbE6
12	• Ethernet LIC in Slot 12: SFP1, SFP2, GbE3/CS3, GbE4/CS4 • TDM LIC, RMC, or RIC in Slot 12: GbE3/CS3 only

TCC GbE Interface Limitations with TCC-B and TCC-B-MC

When an Ethernet LIC is installed in slot 12, the two GbE interfaces on the TCC-B or TCC-B-MC are disabled, leaving a total of 8 GbE interfaces per chassis.

Adjacent Pair Guidelines

RMCs that are planned to be used in XPIC configurations must be placed in adjacent pairs, as follows:

- Slots 3 and 4
- Slots 5 and 6
- Slots 7 and 8 (2RU only)
- Slots 9 and 10 (2RU only)

Note:

This limitation does not apply to RIC-D.

If you configuring 2+2 HSB with XPIC, you must configure the radio protection group in non-adjacent channels, e.g., slots 3 and 5 or slots 4 and 6. That is because the XPIC groups must be configured in adjacent slots. For example:

- XPIC Group #1: Slots 3 and 4
- XPIC Group #2: Slots 5 and 6
- Protection Group #1: Slots 3 and 5
- Protection Group #2: Slots 4 and 6

Slot Sections and 2.5 Gbps Mode

The slots in the chassis are divided into sections, as described below. Each section can be configured to 1 Gbps mode (default) or 2.5 Gbps mode, and a card cannot exceed the capacity of the section it is in.

Note:

When TCC-U is used, slot sections do not exist and none of the restrictions listed in this section are applicable. With TCC-U, 2.5 Gbps capacity is available in all slots.

Table 4 *Card Type Usage Per Section Capacity*

Card Type	2.5 Gbps Mode	1 Gbps Mode
RIC-D	No restrictions	No restrictions
RMC-B	Must be part of a Multi-Carrier ABC group	Multi-Carrier ABC and 1+0
RMC-A	Cannot be used	1+0
RMC-E	Must be part of a Multi-Carrier ABC group	Must be part of a Multi-Carrier ABC group
LIC-X-E10	Cannot be used	Slot section (B, E, or F) is automatically configured to 10 Gbps mode when the Expected Card Type is set to LIC-X-E10.
LIC-X-E4-Elec	Cannot be used	Slot sections B, E, and F– no restrictions
LIC-X-E4-Opt	Cannot be used	Slot sections B, E, and F– no restrictions
LIC-T16	Cannot be used	No restrictions
LIC-T155	Cannot be used	No restrictions
LIC-STM1/OC3-RST	Must be part of a Multi-Carrier ABC group	Must be part of a Multi-Carrier ABC group

Figure 3: *1RU Chassis – Slot Sections*

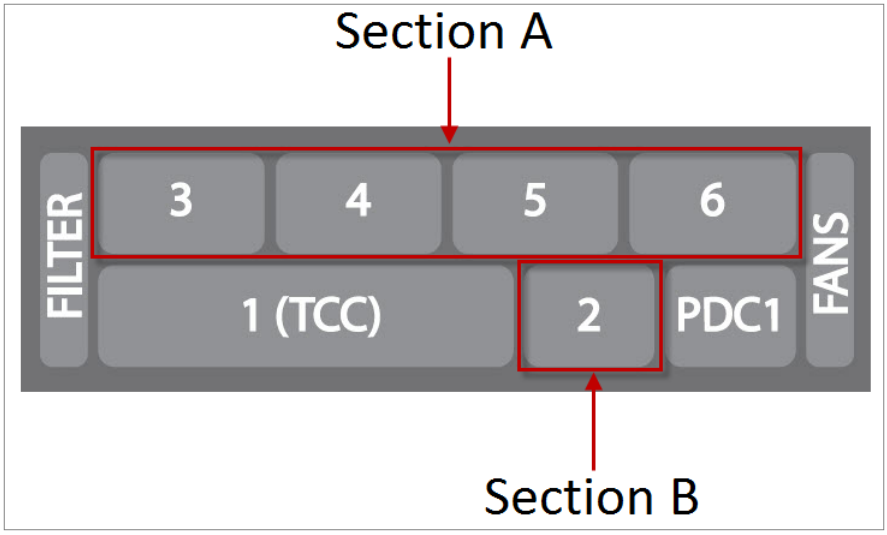
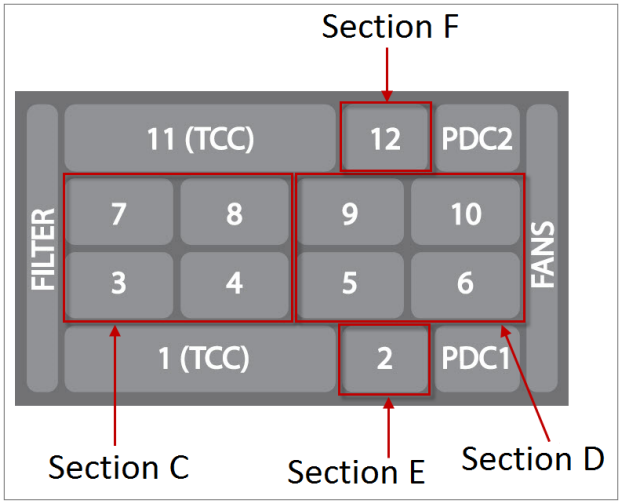


Figure 4: *2RU Chassis – Slot Sections*



In 1 Gbps mode, you can mix all types of traffic and radio cards in the same section, subject to the card population guidelines described in the rest of this chapter.

It is important to note that only the following cards can operate in a section configured to 2.5 Gbps mode:

- RIC-D
- RMC-B, when part of a Multi-Carrier ABC group
- LIC-STM1/OC3-RST, as part of a Multi-Carrier ABC group
- RMC-E, as part of a Multi-Carrier ABC group

If you plan to use 2.5 Gbps TCC-Based Multi-Carrier ABC groups, you *must* configure slot section A (1RU chassis) or C (2RU chassis) to 2.5 Gbps mode. In this configuration, the 2.5 Gbps groups must be Group 1 and Group 3.

Note:

Only RIC-D cards are supported in multiple 2.5 Gbps groups.

Additional Slot Guidelines

Note:

For TCC-U, only the ABC Group 1 limitation is applicable.

When using Multi-Carrier ABC, the ABC mechanism requires one slot on the chassis as a dedicated Multi-Carrier ABC slot. That means the slot either be populated with a card that belongs to the ABC group or the slot must be empty.

The identity of this dedicated slot depends on the ID number of the ABC group, as described in Table 5. For example, if two Multi-Carrier ABC groups are configured on a 2RU chassis and given Group ID 1 and Group ID 2, Slot 3 and Slot 4 should both be populated by cards assigned to an ABC group.

Note:

The cards do not have to be assigned specifically to the group that corresponds to the slot. For example, the card in slot 3 could be assigned to ABC Group 2.

Table 5 *Additional Slot Limitations with Multi-Carrier ABC*

Group Number	2RU Chassis	1RU Chassis
ABC Group 1	Slot 3	Slot 3
ABC Group 2	Slot 4	Slot 4
ABC Group 3	Slot 7	Slot 5
ABC Group 4	Slot 8	Slot 6

Traffic Control Card (TCC)

The Traffic Control Card (TCC) provides control functionality. It also provides GbE interfaces for Ethernet traffic and one or two FE interfaces for management traffic.

PTP 820A offers the following types of TCC:

- TCC-U – Provides 6 x 1/10GE SFP interfaces and 2 x RFU or 1/2.5 GbE electrical PoE interfaces. Supports up to two Multi-Carrier ABC groups, with capacity of 2.5 Gbps (non-configurable). Supports both TCC-based and RFU-based Multi-Carrier ABC. Supports multiple high-capacity configurations with Link Bonding.

  Note:

  When used with electrical SFP transceivers, the SFP interfaces support 1GE only.

  TCC-U requires System Release 11.5.5 or higher. TCC-U does not support RMC-A.

- TCC-B2-XG-MC – Supports up to two Multi-Carrier ABC groups with capacity of 2.5 Gbps or up to four Multi-Carrier ABC groups with capacity of 1 Gbps per group. Supports both TCC-based and RFU-based Multi-Carrier ABC. Provides 2 x FE Ethernet management interfaces, 2 x GbE optical interfaces, 2 x GbE electrical interfaces, and 2 x dual mode electrical or cascading interfaces.

> **Note**:
>
> Only RIC-D cards and LIC-STM1/OC3-RST cards are supported in multiple 2.5 Gbps groups.

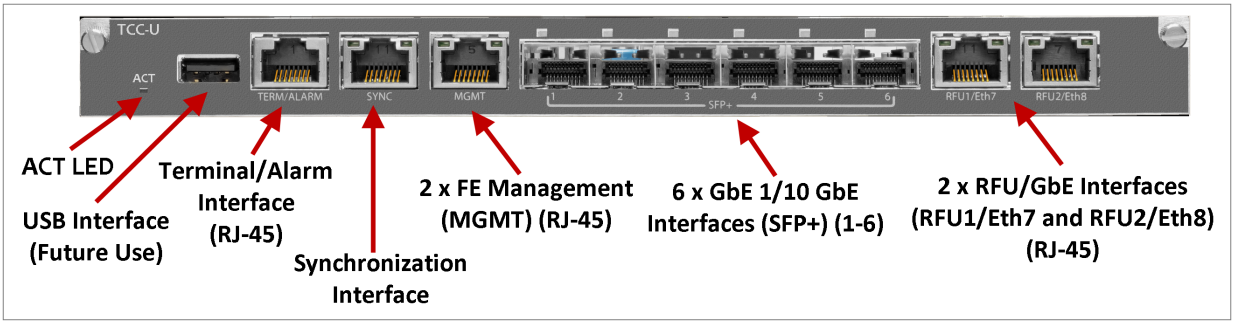
- TCC-B-MC – Supports Multi-Carrier ABC configurations. Supports both TCC-based and RFU-based Multi-Carrier ABC. Provides 2 x FE Ethernet management interfaces and 2 x GbE combo interfaces (electrical or optical) for Ethernet traffic.
- TCC-B – Provides 2 x FE Ethernet management interfaces and 2 x GbE combo interfaces (electrical or optical) for Ethernet traffic.
- TCC-B2 – Provides 2 x FE Ethernet management interfaces, 2 x GbE optical interfaces, 2 x GbE electrical interfaces, and 2 x dual mode electrical or cascading interfaces.

The TCC is responsible for the following functionality:

- Provides the main CPU for the IDU chassis
- Responsible for chassis management
- Responsible for switch aggregation
- Responsible for synchronization in the PTP 820A chassis

TCC-U Interfaces

Figure 5: *TCC-U Interfaces*



TCC-U contains six optical 1/10 GbE interfaces, labelled 1 through 6.

> **Note**:
>
> When used with electrical SFP transceivers, the SFP interfaces support 1GE only.

SFP+ 1 and SFP+ 2 can be configured as normal Ethernet traffic interfaces or as cascading interfaces. When operating in cascading mode, these interfaces can handle hybrid Ethernet and Native TDM traffic, enabling operators to create links among multiple PTP 820 and PTP 850 units in a node for multi-directional applications based on hybrid Ethernet and Native or pseudowire TDM services.

TCC-U also contains two RJ-45 interfaces, each with a capacity of 2.5 Gbps, that can be used either as RFU interfaces or as additional Ethernet interfaces. These interfaces are labelled RFU1/Eth1 and RFU2/Eth2.

- When used as RFU interfaces, they can be connected to RFU-D, RFU-D-HP, RFU-E, or RFU-S. They support PoE and capacity of 2.5 Gbps. They do not support TCC-based Multi-Carrier ABC or radio HSB.

Note:

PoE is not supported with RFU-D-HP.

Not all System Release versions support using these ports as RFU interfaces. For further information, check the Release Notes for the System Release version you are using.

- When used as Ethernet interfaces, capacity of each interface can be configured to 1 Gbps or 2.5 Gbps.

When using TCC-U, the second RFU interface (RFU2) can be used on RIC-D cards that are placed in slots 5 through 10. However, this is subject to the following limitations:

- If RFU1/Eth7 on the TCC-U is being used, RFU2 cannot be used on a RIC-D in slot 7 and vice versa.
- If RFU2/Eth8 on the TCC-U is being used, RFU2 cannot be used on a RIC-D in slot 8 and vice versa.

Note:

Use of RFU2/2.5GE2 in slots 7 and 8 is subject to other limitations. See Radio Interface Cards (RIC).

The TCC-U also contains the following interfaces:

- One RJ-45 synchronization interface for clock input and clock output.
- One RJ-45 interface for terminal connection (console) and external alarms, supporting one input and one output alarm.

Note:

Support for external alarms with TCC-U is planned for future release.

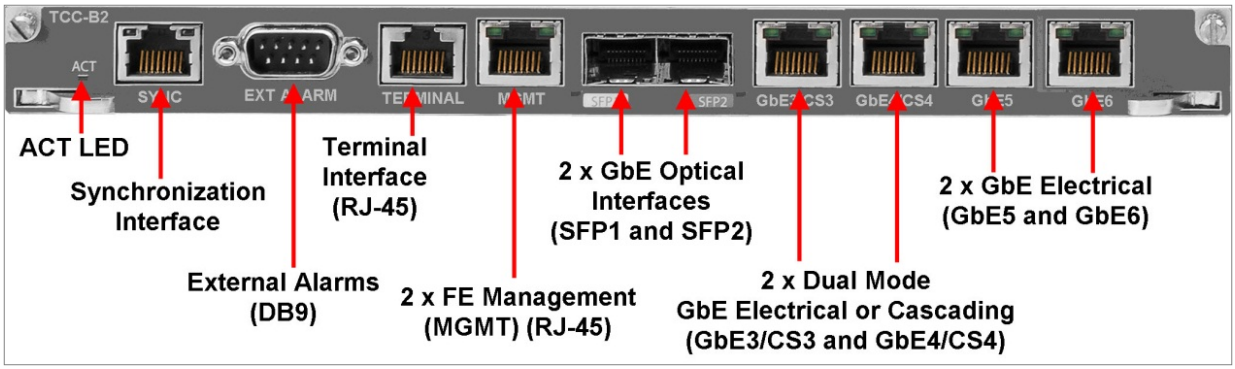
For a description of the management interfaces on TCC-U, see Management Interfaces for TCC-U, TCC-B2-XG-MC , and TCC-B2.

Note:

TCC-U also includes a USB port, which is planned for future use.

TCC-B2/TCC-B2-XG-MC Interfaces

Figure 6: *TCC-B2/TCC-B2-XG-MC Interfaces*



TCC-B2 and TCC-B2-XG-MC contain two optical GbE interfaces: SFP1 and SFP2.

TCC-B2 and TCC-B2-XG-MC contain two electrical GbE interfaces: GbE5 and GbE6.

GbE3/CS3 and GbE4/CS4 can be configured as normal GbE traffic interfaces or as cascading interfaces. When operating in cascading mode, these interfaces can handle hybrid Ethernet and Native TDM traffic, enabling operators to create links among multiple PTP 820 units in a node for multi-directional applications based on hybrid Ethernet and Native or pseudowire TDM services.

TCC-B2 and TCC-B2-XG-MC also contain the following interfaces:

- One RJ-45 terminal interface (RS-232).
- One DB-9 interface for external alarms, supporting five input alarms and one alarm output.
- One RJ-45 synchronization interface for clock input and clock output.

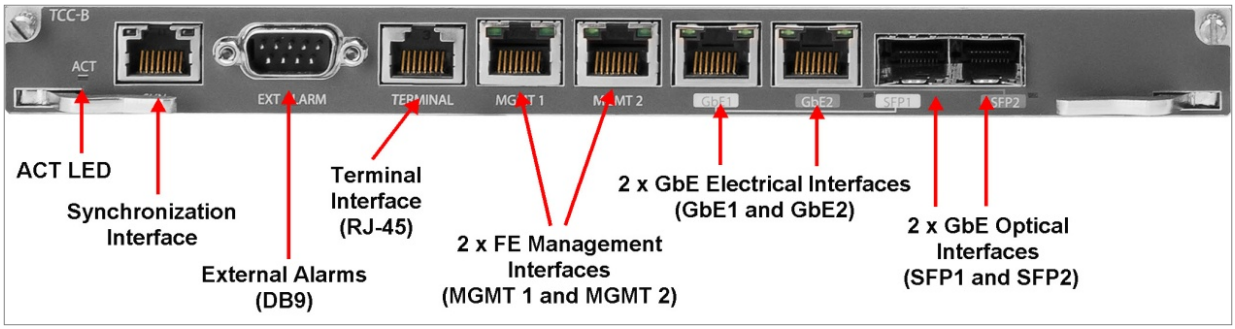
For a description of the management interfaces on TCC-B2 and TCC-B2-XG-MC, see Management Interfaces for TCC-U, TCC-B2-XG-MC , and TCC-B2.

Note:

TCC-B2 cannot be used with software versions prior to 8.0 and TCC-B2-XG-MC cannot be used with software versions prior to 8.2.

TCC-B/TCC-B-MC Interfaces

Figure 7: *TCC-B and TCC-B-MC Interfaces*



TCC-B and TCC-B-MC contain two GbE Ethernet interfaces and two FE interfaces for management.

For the GbE interfaces, you can choose between two optical (SFP) and two electrical (RJ-45) physical interfaces. The electrical interfaces are labeled GbE1 and GbE2. The optical interfaces are labeled SFP1 and SFP2. The optical interfaces are located to the right of the electrical interfaces.

TCC-B and TCC-B-MC also contain the following interfaces:

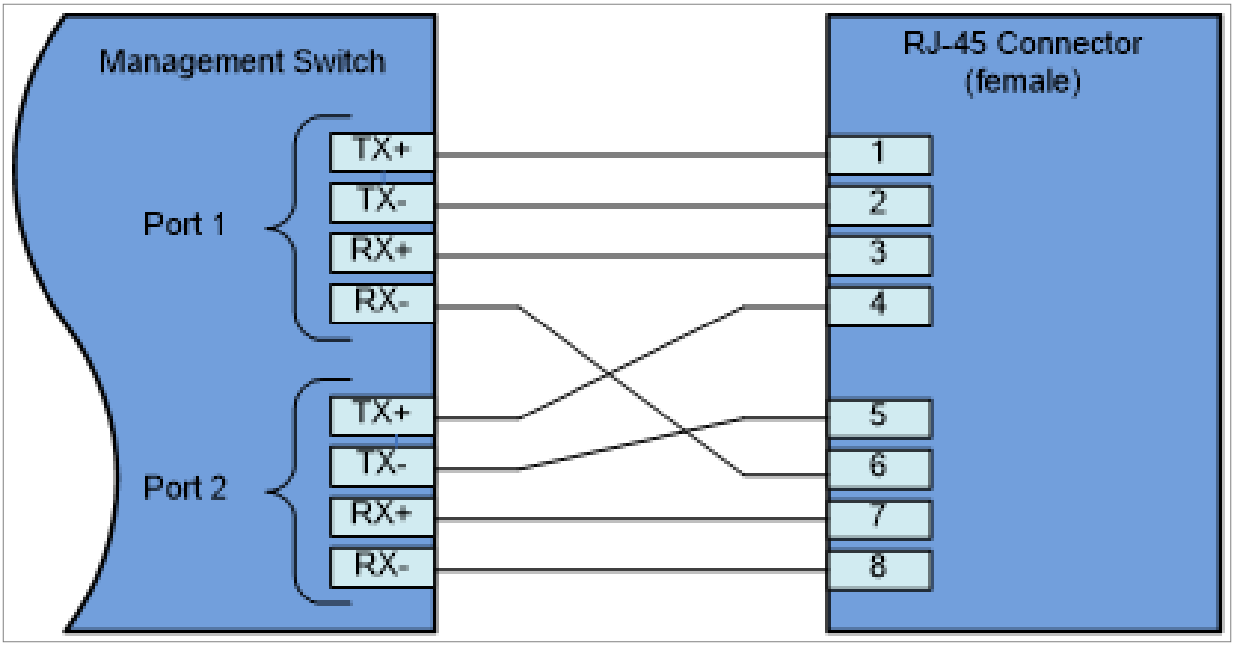
- One RJ-45 terminal interface (RS-232).
- One DB-9 interface for external alarms, supporting five input alarms and one alarm output.
- One RJ-45 synchronization interface for clock input and clock output.

The FE management interfaces are labeled MGMT1 and MGMT2. These interfaces are 100BaseT with auto negotiation and auto crossover.

Management Interfaces for TCC-U, TCC-B2-XG-MC , and TCC-B2

TCC-U, TCC-B2, and TCC-B2-XG-MC contain two FE management interfaces, which connect to a single RJ-45 physical connector on the front panel (MGMT).

Figure 8: *TCC-B2/TCC-B2-XG-MC Management Interface Pin Connections*



If the user only needs to use a single management interface, a standard Cat5 RJ-45 cable (straight or cross) can be connected to the MGMT interface.

To access both management interfaces, a special 2 x FE splitter cable can be ordered from Cambium.

Table 6 *2 x FE Splitter Cable Marketing Model*

Marketing Model	Marketing Description	Part Number
SPL-ETH-CBL	Ethernet split cable rohs	WA-0245-0

TCC LED

All TCC models contain the following LED:

- ACT – Indicates whether the card is working properly (Green) or if there is an error or a problem with the card's functionality (Red).

All TCC models can be used in both 1RU and 2RU chassis.

Radio Interface Cards (RIC)

The Radio Interface Card (RIC) provides interfaces between the IDU and any of the following RFUs:

- RFU-D
- RFU-E
- RFU-S
- RFU-D-HP

The 1RU model of PTP 820A can accommodate up to five RICs. The 2RU model of PTP 820A can accommodate eight RICs.

PTP 820A offers the RIC-D. The RIC-D includes two combo interfaces to the RFU (optical or electrical), each with a capacity of 2.5 Gbps.

In order to use the second RFU interface on a RIC-D (RFU2/2.5GE2):

- The unit must be using TCC-U.
- The RIC-D card must be placed in in slots 5-10. In a 1RU chassis, the RIC-D must be placed in slots 5-6.

The following additional limitations exist for using RFU2/2.5GE2 in slots 7-8:

- If the first onboard RJ-45 interface on the TCC-U (RFU1/Eth7) is being used, RFU2/2.5GE2 cannot be used on a RIC-D in slot 7.
- If the second onboard RJ-45 interface on the TCC-U (RFU2/Eth8) is being used, RFU2/2.5GE2 cannot be used on a RIC-D in slot 8.The use of RFU2/2.5GE2 in slots 7 and 8 requires TCC-U P/N 24-T014-2 or later, once it is available. For details about availability, contact your Cambium representative.
- To use a RIC-D in 2.5 Gbps mode, you must place the RIC-D in a section of the chassis configured for 2.5 Gbps mode. This restriction is not relevant with TCC-U. For details, see Slot Sections and 2.5 Gbps Mode.

Note:

Standard-power RFUs can receive PoE power from the IDU via the electrical interfaces. If they are connected to the IDU via the optical interfaces, a separate power cable must be used. High-power RFUs always require a separate power cable. For details, see IDU-RFU Cable Connection.

The following RFU configurations are supported per RIC-D:

- 1 x RFU-D
- 1 x RFU-D-HP
- 1 x RFU-S
- 1x RFU-E

Figure 9: *RIC-D*

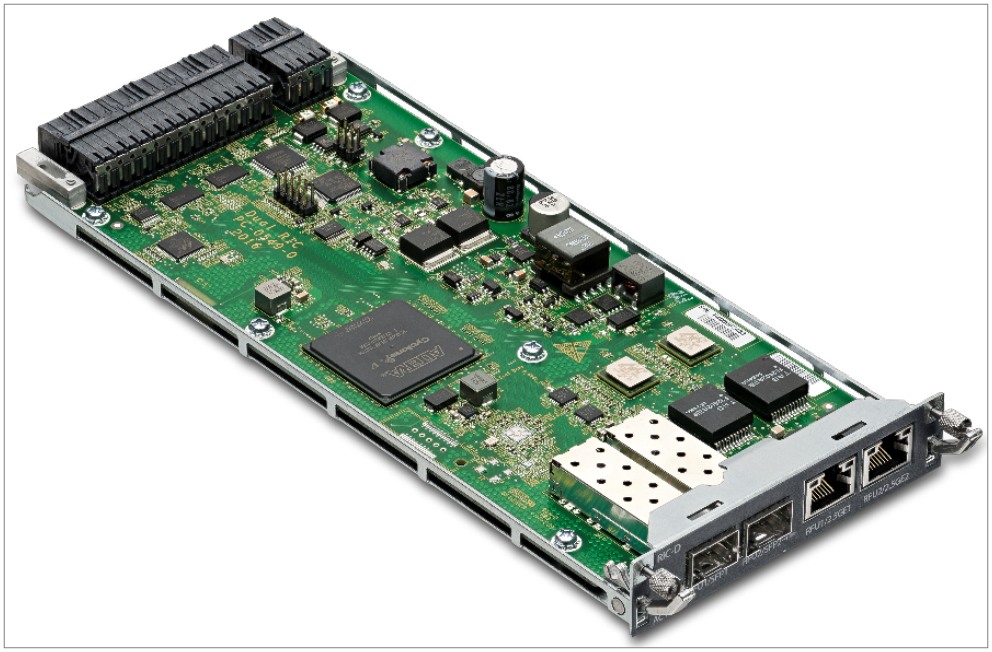
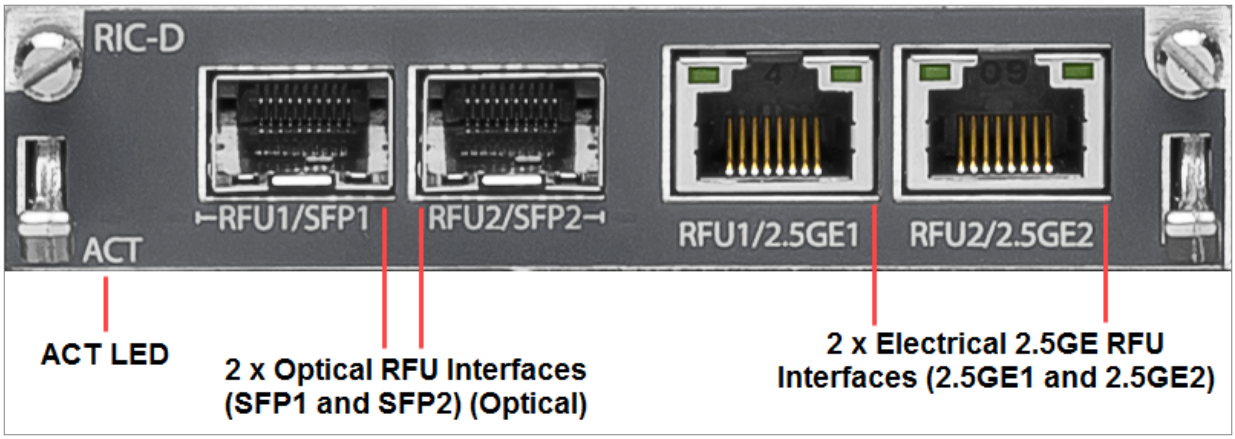


Figure 10: *RIC-D Interfaces*



RICs can be placed in any slot except the TCC slot (slot 1 and, in a 2RU chassis, slot 11).

Radio Interface Cards (RMCs)

Radio Interface Cards (RMCs) provide the modem interface between the IDU and the RFU. The 1RU chassis can accommodate up to five RMCs. The 2RU chassis can accommodate up to ten RMCs.

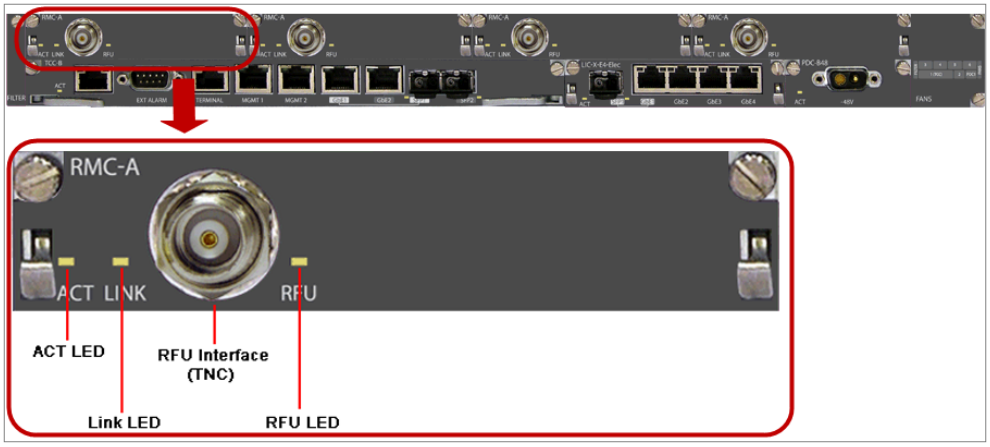
There are two types of RMC:

- RMC-A: Supports up to 256 QAM

> **Note**:
>
> RMC-A cannot be used with TCC-U.

- RMC-B: Supports up to 2048 QAM

Figure 11: *RMC Detailed View*



Ethernet Line Interface Cards

PTP 820A offers the following types of Ethernet Line Interface Cards (Ethernet LICs):

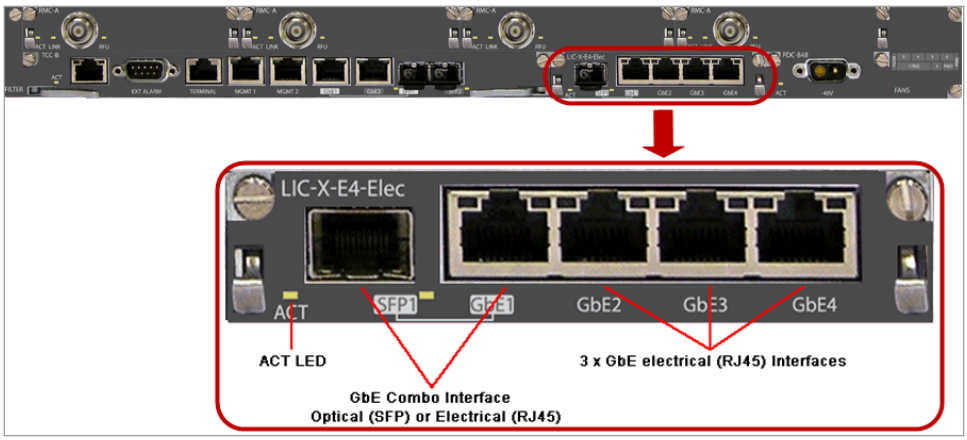
- LIC-X-E4-Elec, with 1 GbE combo interface and 3 GbE electrical (RJ-45) interfaces
- LIC-X-E4-Opt, with 1 GbE combo interface and 3 GbE optical (SFP) interfaces
- LIC-X-E10, with a single 10G optical (SFP+) interface

LIC-X-E4-Elec

The LIC-X-E4-Elec has the following interfaces:

- 1 x GbE combo interface (SFP1 / GbE1)
- 3 x GbE electrical interfaces

Figure 12: *LIC-X-E4-Elec Detailed View*



Note:

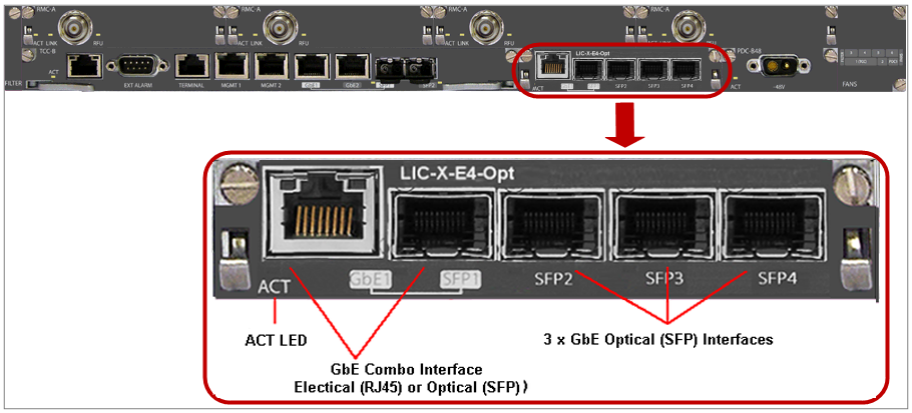
When using the electrical ports of the LIC-X-E4-Elec to connect between the PTP 820A IDU and an outdoor unit such as PTP 820C or PTP 820S, in areas in which severe lightning conditions are likely to occur, it is required to use lightning protection.

LIC-X-E4-Opt

The LIC-X-E4-Opt has the following interfaces:

- 1 x GbE combo interface (SFP1 / GbE1)
- 3 x GbE optical (SFP) interfaces

Figure 13: *LIC-X-E4-Opt Detailed View*



LIC-X-E10

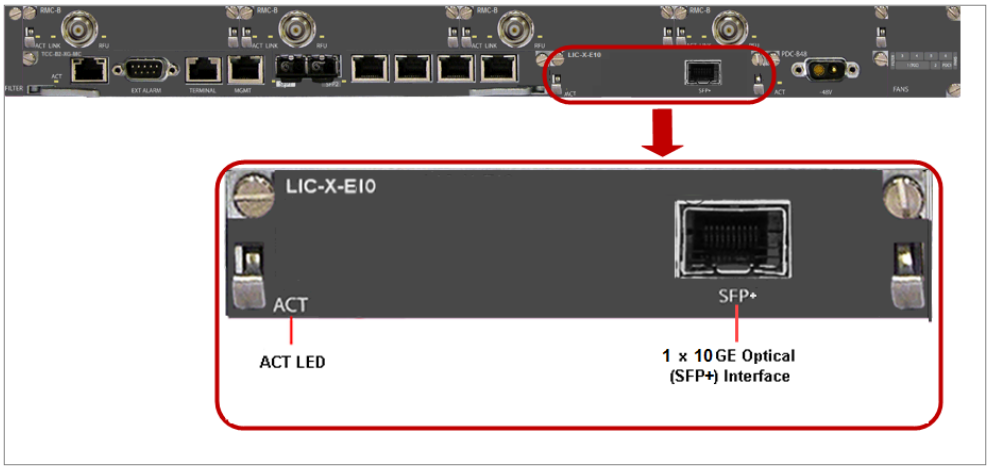
The LIC-X-E10 has a single 10G optical interface.

Note:

The 10G interface on the LIC-X-E10 cannot be used as a cascading interface.

The LIC-X-E10 requires TCC-U or TCC-B2-XG-MC.

Figure 14: *LIC-X-E10 Detailed View*



Interface protection is available for the 10G interface on LIC-X-E10 Ethernet LICs. An optical Y-splitter cable is used to connect the two 10G interfaces and the external switch.

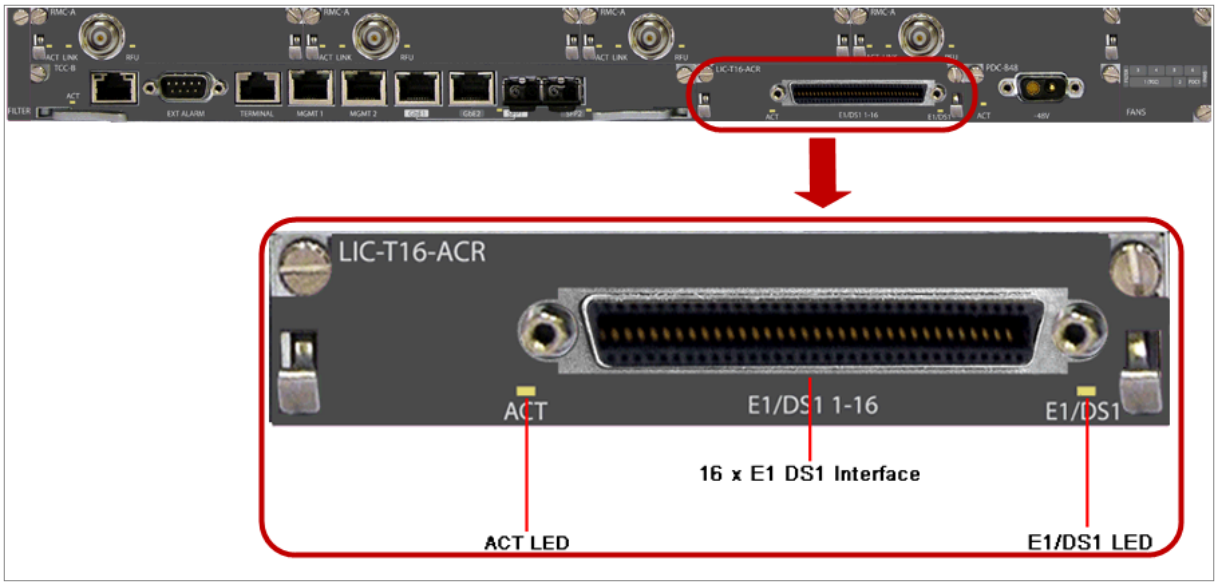
TDM Line Interface Cards

PTP 820A offers the following types of TDM Line Interface Cards (TDM LICs):

- **LIC-T16** (16 x E1)
- **LIC-T155** (1 x ch-STM-1)
- **LIC-STM1/OC3-RST** (1 x STM-1)

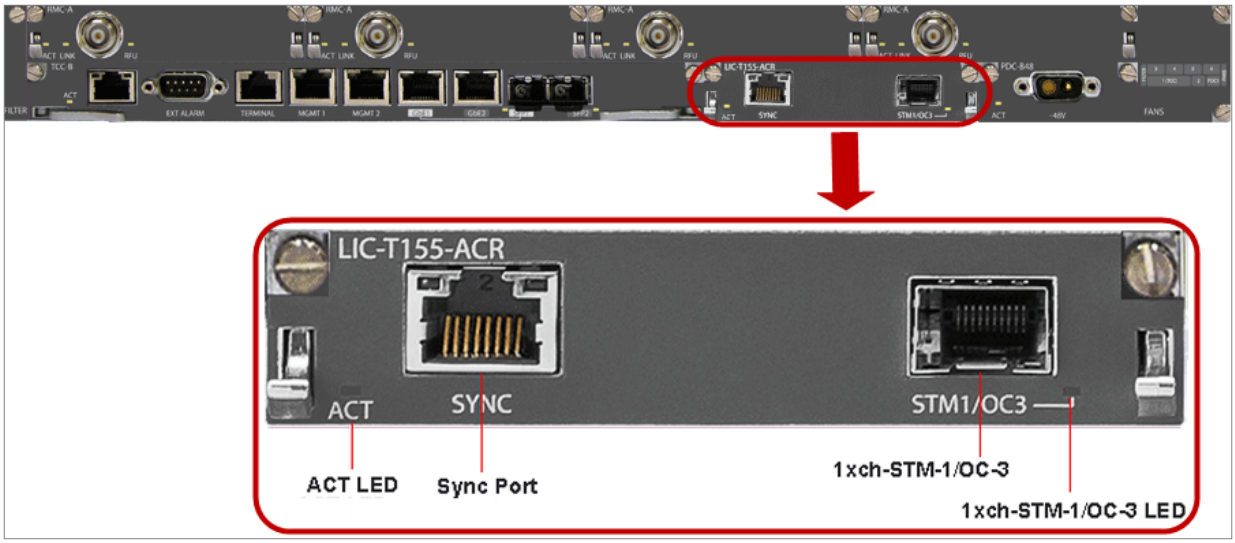
LIC-T16 (16 x E1) Line Interface Card

Figure 15: *LIC-T16 Detailed View*



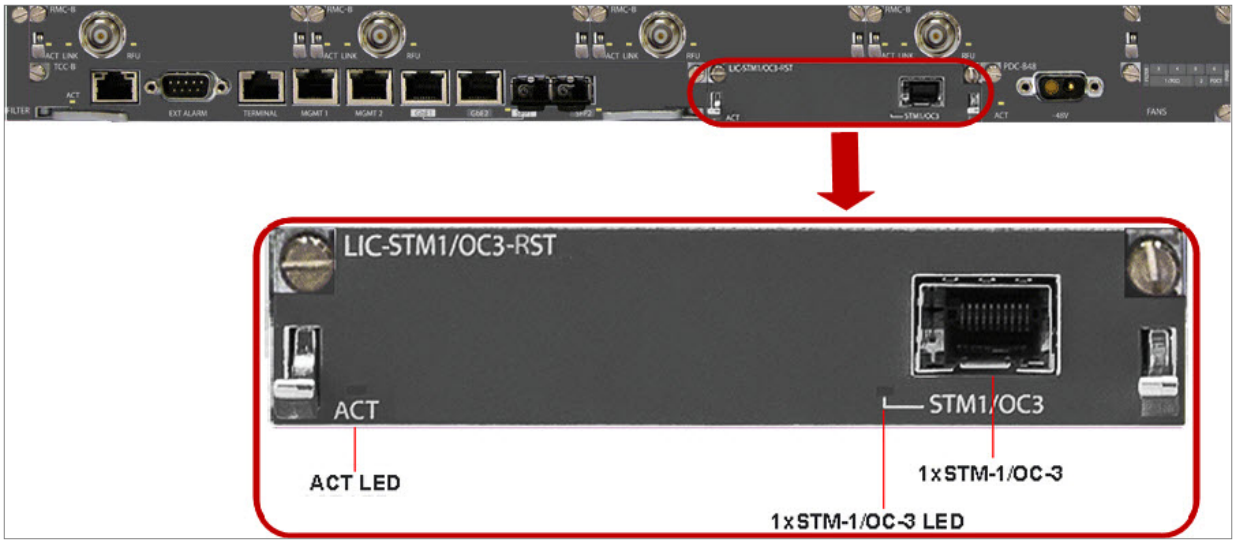
LIC-T155 Line Interface Card

Figure 16: *LIC-T155 Detailed View*



LIC-STM1/OC3-RST Line Interface Card

Figure 17: *LIC-T155 Detailed View*



Power Distribution Card (PDC)

PTP 820A receives an external supply of 48V current via one or two Power Distribution Cards (PDCs). The PDC or PDCs distribute the power via the backplane to all the modules in the chassis. Each module receives the 48V input and regulates it down to the operating voltage required by that module.

The PDC includes reverse polarity protection, so that if the positive (+) and negative (-) inputs are mixed up, the system remains shutdown.

The PDC can tolerate up-to -60V, with a maximum current of 30A.

A 1RU PTP 820A includes a single power distribution card (PDC) with a dual-feed option for power redundancy. With the dual-feed option, users can connect two power supplies to the PDC for power redundancy.

A 2RU PTP 820A can use two PDC cards for redundancy. Each PDC provides 48V power to all modules in the chassis via the backplane, on different lines. A diode bridge in the modules prevents power spikes and unstable power from the two power sources.

Figure 18: *Standard PDC Detailed View*

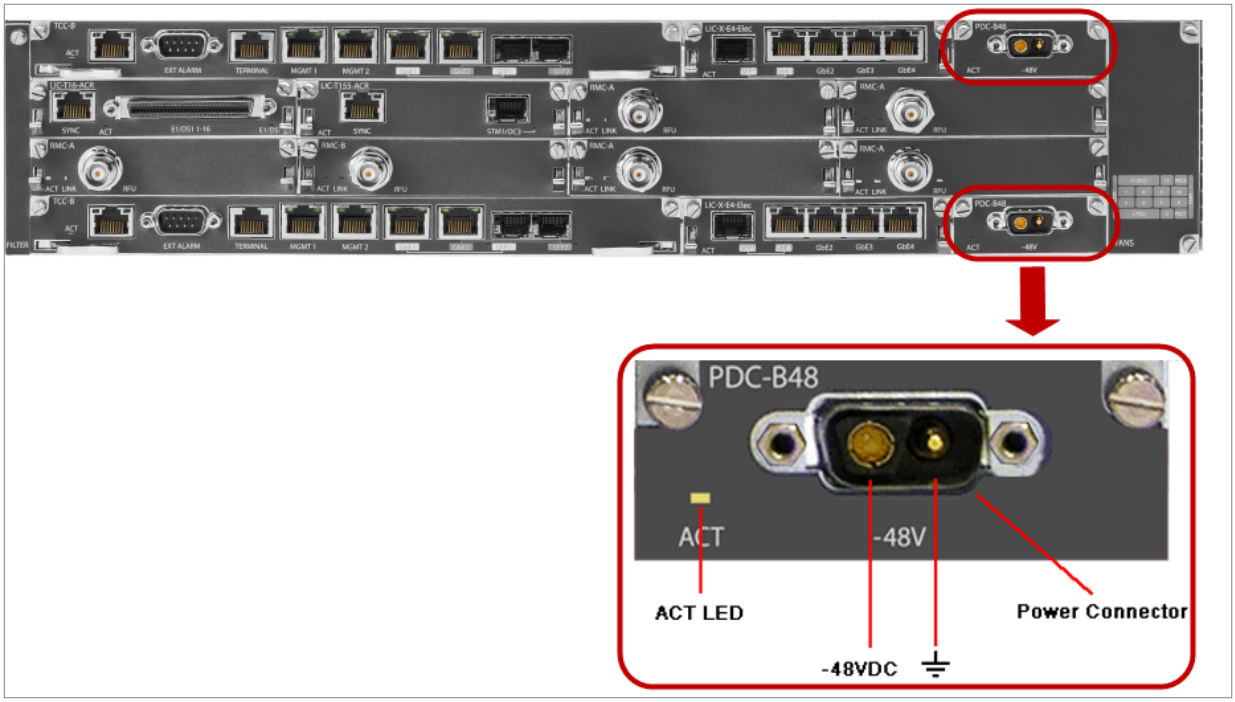
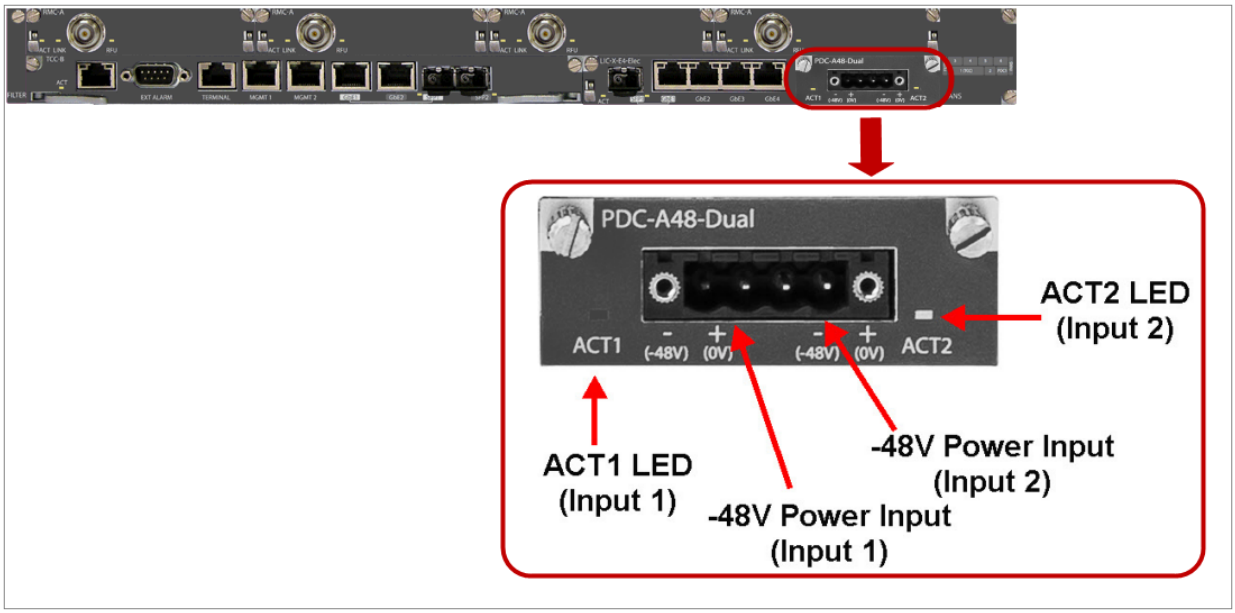


Figure 19: *Dual-Feed PDC Detailed View*



Note:

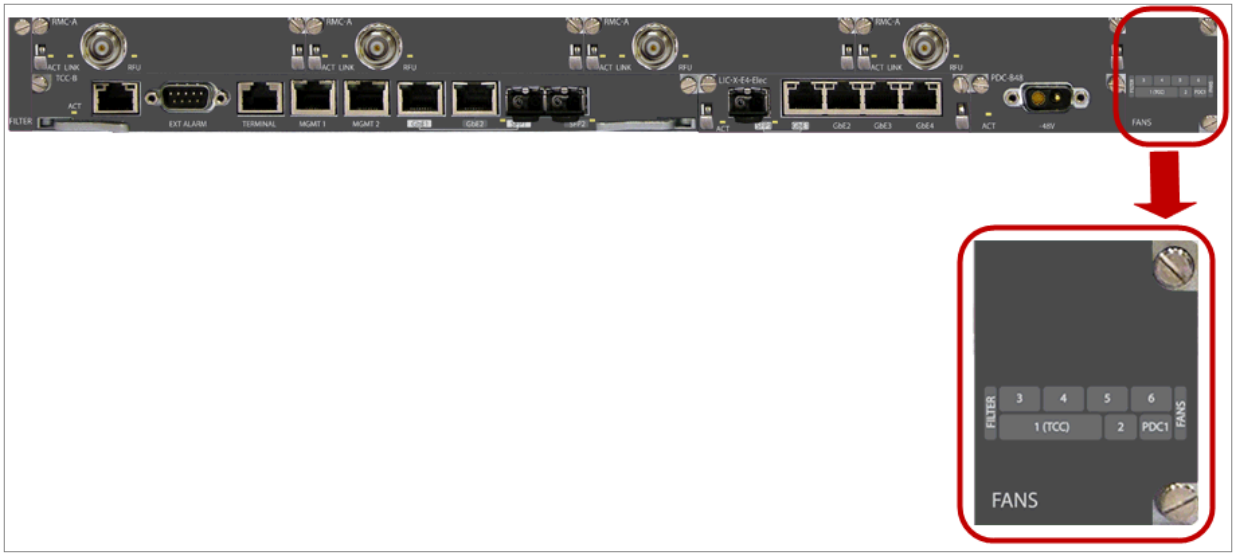
If the power is below -38V, the power supply to the TCC is automatically shut down.

Most RFUs are powered from the PDC, via the RMC or RIC that is connected to the RFU. In some cases, the RFU is powered directly from an external DC power source. For details, see IDU-RFU Cable Connection.

Fans Module

The fans module contains four 48V fans, which can dissipate heat for systems up to 270W. The fans draw air into one side of the chassis, and push the air through the chassis and out the other side.

Figure 20: *Fans Module Detailed View*



The fan speed increases and decreases in response to the temperature inside the chassis. When the temperature rises, the fan speed increases, and when the temperature decreases, the fan speed decreases. The fan speed never decreases below a minimum level regardless of temperature.

Filter Tray Overview

A filter is offered as optional equipment. If a filter tray is not ordered, the chassis is equipped with a blank filter slot cover.

Note:

It is strongly recommended to use filters in open environments, cabinets, etc.

The following filters are available:

Marketing Model	Description
PTP 820-Filter-tray-2RU-IDU	PTP 820 Filter tray, 2RU IDU
PTP 820-Filter-tray-1RU-IDU	PTP 820 Filter tray, 1RU IDU

The expected life range of these filters is approximately two to three years. This range may be shorter or longer, depending upon the application, environmental conditions, handling, maintenance, and care of the filter media.

Filter Storage Guidelines

Filters should not be stored for long periods of time. Instead, it is recommended to purchase cost-effective quantities and to maintain sufficient inventories for no longer than a few months. At a maximum, it is recommended to put filters into service no later than one year after the product shipment date. Check the filter media integrity before installing filters that have been stored for longer periods.

Filters should be stored in a cool, dry, and dark environment. Avoid exposing the filters to high heat, humidity at high temperatures, and ultraviolet light. Also, avoid exposing the filters to solvents and sulfates, such as exhaust. Any digression from these conditions will adversely affect the filter's life span.

Ideal conditions include maintaining the relative humidity between 30% and 70% and the temperature between 4°C and 30°C (40°F and 85°F). Wrapping or covering filters with plastic is also recommended to keep the filters dry and protect them from ultraviolet light.

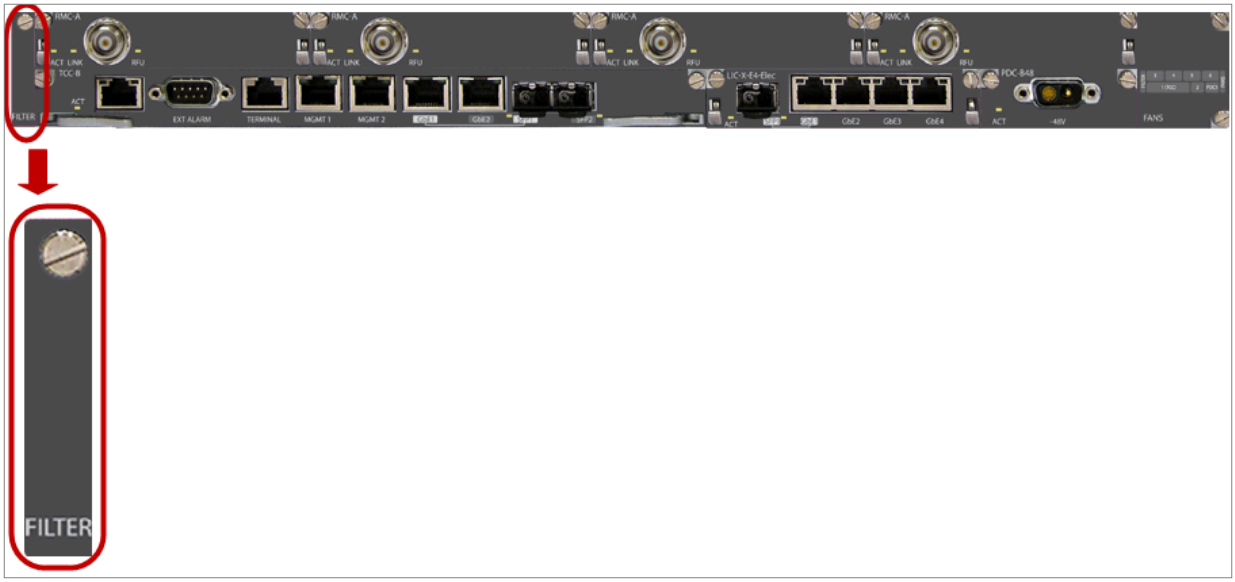
In general, it is better for the filter to be installed in the intended equipment with air flow as opposed to storage in cartons and warehouses without air flow.

Filter Maintenance Guidelines

Filters should be cleaned every three to six months. In challenging environments, cleaning may be advisable more often. The filter media can be cleaned with slightly compressed air, vacuumed, and/or rinsed with clean water. If a degreaser is required, use only a mild detergent, such as, dishwashing liquid. Avoid using harsh solvents or cleaning agents. Make sure the filters are completely dry before reinstalling.

Filters should be replaced every two to three years, after approximately every four to eight cleaning cycles. Replacement is necessary to ensure media durability, eliminate residual dust build-up, and optimize air flow through the filter media.

Figure 21: *Filter Tray Detailed View*



PTP 820 Assured Platform

Cambium's PTP 820 Assured platform enhances network reliability and security, ensuring that mission-critical networks maintain availability, and protecting the confidentiality and integrity of their users' data.

The PTP 820 Assured platform is compliant with FIPS 140-3, including:

- Compliance with FIPS 140-3 specifications for cryptography module.
- FIPS 140-3 Level 2 physical security.
- AES-256 encryption (FIPS 197) over radio links.

The PTP 820 Assured platform also provides:

- Secured communication and protocols for management interface.
- Centralized user authentication management via RADIUS.
- Advanced identity management and password policy enforcement.
- Security events log.
- Secure product architecture and development.

The following products are included in the PTP 820 Assured platform:

- PTP 820A Assured
- PTP 820A Assured
- PTP 820G Assured
- PTP 820C Assured
- PTP 820C-HP Assured

Note:

PTP 820 Assured is supported with certain versions of System Release. To determine whether a specific System Release version supports PTP 820 Assured, check the Release Notes for the System Release version.

Preparing for Installation

This section provides instructions for transporting, inspecting, and unpacking the equipment for an PTP 820A system prior to installation.

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.

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.

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:

t 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.

Verifying Initial Hardware Configuration

Before installing the IDU in the rack, verify placement of the following trays according to the label on the fan tray.

Note:

This step is not necessary for an empty chassis.

- A fan tray in right vertical slot.
- A PDC tray in PDC Slot 1.
- A blank filter tray in left vertical slot.
- An IVM on the rear side.

Note:

In most cases, an PTP 820A chassis is delivered with an IVM already installed. However, if you are required to install or replace an IVM, refer to Installing an IVM.

Figure 22: *1RU IDU Chassis - Front View*

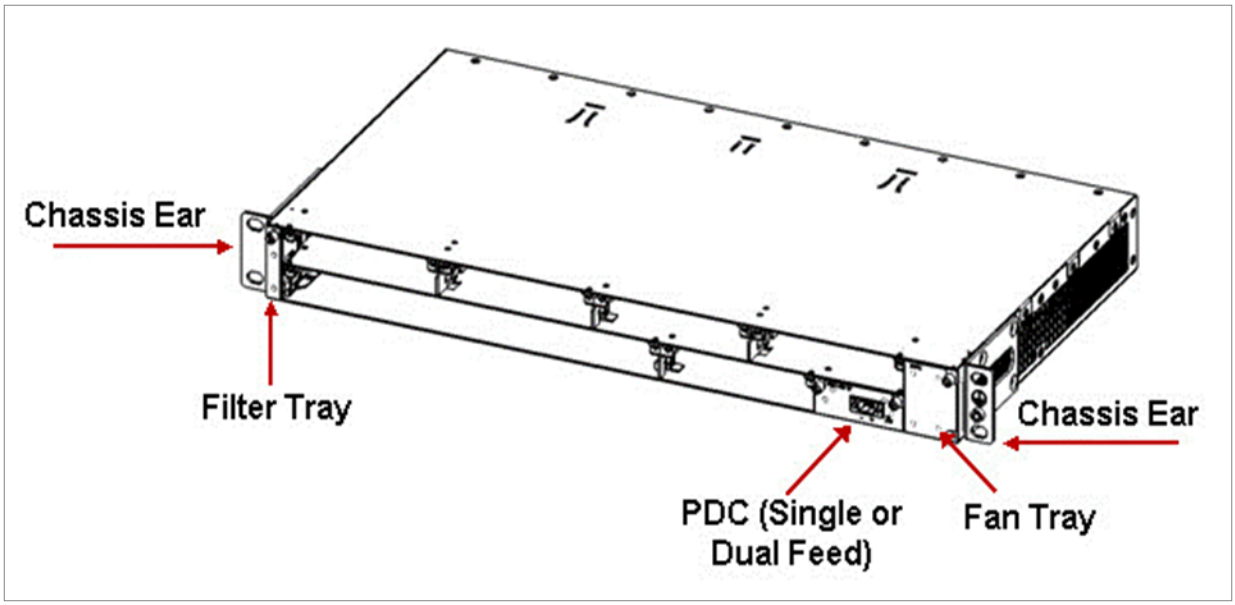


Figure 23: *1RU IDU Chassis - Rear View*

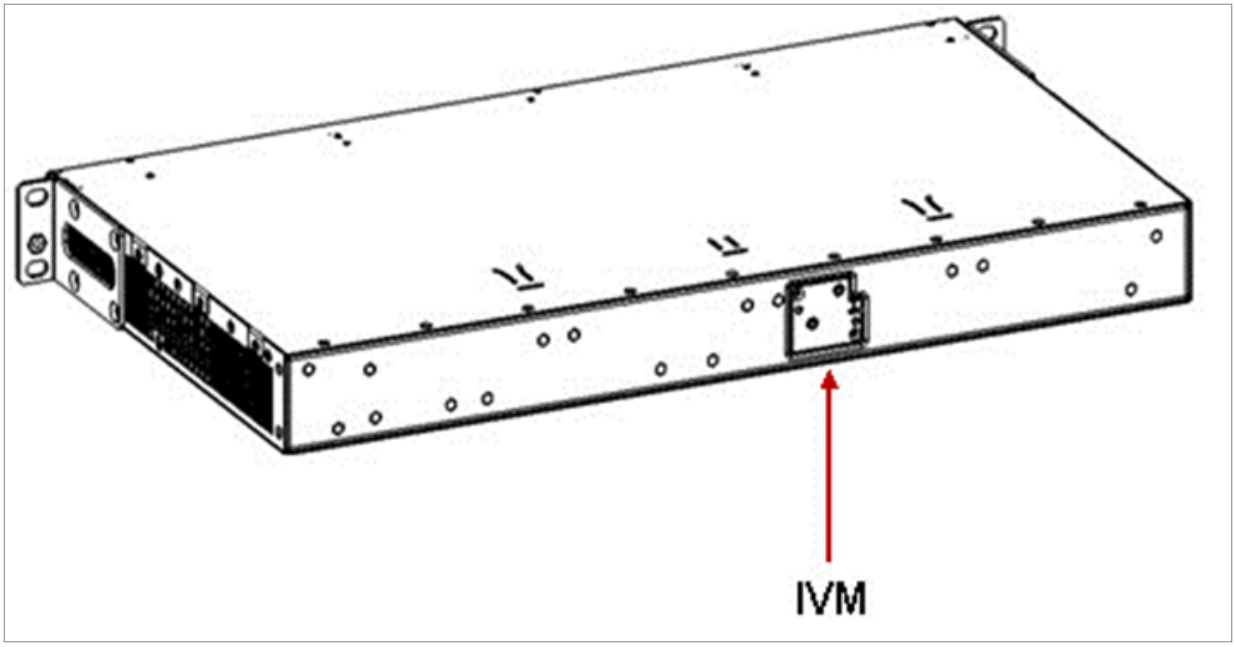


Figure 24: *2RU IDU Chassis - Front View*

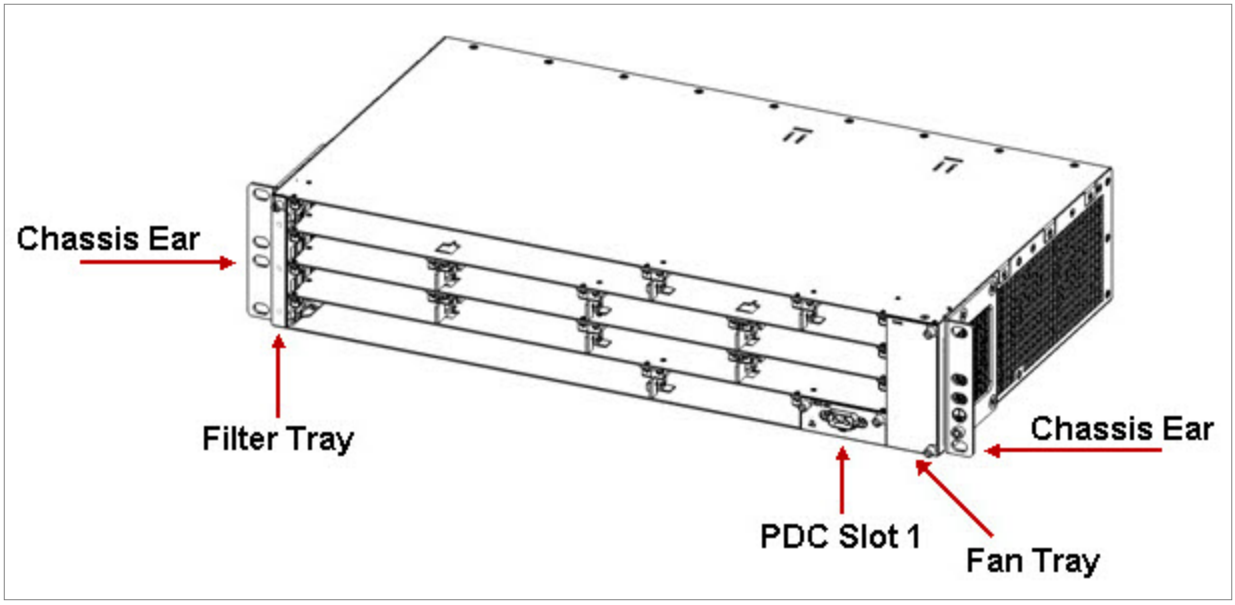
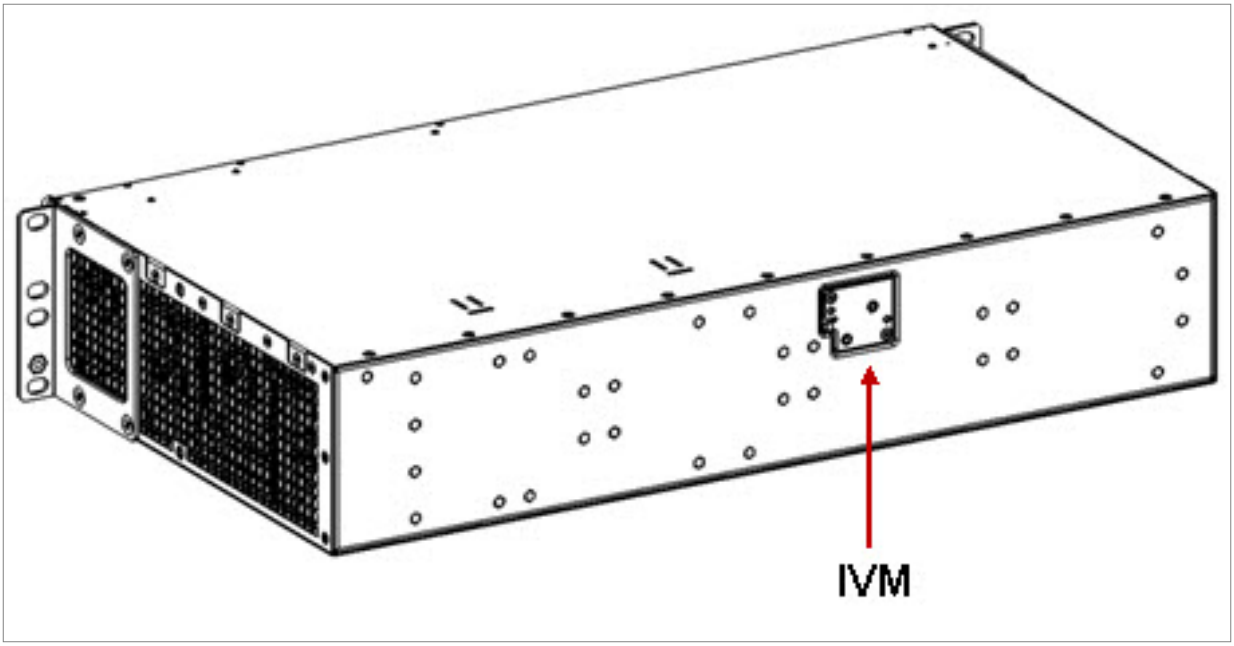


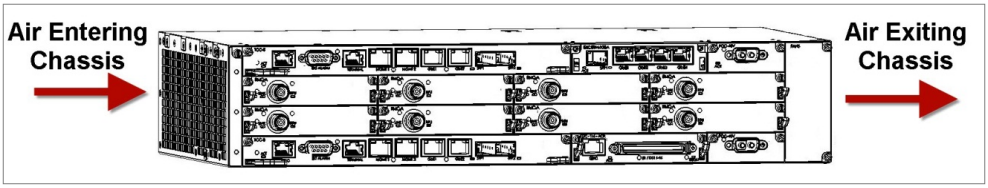
Figure 25: *2RU IDU Chassis - Rear View*



Ensuring Proper Clearance for Air Flow around the IDU

The PTP 820A fans draw air into the left side of the chassis, and push the air through the chassis and out the right side.

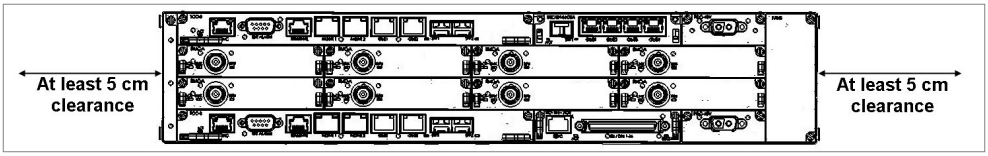
Figure 26: *PTP 820A Air Flow*



To ensure that the PTP 820A maintains a proper operating temperature, you must ensure that the air flow is unimpeded:

- Make sure to install the chassis level in the rack, with at least 5 cm clearance between both sides of the chassis and the walls or other obstacles.
- Make sure the sections of the rack that are aligned with the chassis are open so as to allow air flow to and from the chassis.

Figure 27: *PTP 820A Chassis Clearance*



Installing the Chassis

This section provides instructions for installing a PTP 820A chassis.

Required Tools for Chassis Installation

Item	Description	Quantity	Notes
1	PTP 820A 1RU or 2RU chassis	1	
2	19" rack / sub-rack	1	Supplied by customer
2	IVM module	1	This is usually pre-installed on the chassis.
2	Blank Drawer	1 per slot	Required for any slot that does not contain a card.

Mounting the Chassis in the Rack

This procedure is for both 1RU and 2RU chassis.

There are two possible ways to install a PTP 820A chassis:

- **Standard Mount** – The front of the chassis is flush with the front of the rack.
- **Front Mount** – The front of the chassis protrudes slightly from the front of the rack, in order to reduce or eliminate protrusion of the chassis from the rear of the rack.

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

Figure 28: *1RU IDU Chassis in Rack - Front Mount*

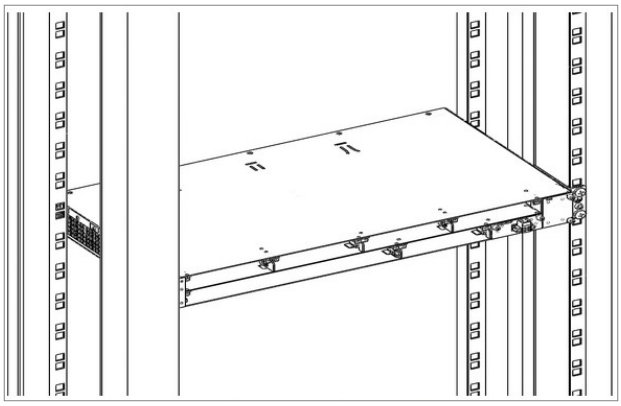


Figure 29: *2RU IDU Chassis in Rack - Front Mount*

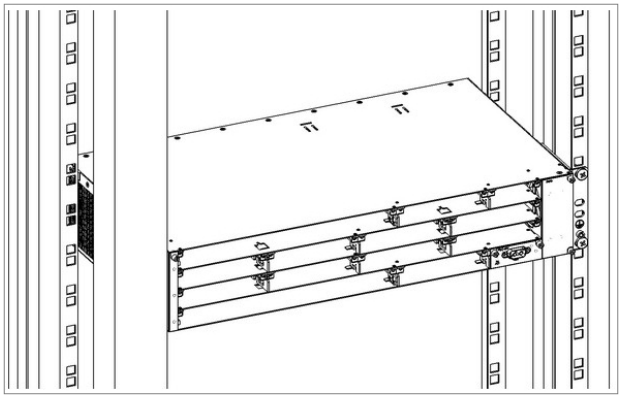


Figure 30: *1RU IDU Chassis in Rack - Standard Mount*

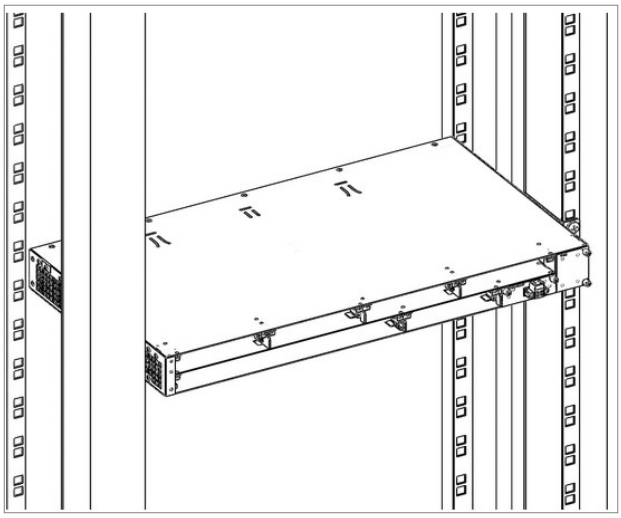
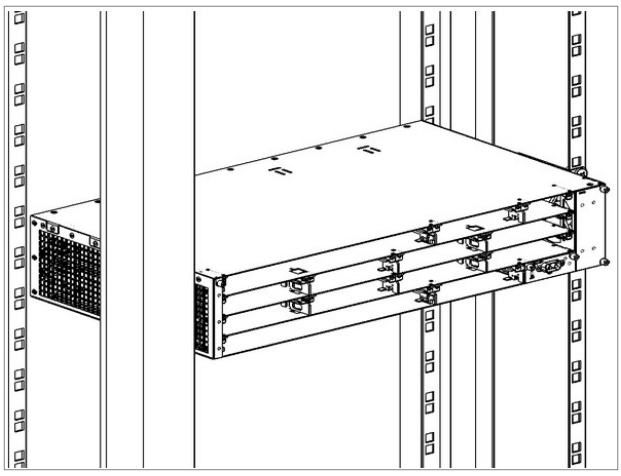


Figure 31: *2RU IDU Chassis in Rack - Standard Mount*

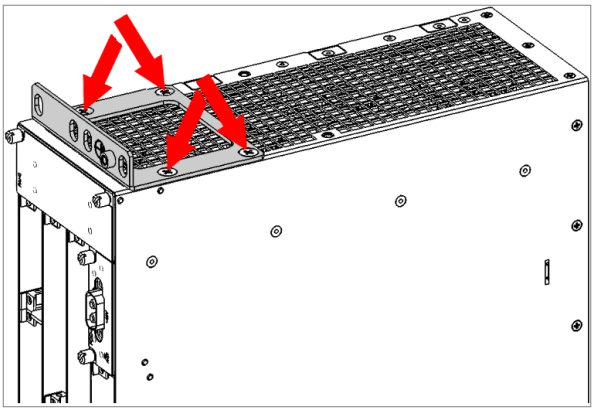


Standard Mount to Front Mount Conversion

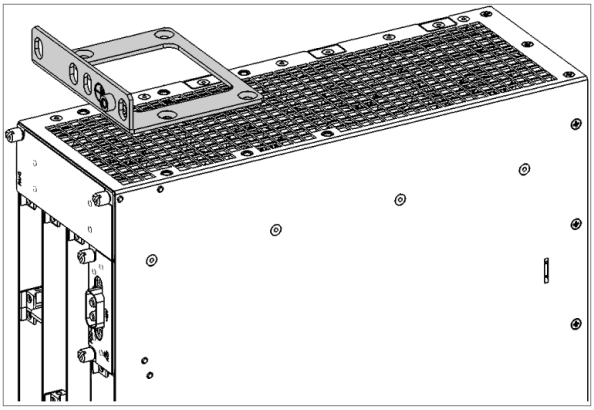
Loosen the four screws that hold the bracket to the chassis and retighten them in the new position as shown below.

The same procedure is performed for the bracket at the opposite side of the chassis.

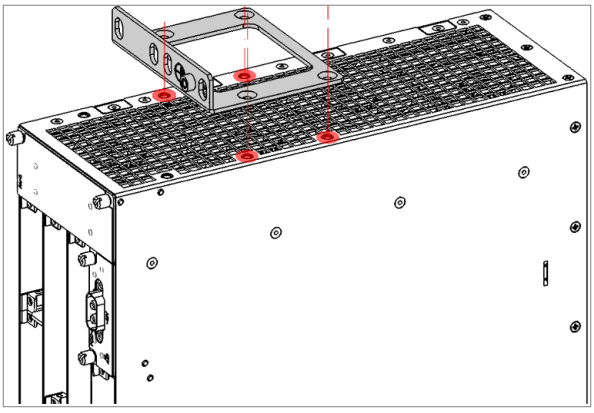
1. Remove the four screws that hold the bracket to the chassis.



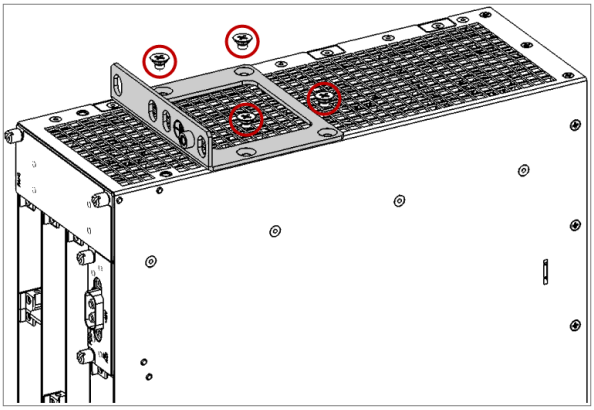
2. Remove the bracket.



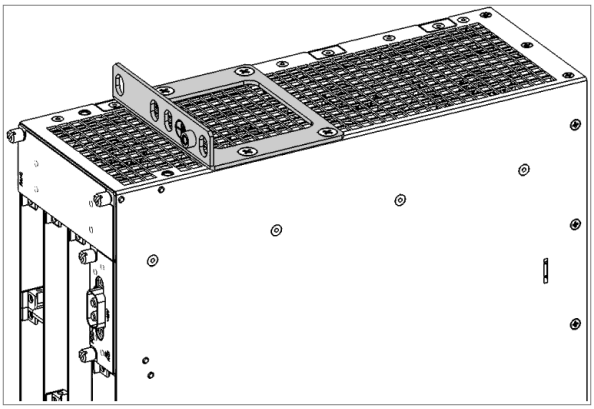
3. Align the bracket with the holes in the center of the chassis.



4. Replace all four screws.



5. Retighten the screws in the new position.



Grounding the 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 820A chassis is 5 mΩ or less.

If an indoor PoE is used, the grounding for the PoE should meet these same criteria.

Connect a grounding wire to the single-point stud shown in the figures below, and then to the rack, using a single screw and two washers.

Figure 32: *1RU Chassis Grounding*

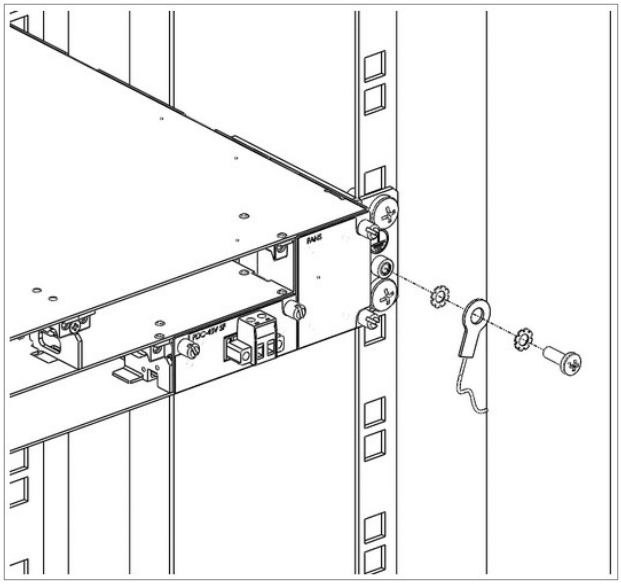
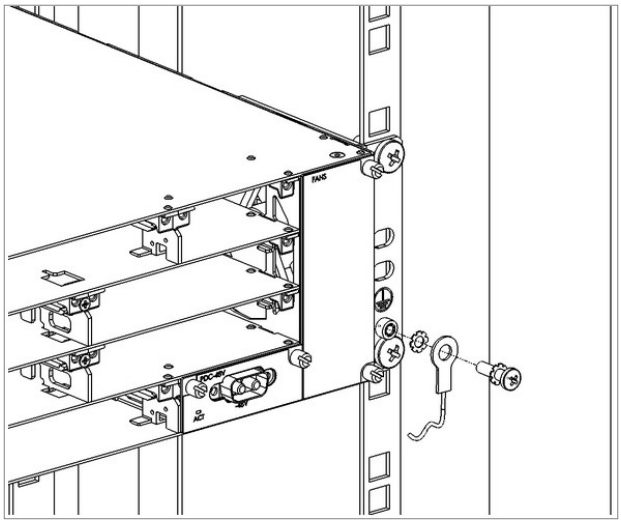


Figure 33: *2RU Chassis Grounding*



Replacing the Chassis

Note:

When a complete IDU chassis is replaced, the traffic through this IDU will be interrupted.

1. Unplug the power connector(s) on the PDC(s).
2. Disconnect all cables from the cards in the chassis. Mark all cables to ensure that the cables can be reconnected to the correct cards and interfaces in the new chassis.
3. Disconnect the chassis grounding cable.

4. Since the chassis fully populated is heavy, it may be convenient to remove cards prior to removing chassis from the rack.
5. Unscrew the chassis from the rack (four screws).
6. Carefully pull the chassis out.
7. Remove all cards from the chassis.
8. Install the new chassis, as described in Mounting the Chassis in the Rack.
9. Replace the cards in the new chassis.
10. Carefully insert the new chassis into the rack.
11. Fasten the four screws.
12. Reconnect the chassis grounding cable.
13. Re-insert all cards. Tighten the captive screws manually.
14. Reconnect the front cables.
15. Reconnect the power cable(s).

Installing an IVM

In most cases, an PTP 820A chassis is delivered with an IVM already installed. However, if you are required to install or replace an IVM, follow these instructions:

On the rear side of the chassis, place the IVM in front of the backplane and secure it using the two screws supplied with the IVM bracket.

Figure 34: *Installing an IVM, 1RU*

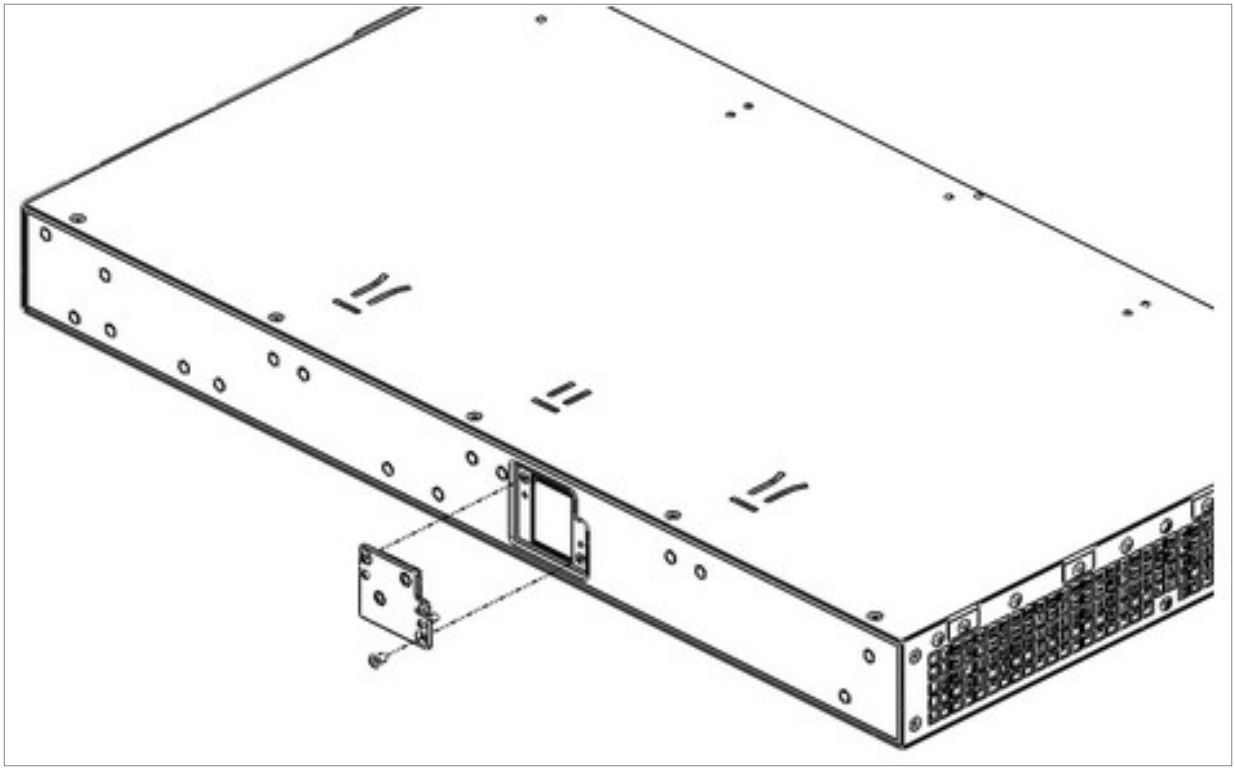
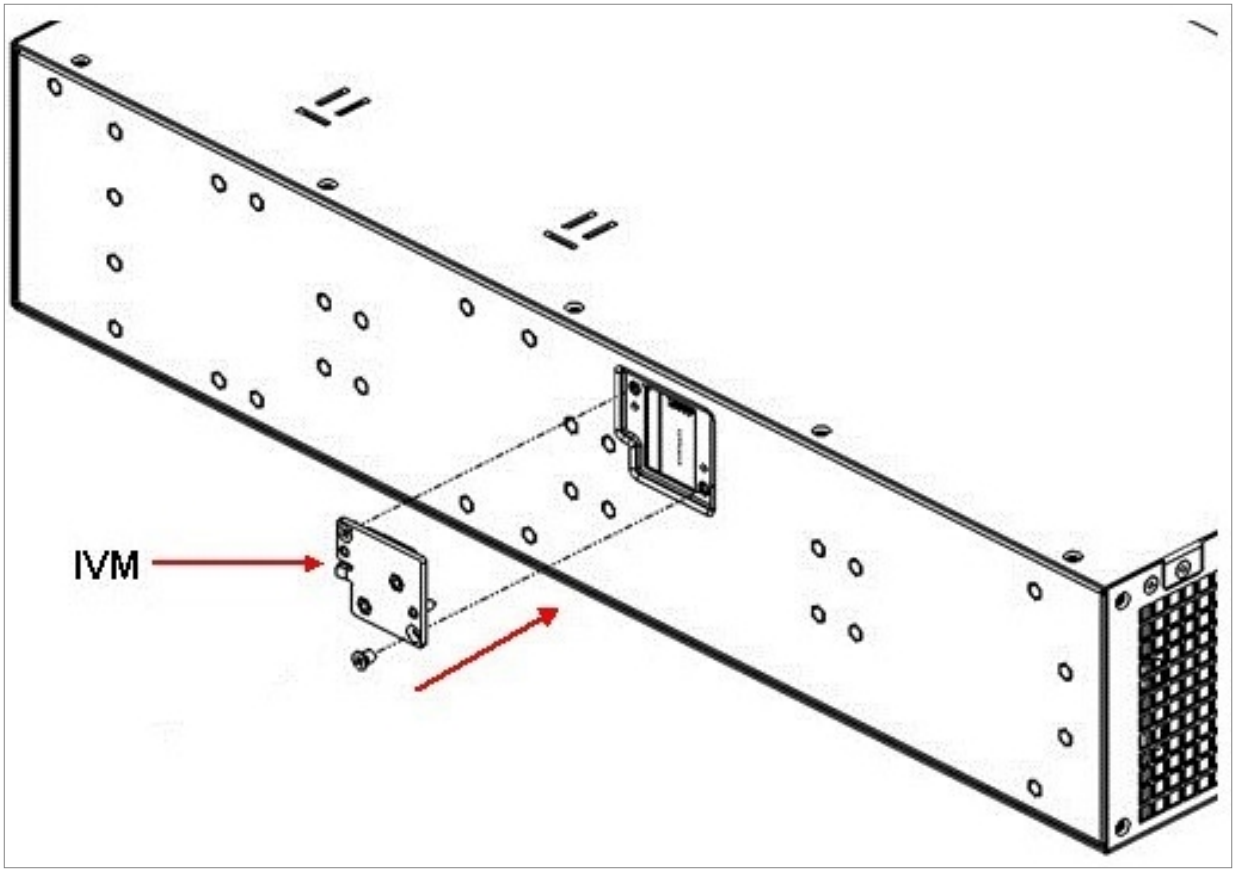


Figure 35: *Installing an IVM, 2RU*

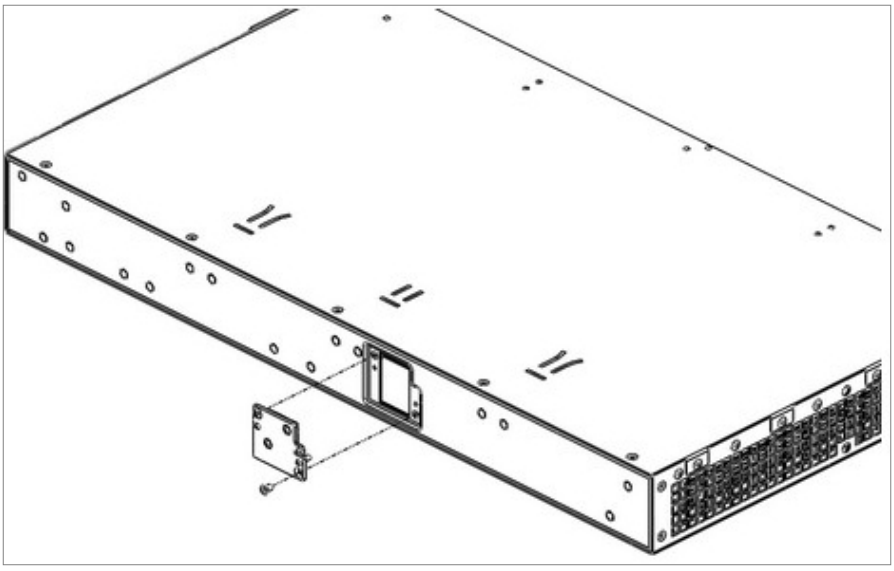


Replacing an IVM

In the event that an IVM must be replaced, follow these instructions:

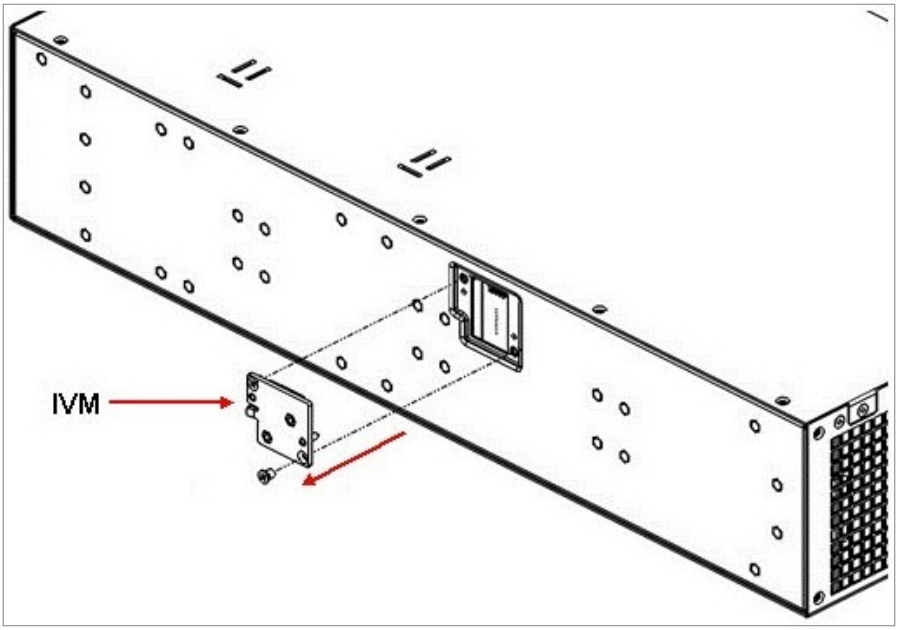
1. Loosen the two screws that secure the IVM in its place and gently pull out the IVM.

Figure 36: *Replacing an IVM, 1RU*



2. Install the new IVM, as described in Installing an IVM.

Figure 37: *Replacing an IVM, 2RU*



Installing and Replacing Cards in the Chassis

Note:

When replacing a card, the new card must have exactly the same unit code (Code:) as the unit to be replaced.

TCC Installation and Replacement

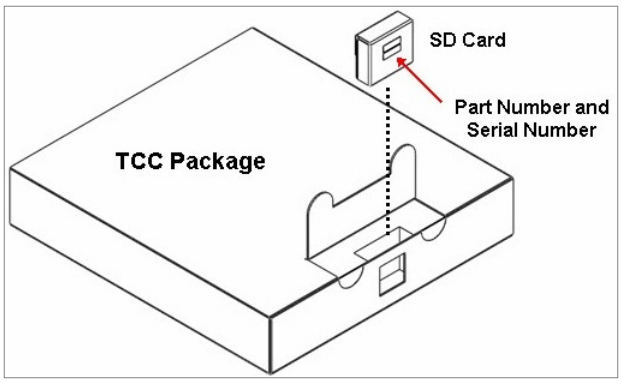
Inserting the SD Card in the TCC

When installing a new system, the new TCC is delivered with an SD card, which stores the unit's software version and configuration. The SD card is packaged in a compartment in the front portion of the TCC package. It is placed in such a way that you can view the label and serial number of the SD card before opening the package.

Note:

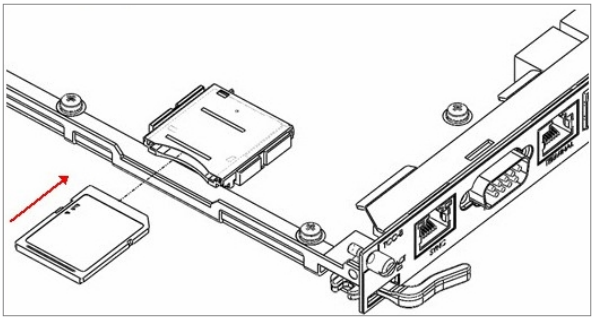
In some cases, the TCC is delivered with the SD card already installed. If the SD card is already installed, proceed directly to Inserting a TCC in the Chassis.

Figure 38: *TCC Package with SD Card*



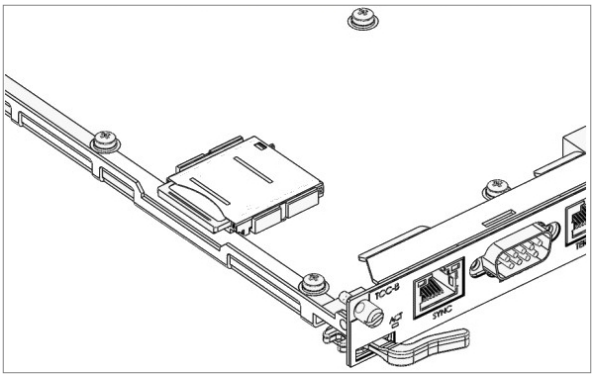
1. Carefully remove the SD card from the package.
2. Before installing the TCC, insert the SD card into its socket on the upper left side of the TCC. Make sure the orientation of the SD card is correct, as shown in the figure below

Figure 39: *Inserting an SD Card into a TCC*



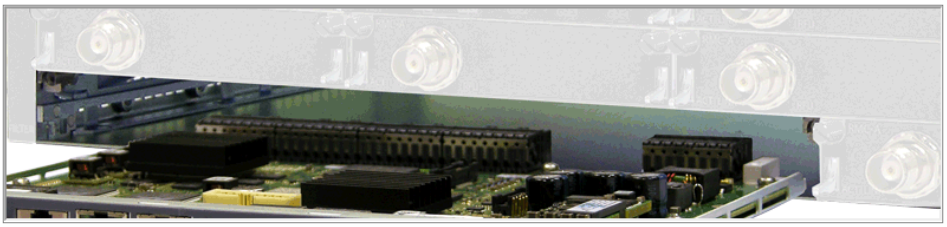
When the SD card is inserted properly, it should click into place. The figure below shows an SD card properly inserted in its socket on the TCC.

Figure 40: *SD Card Inserted in a TCC*

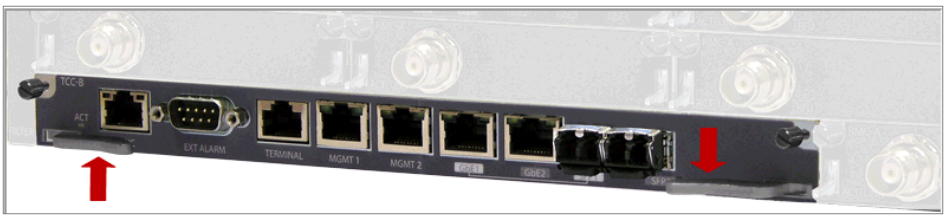


Inserting a TCC in the Chassis

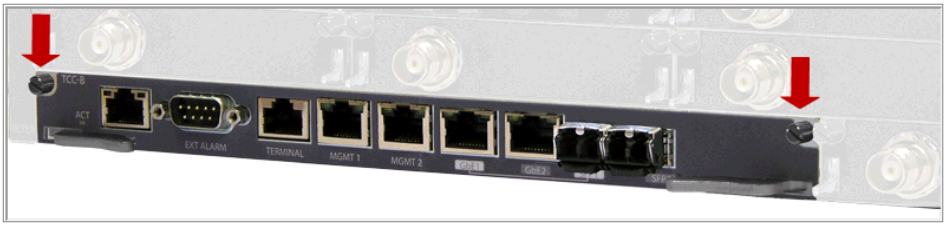
1. Carefully insert the new TCC into slot 1 or, if installing a second TCC in a 2RU chassis, slot 11. Ensure that the TCC enters the guides inside the chassis, and gently press the TCC to enter the internal connectors without the use of excessive force.



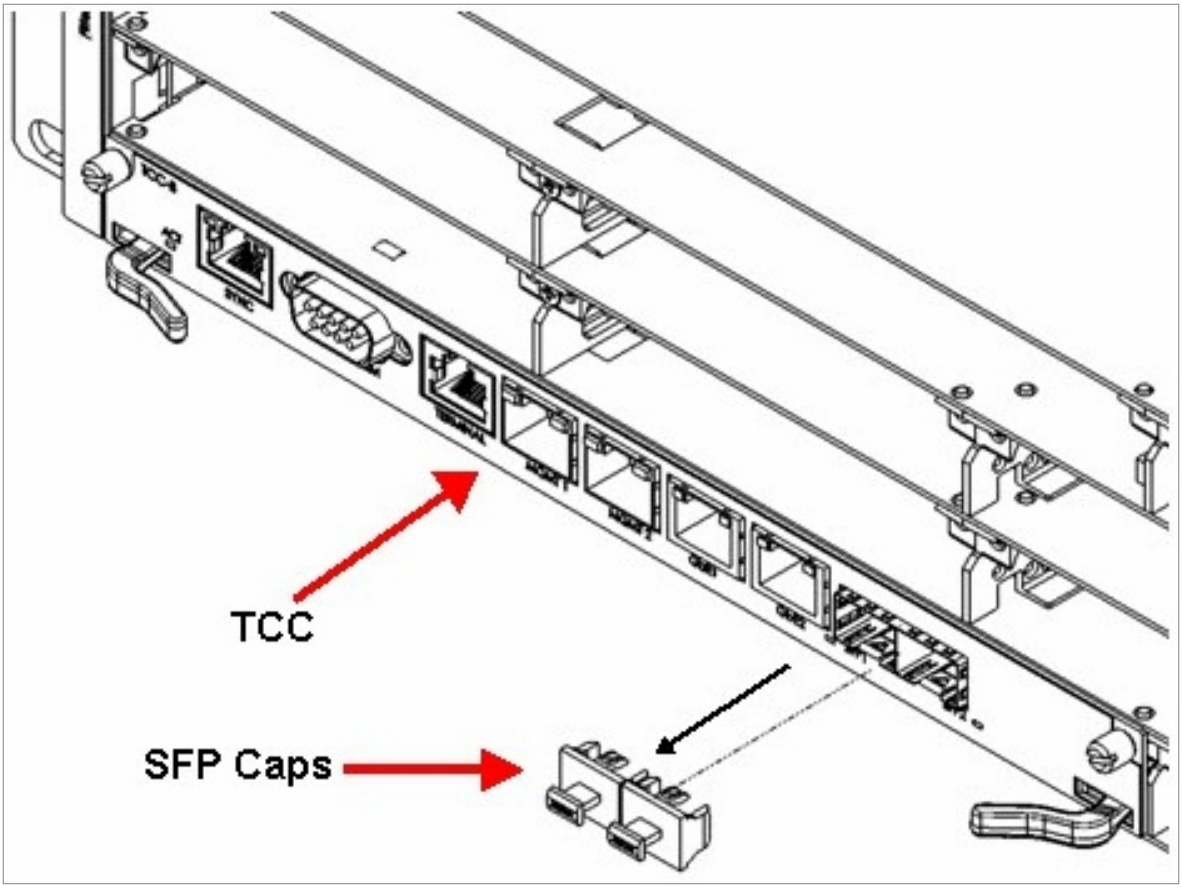
2. Make sure that the card ejectors lock in the correct position.



3. Fasten the two captive screws manually.



4. Remove the SFP caps from the TCC.



Replacing a TCC

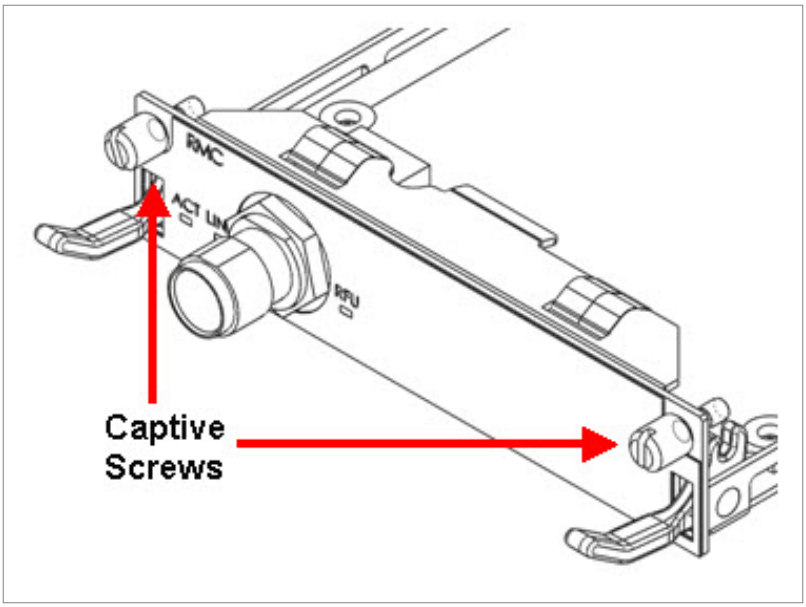
For instructions on replacing a TCC, refer to the User Guide for PTP 820A and PTP 820A, System Release 12.7 and later.

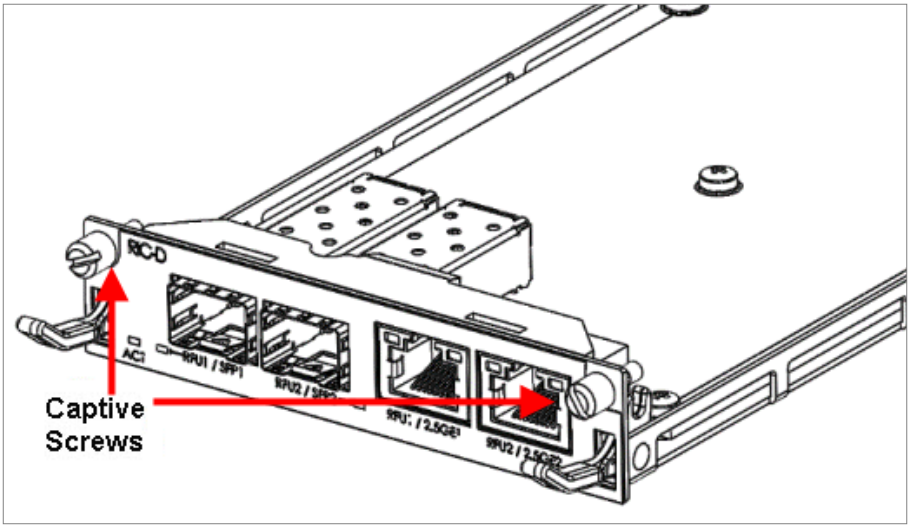
RMC and RIC-D Installation and Replacement

For rules and guidelines about slot placement, refer to Chassis Slots and Card Population Guidelines.

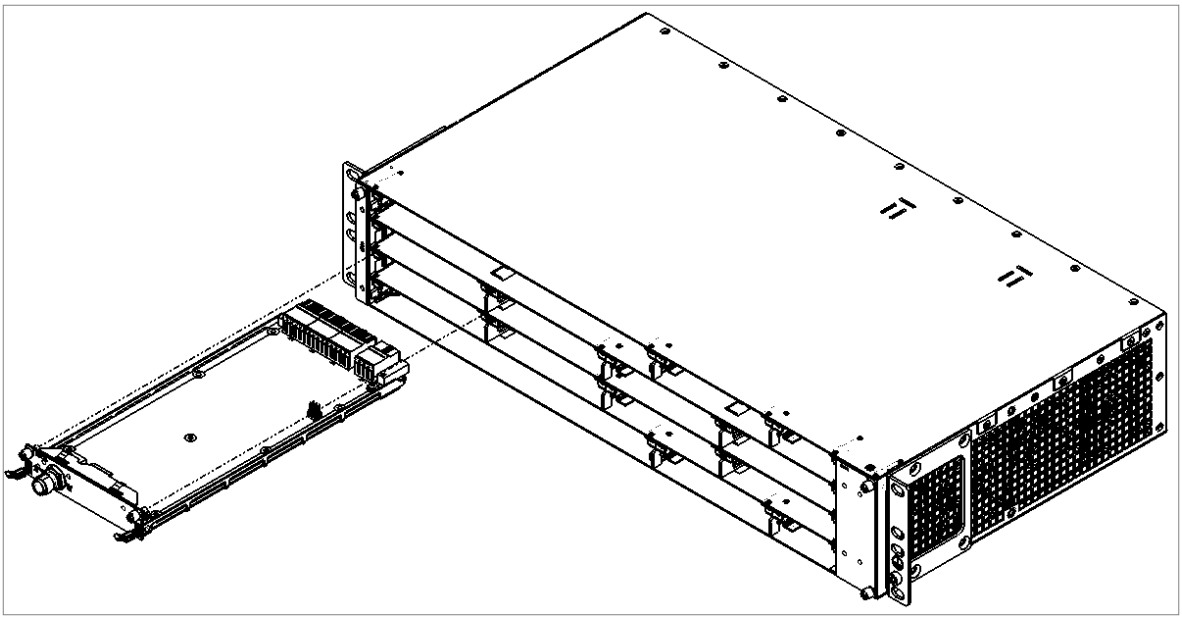
Inserting an RMC or RIC-D into the Chassis

1. Verify that both captive screws are loosened.





2. Insert the RMC or RIC-D into the appropriate slot in the chassis. Ensure that the RMC or RIC-D enters the guides inside the chassis and gently press the RMC or RIC-D to enter the internal connectors without the use of excessive force.



3. Make sure that the RMC or RIC-D ejectors are locked.

Note:

The figures below show an RMC-A. The actual interfaces and labels of the RMC or RIC-D depend on the type of card, but the ejectors are the same for all RMC and RIC-D types.

Figure 41: *RMC/RIC-D Ejectors – Locked*

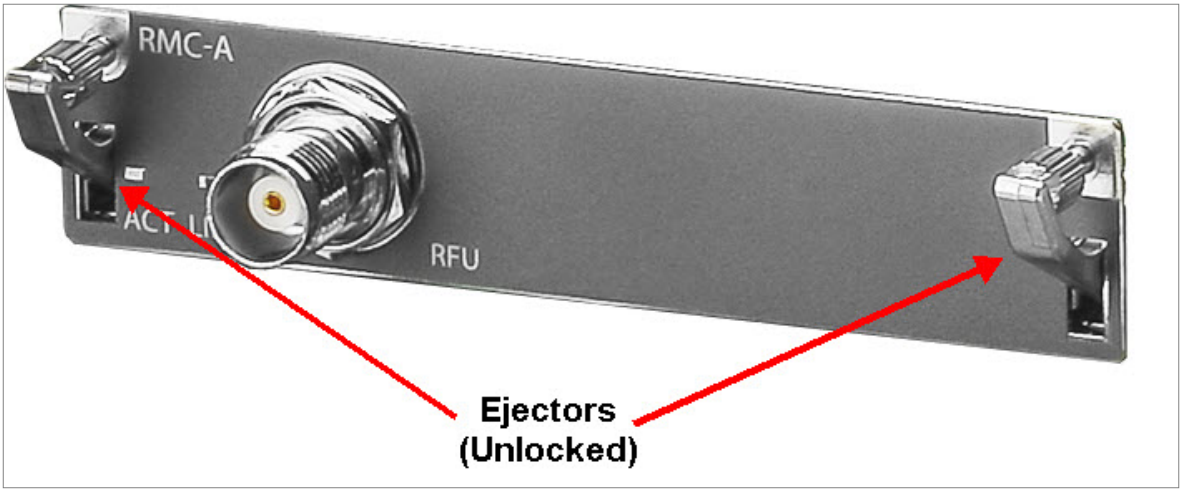
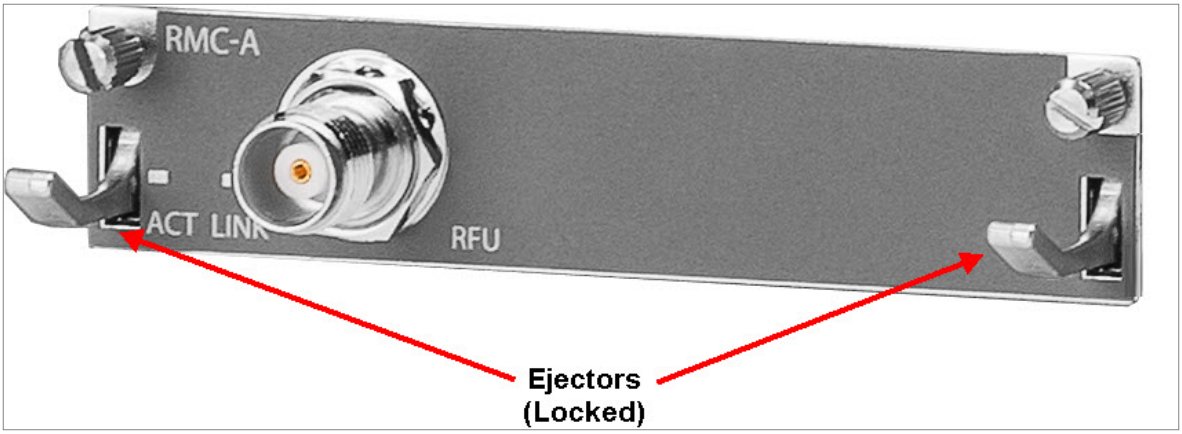
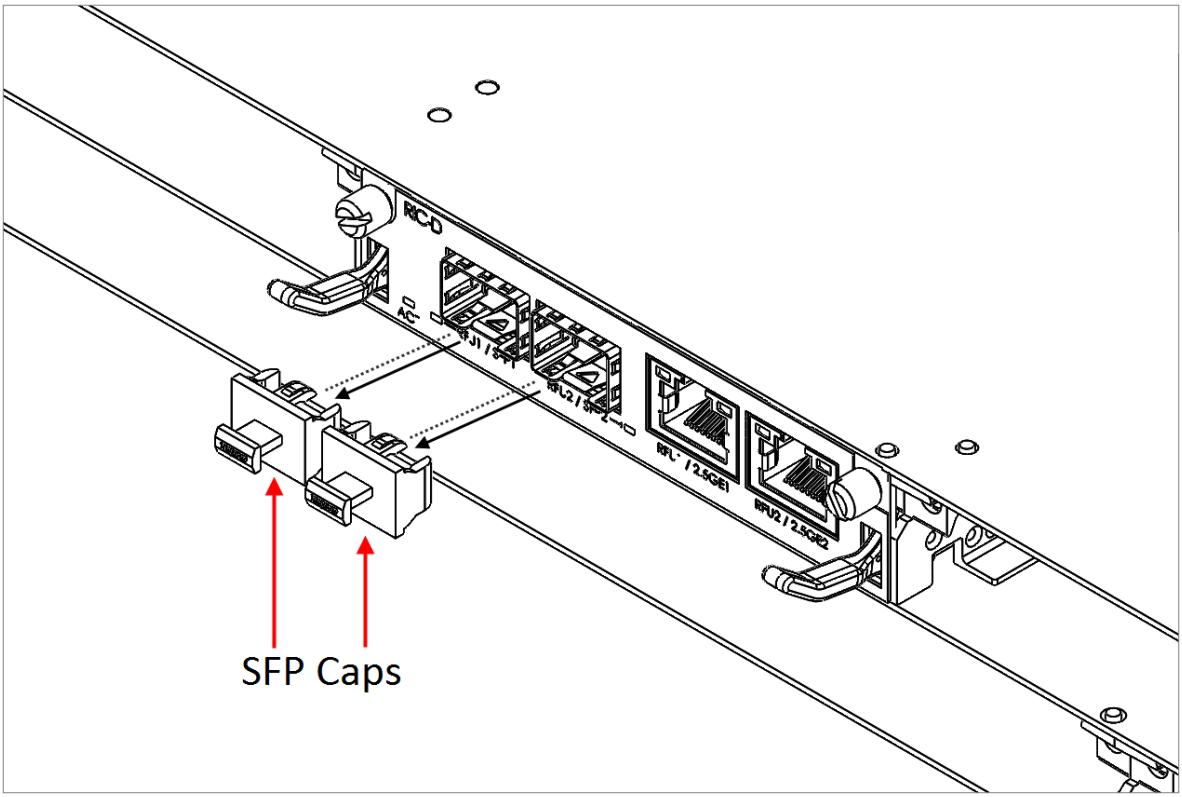


Figure 42: *RMC/RIC-D Ejectors – Unlocked*

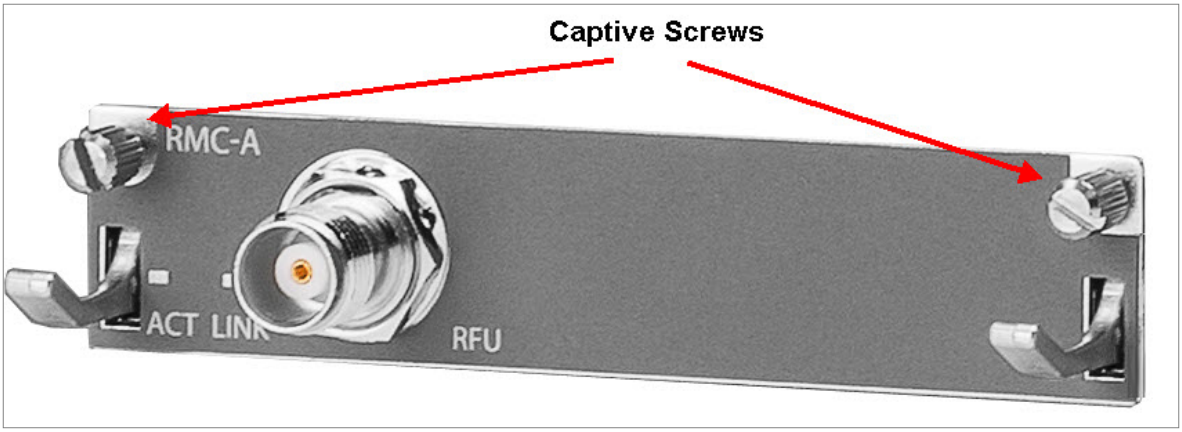


4. If you are installing a RIC-D, remove the SFP cap from the RIC-D.



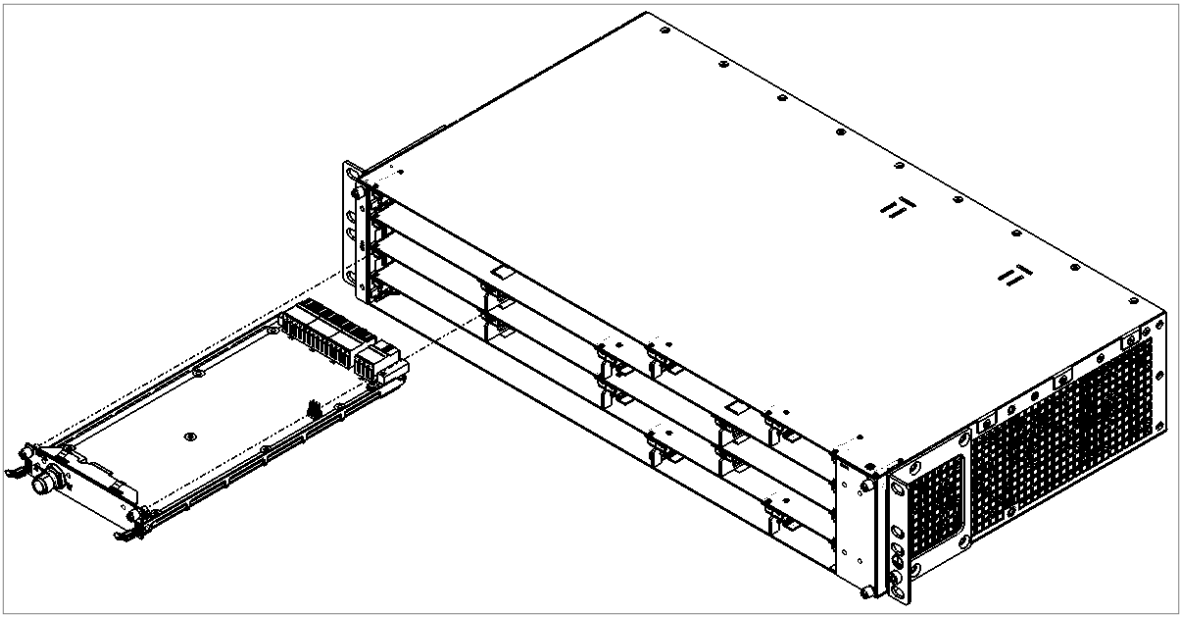
5. Secure the RMC or RIC-D by fastening the two captive screws gently with a screwdriver (not by hand).

Figure 43: *RMC/RIC-D Captive Screws*



Removing an RMC or RIC-D

1. Unplug all cables connected to the RMC or RIC-D.
2. Loosen the two captive screws that secure the RMC or RIC-D in its place.
3. Release the RMC or RIC-D from the backplane by unlocking the RMC or RIC-D ejectors.
4. Slide the RMC or RIC-D out of the chassis.



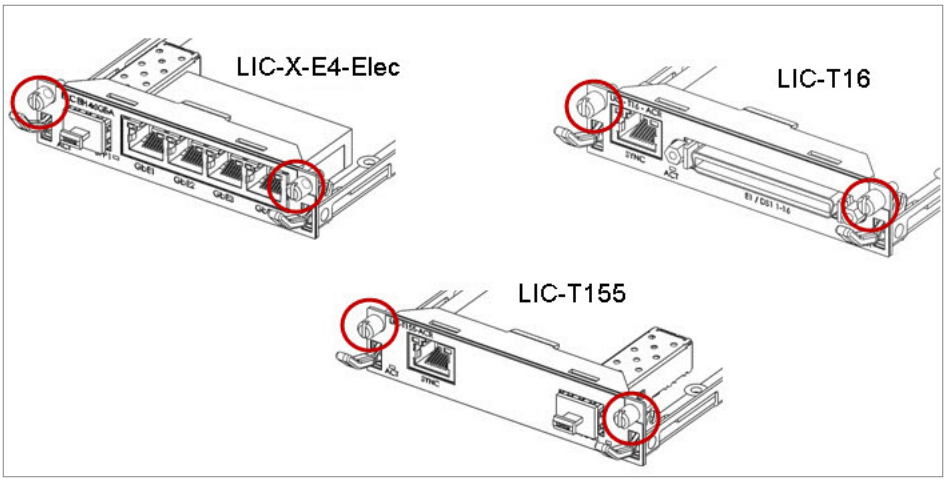
5. Install the new RMC or RIC-D, as described in Inserting an RMC or RIC-D into the Chassis. Verify that the captive screws are loosened before installing the new RMC or RIC-D.

Ethernet and TDM LIC Installation and Replacement

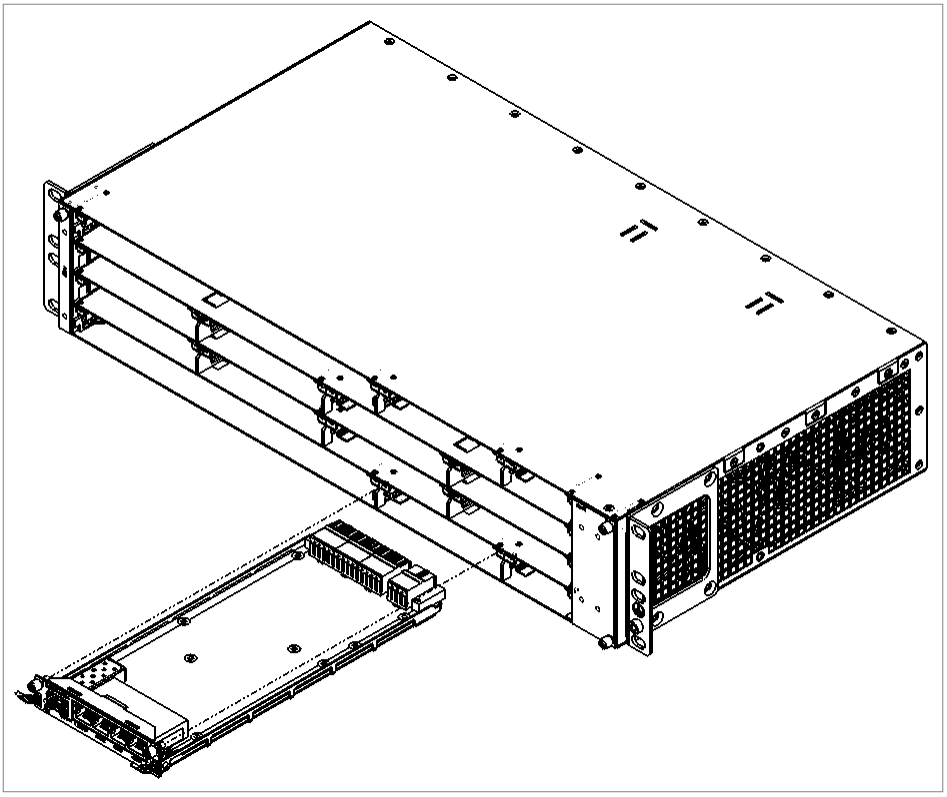
For rules and guidelines about slot placement, refer to Chassis Slots and Card Population Guidelines.

Inserting a LIC into the Chassis

1. Verify that both captive screws are loosened.



2. Insert the LIC into the chassis in the required slot. Ensure that the LIC enters the guides inside the chassis and gently press the LIC to enter the internal connectors without the use of excessive force.



3. Make sure that the LIC ejectors are locked.

Note:

The figures below show an LIC-X-E4-Elec. The actual interfaces and labels of the LIC depend on the type of LIC, but the ejectors are the same for all LIC types.

Figure 44: *LIC Ejectors – Unlocked*

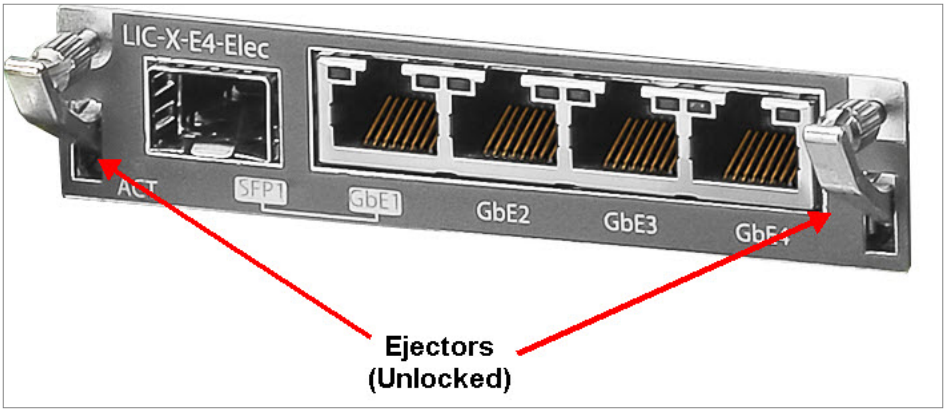
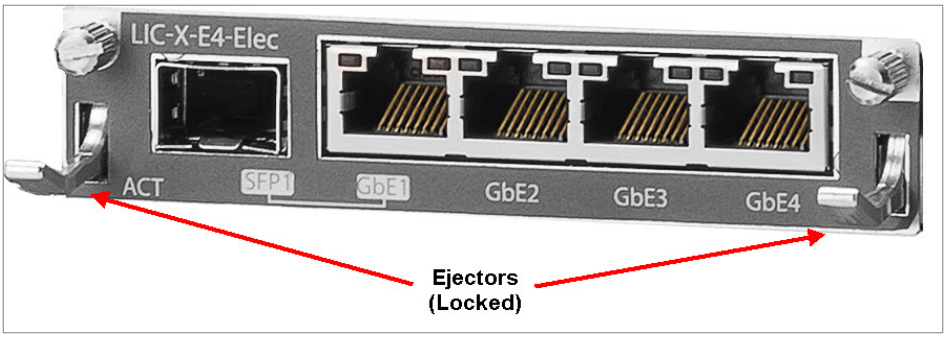


Figure 45: *LIC Ejectors – Locked*



4. If you are installing an LIC-X-E4-Elec or LIC-T155, remove the SFP cap from the LIC.

Figure 46: *Removing the SFP Cap from an LIC-X-E4-Elec*

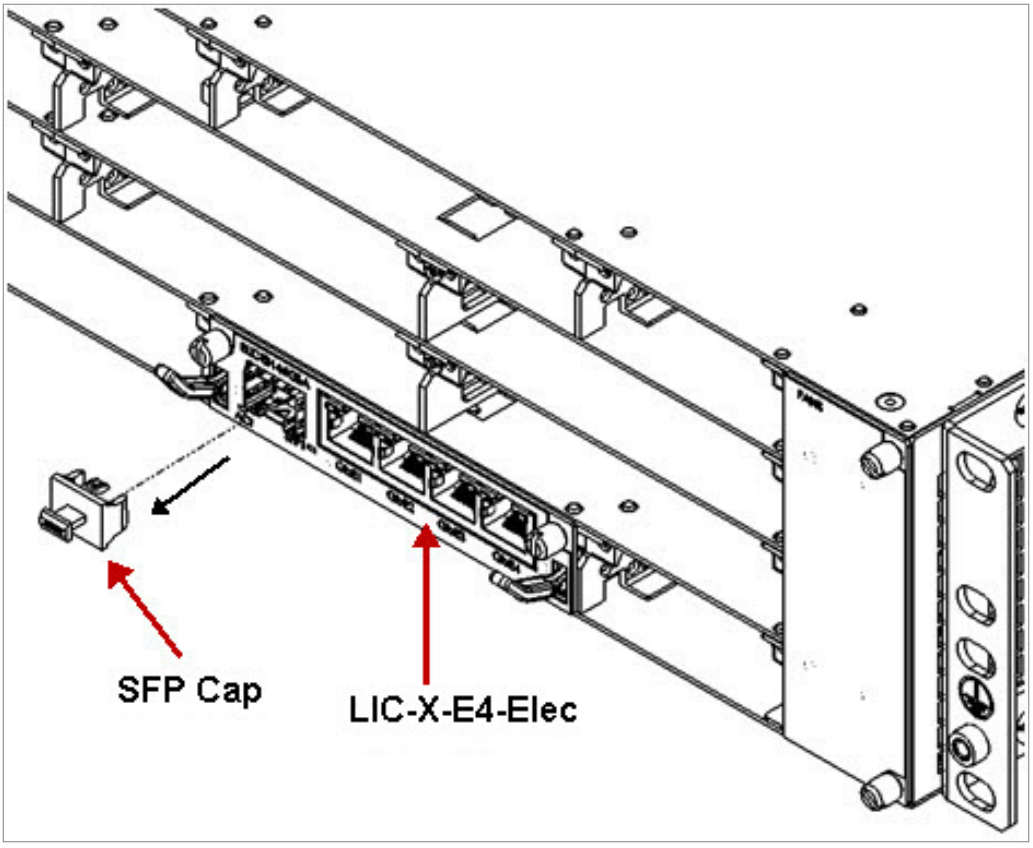
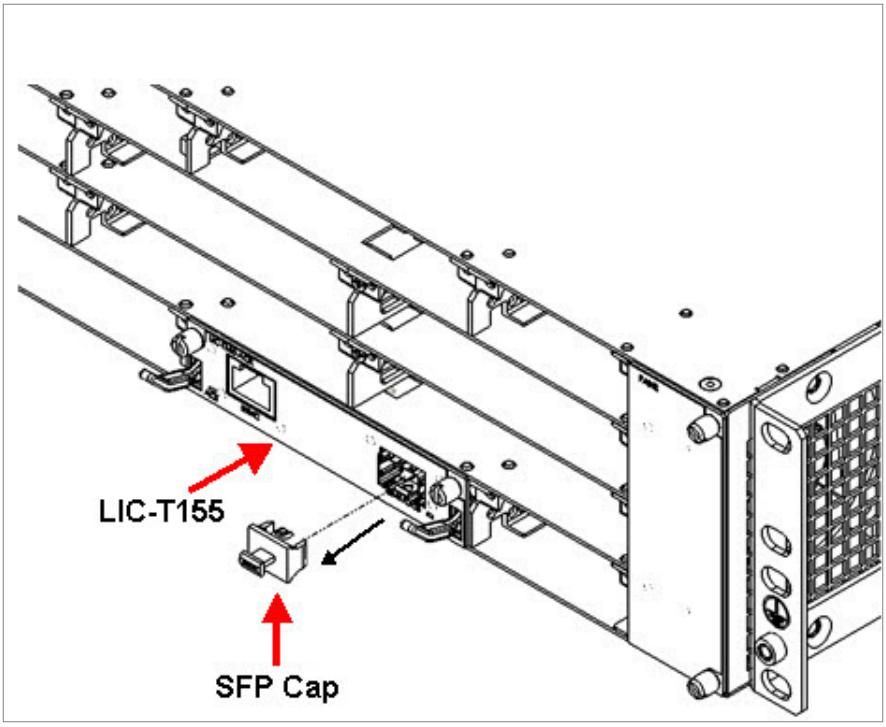
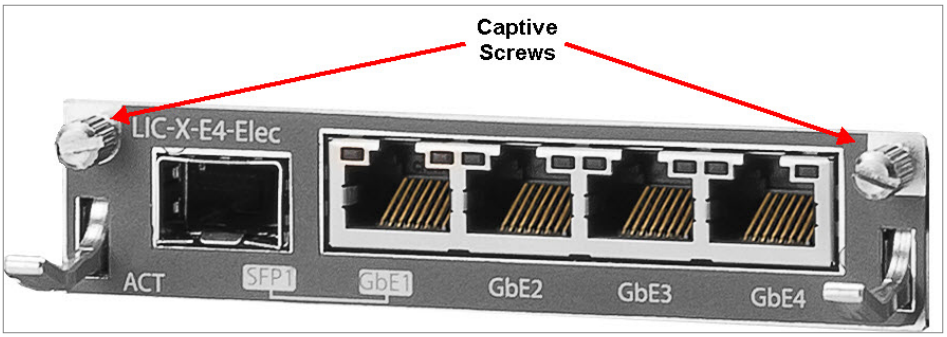


Figure 47: *Removing the SFP Cap from an LIC-T155*



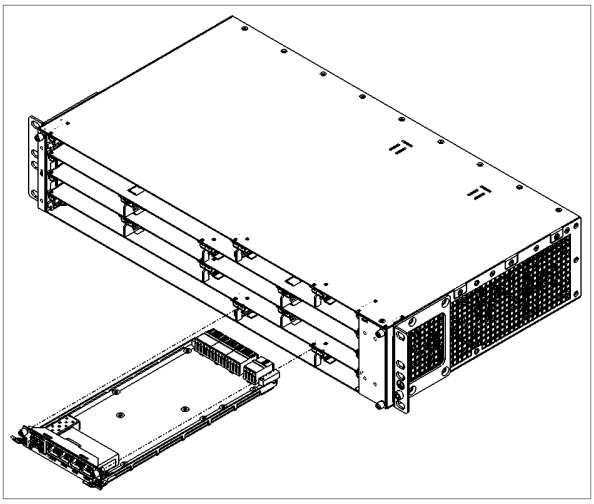
5. Secure the LIC by fastening the two captive screws gently with a screwdriver (not by hand).

Figure 48: *LIC Captive Screws*



Removing a LIC

1. Unplug all cables connected to the LIC.
2. Loosen the two captive screws that secure the LIC in its place.
3. Release the LIC from the backplane by unlocking the LIC ejectors.
4. Slide the LIC out of the chassis.



5. Install the new LIC, as described in Inserting a LIC into the Chassis.
6. Verify that the captive screws are loosened before installing the LIC.

PDC Installation and Replacement

Order of Installation

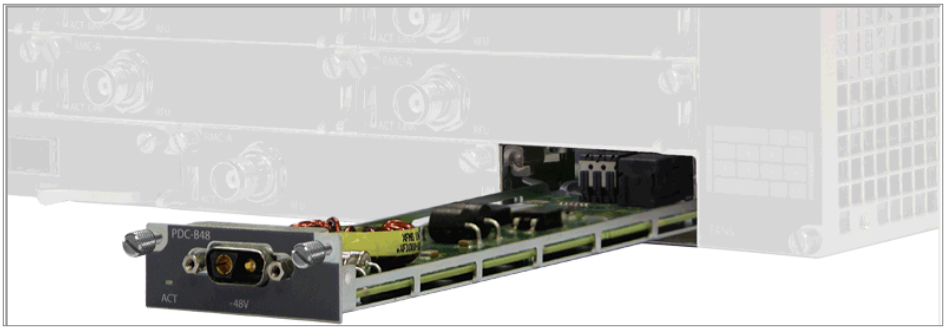
In a 1RU chassis, the PDC must be installed in PDC Slot 1.

In a 2RU chassis, the first PDC must be installed in PDC Slot 1. Optionally, you can install a second PDC in PDC Slot 2.

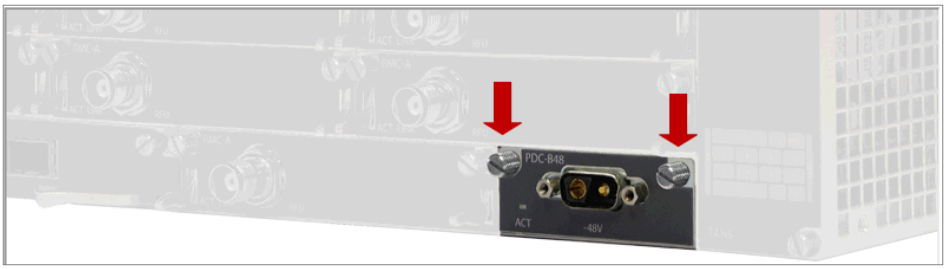
For slot numbering, refer to Chassis Slots and Card Population Guidelines.

Installing a PDC

1. Insert the PDC into the appropriate slot in the chassis, and secure it using two captive screws.



2. 2. Fasten the two captive screws manually.



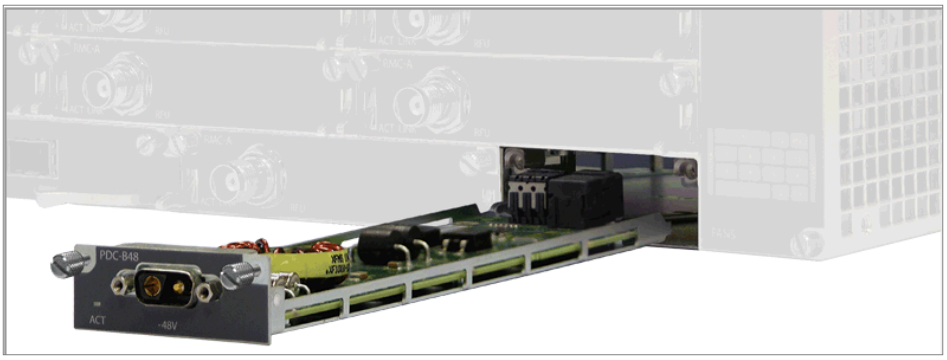
3. Connect the power cable, as described in Connecting the Power Cable.

Replacing the PDC

1. Disconnect the power cable (not shown) on the PDC to be replaced.

2. Unscrew the two captive screws that secure the PDC to the chassis. A screwdriver may be used if necessary to unscrew the screws.

3. Carefully slide the PDC out of the chassis by pulling the screws.



4. Install the new PDC, as described in Installing a PDC.

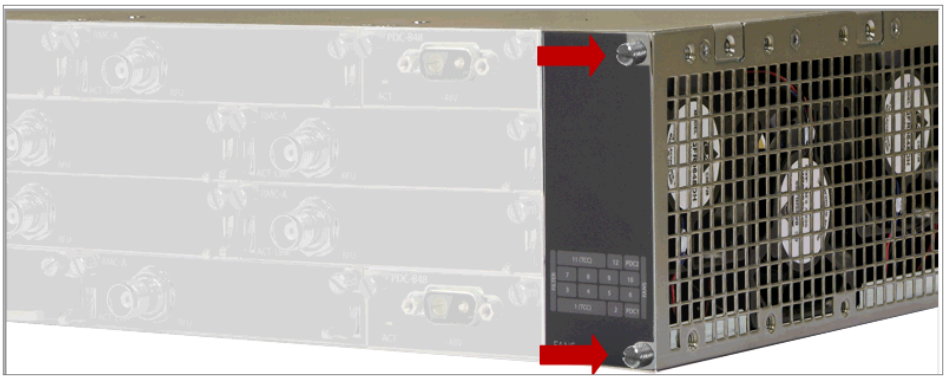
Installing and Replacing the Fans Drawer

A fans drawer is generally included in a new chassis. If you need to install or replace the fans drawer, use the following instructions.

Installing the Fans Drawer

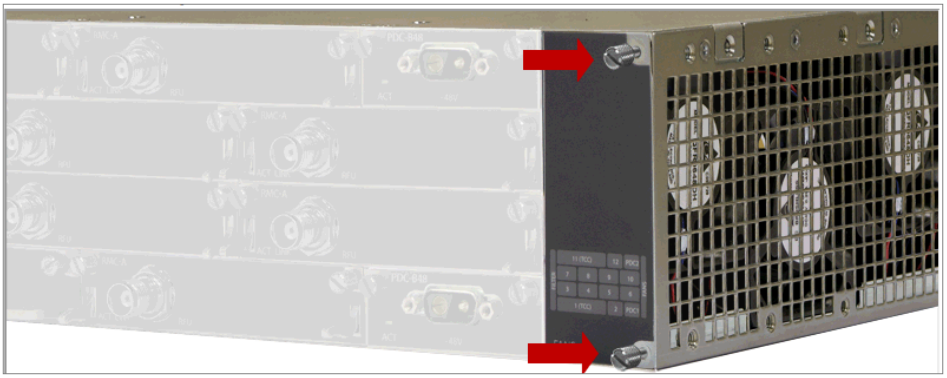
1. Carefully insert the fans drawer in the right vertical slot. Ensure that the drawer enters the guides inside the chassis, and gently press the card to enter the internal connectors without the use of excessive force.

2. Fasten the two captive screws manually.



Replacing the Fans Drawer

1. Unscrew the two captive screws that secure the fans drawer to the chassis. A screwdriver may be used if necessary to unscrew the screws.



2. Carefully remove the drawer from the chassis by pulling the screws.

3. Install the new fans drawer, as described in Installing the Fans Drawer.

Installing and Replacing a Filter Unit

Optionally, a filter unit can be installed in the PTP 820A. The filter unit consists of a filter tray and a filter foam. The filter foam needs to be changed or cleaned from time to time, depending on the environmental conditions.

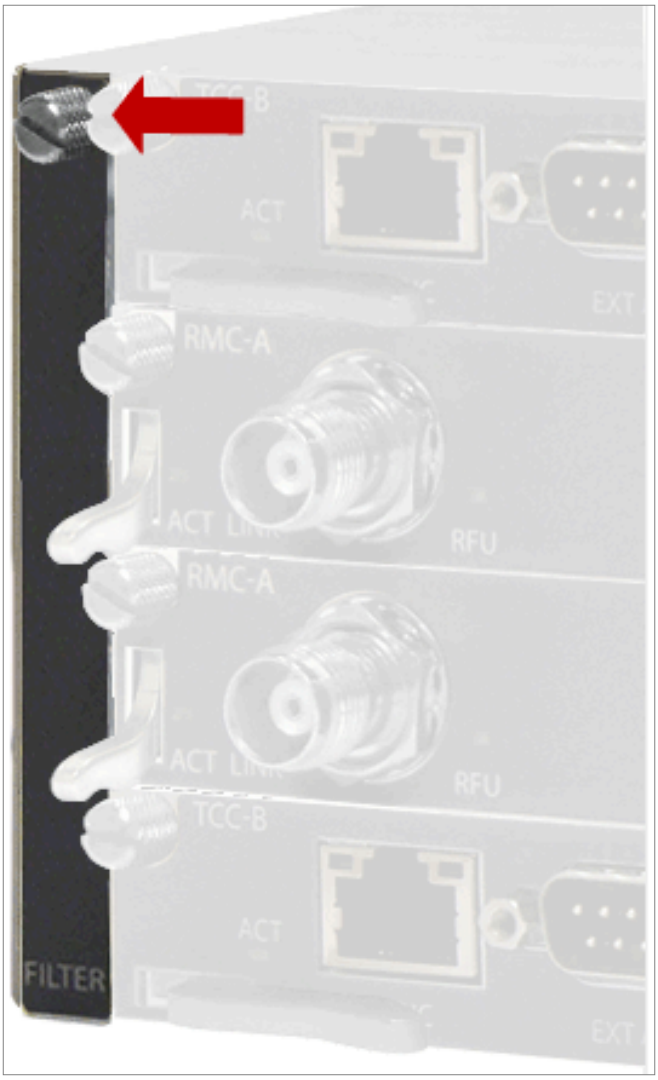
Follow the procedure below to install the filter unit or to remove the filter foam.

Installing the Filter Unit

1. Insert the filter foam in the filter tray.

2. Slide the filter tray into the filter slot in the chassis.

3. Fasten the captive screw manually.


TCC-B
ACT
EXT
RMC-A
ACT
RFU
RMC-A
ACT
RFU
TCC-B
ACT
EXT
FILTER

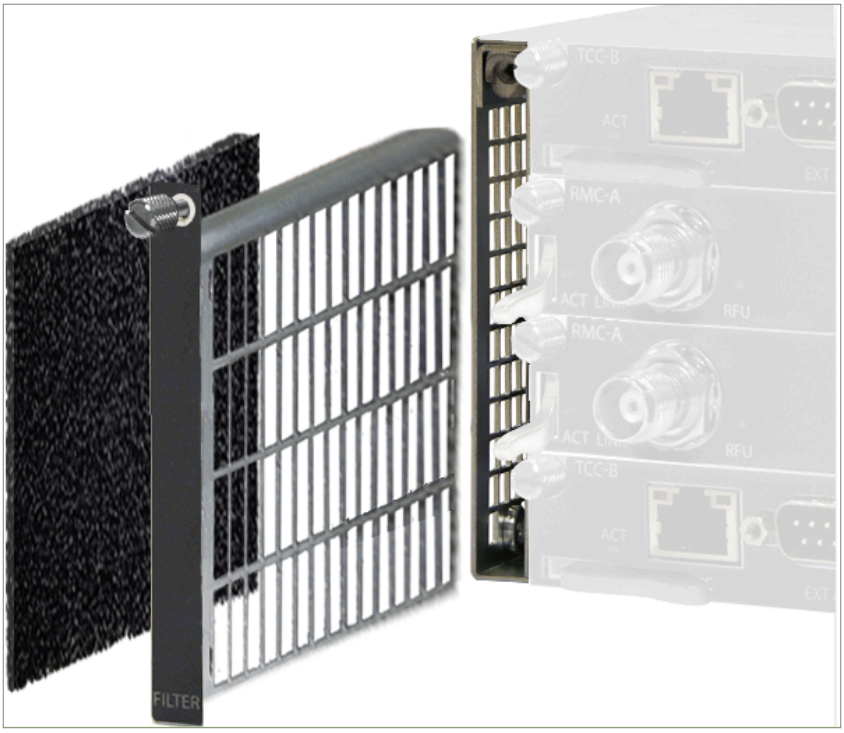
Removing the Filter Foam

The filter tray is secured to the chassis by means of a captive screw (no ejectors).

1. Unscrew the captive screw.

2. Remove the filter tray by pulling the captive screw.

3. Remove the filter foam from the filter tray.




TCC-B
ACT
EXT
RMC-A
ACT
RFU
RMC-A
ACT
RFU
TCC-B
ACT
EXT
FILTER

Installing Blank Panels

Every slot that does not contain a card must contain a blank panel. There are three types of blank panels, corresponding to the three slot sizes in an PTP 820A chassis.

Figure 49: *Blank Panel TCC*

Figure 50: *Blank Panel PDC*

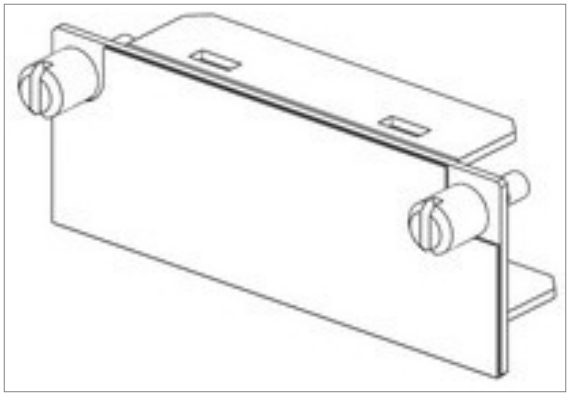
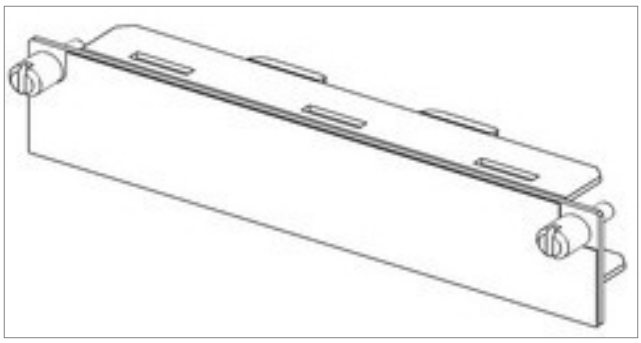
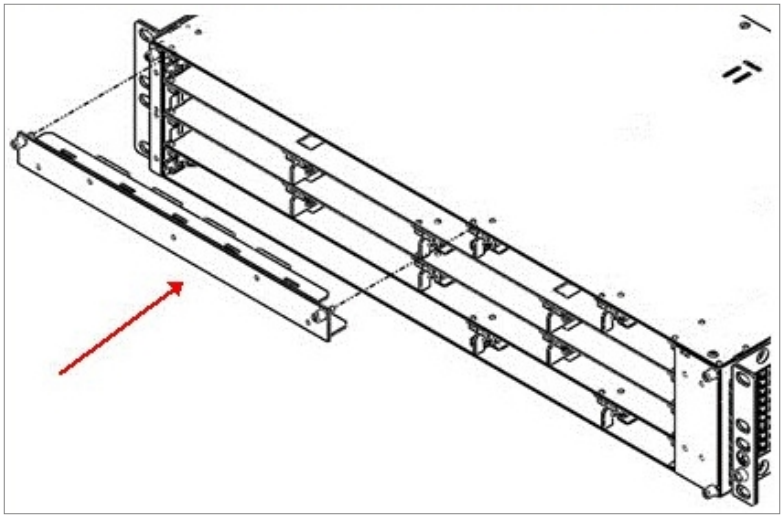


Figure 51: *Blank Panel RMC/RIC/LIC*



To install a blank panel, insert the appropriate panel into the slot and secure the panel using captive screws.

Figure 52: *Installing a Blank Panel*



Connecting the Power Cable

Caution:

In a 1RU chassis, the Fans unit receives its power from the TCC. Therefore, to avoid over temperature in the chassis, do not power up the 1RU unit unless both the TCC and Fans unit are installed in the chassis.

Note:

Before connecting the power supply to the PDC, you must verify that the positive pole in the external power supply is grounded.

The following power cables are available for use with a 1RU PTP 820A unit:

Marketing Model	Description
N000082L254A	CABLE,OPEN END TO OPEN END,2.2M,12AWG
CBL-PWR-OE-OE-16A-5m	Power cable Open-end/Open-end, 16A, 5m

2RU units use a single-feed PDC. The power cable connector is pre-attached to the power cable.

The following power cables are available for a 2RU PTP 820A unit:

Marketing Model	Description
N000082L245A	CABLE,D-TYPE PWR to 2X FERRULE,2.2M,40A,BLACK/RED
CBL-PWR-DType/OE-40A-5m	Power cable D-Type/Open-end, 40A, 5m
CBL-PWR-DType/OE-40A-2.2m-AuNZ	CBL-PWR-DType/OE-40A-2.2m-Australia/NZ

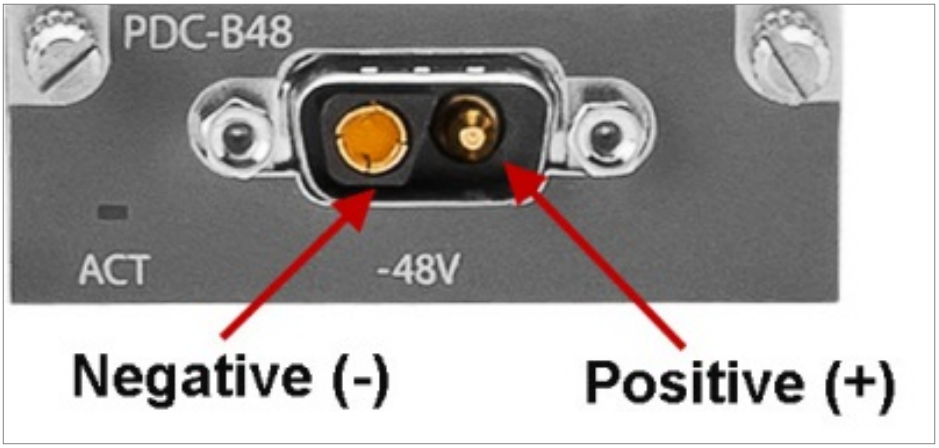
Note:

CBL-PWR-DType/OE-40A-2.2m-AuNZ is for use in Australia and New Zealand only. For this cable, the Blue side (A2) must be connected to the negative (-) terminal and the Red side (A1) must be connected to the positive (+) terminal.

For a 2RU Chassis

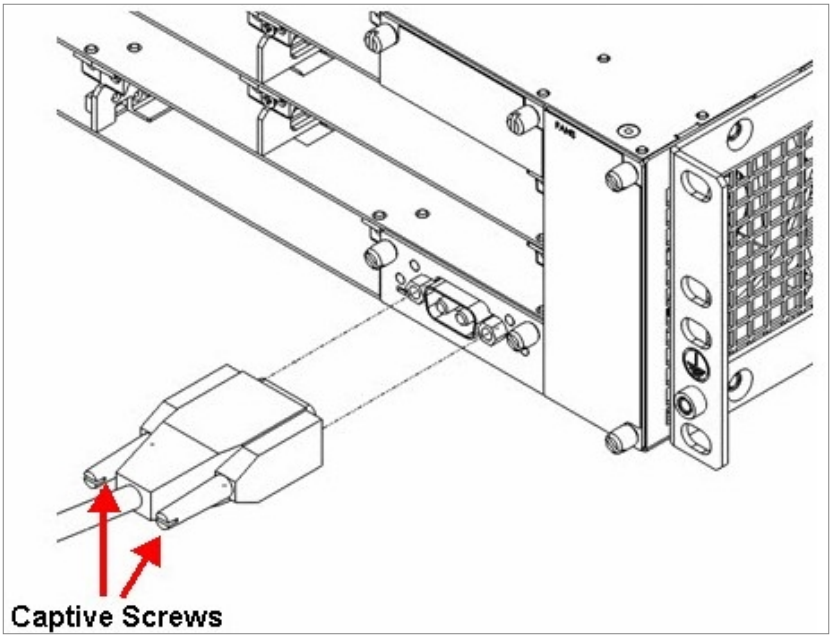
1. Verify that the wiring is according to the correct polarity.

   Figure 53: *2RU Chassis – PDC Polarity*



2. Plug the power connector into the PDC and tighten the two captive screws on the sides of the connector to secure the connector.

   Figure 54: *Connecting the Power Cable in a 2RU Chassis*

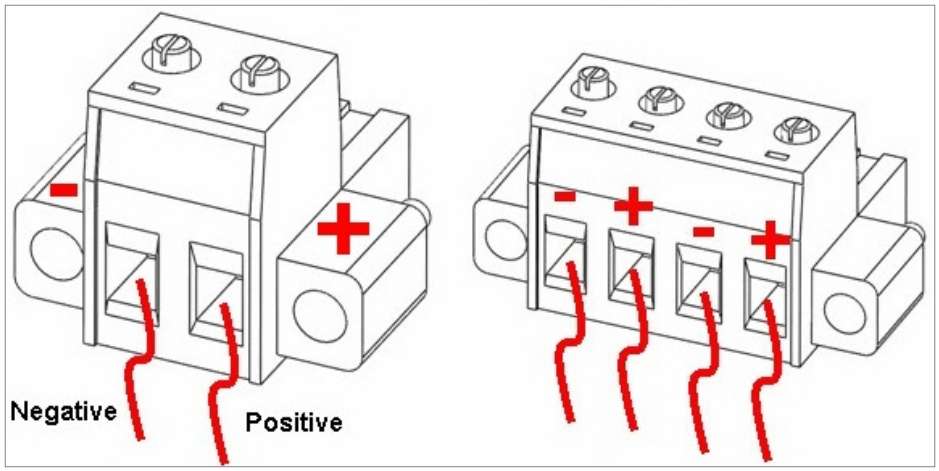


For a 1RU Chassis

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 55: *Correct Wiring on a 1RU Chassis*



4. Insert the wires into the connector.
5. Secure the wires in the connector with the screws.
6. Plug the connector into the PDC and tighten the two screws on the sides of the connector to secure the connector.

Figure 56: *Connecting the Power Cable in a 2RU Chassis – Single-Feed PDC*

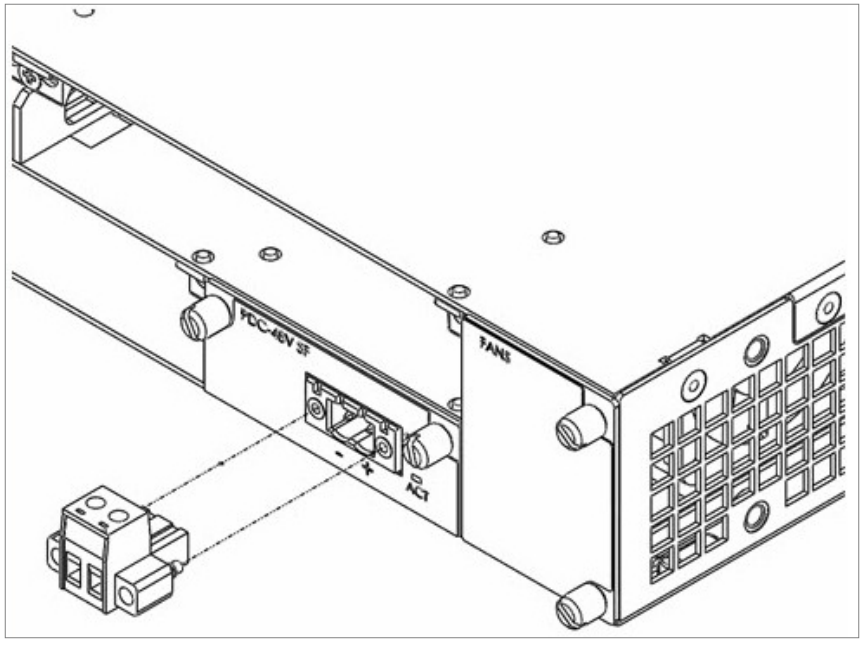
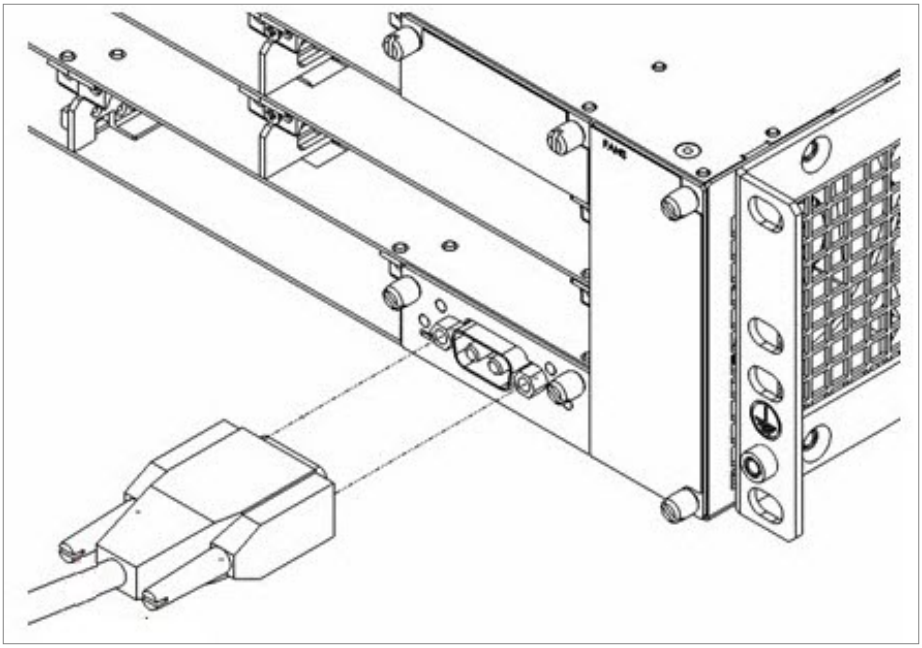


Figure 57: *Connecting the Power Cable in a 2RU Chassis – Dual-Feed PDC*



Power Supply Notes

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

- Voltage range: -40.5 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 form the unit for servicing.

Note:

Make sure to use a circuit breaker 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. The maximum rating of the overcurrent protection shall be 3 Amp per link, while the maximum current rating is 15A for 1RU and 30A for 2RU.

Power supply grounding should be in accordance with the following figures:

Figure 58: *Power Supply Grounding – 1RU Chassis with Dual-Feed PDU*

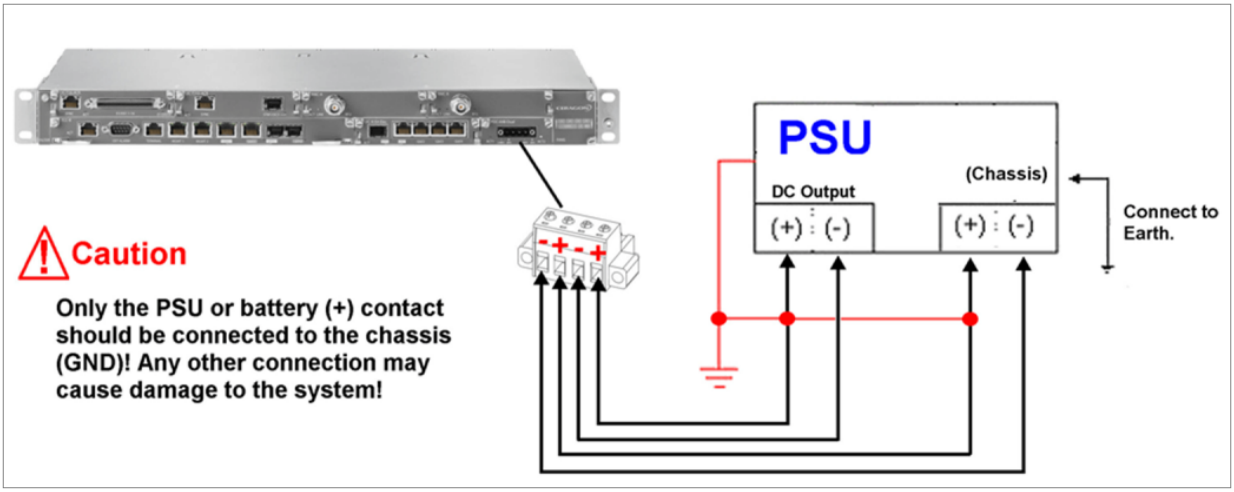


Figure 59: *Power Supply Grounding – 1RU Chassis with Single-Feed PDU*

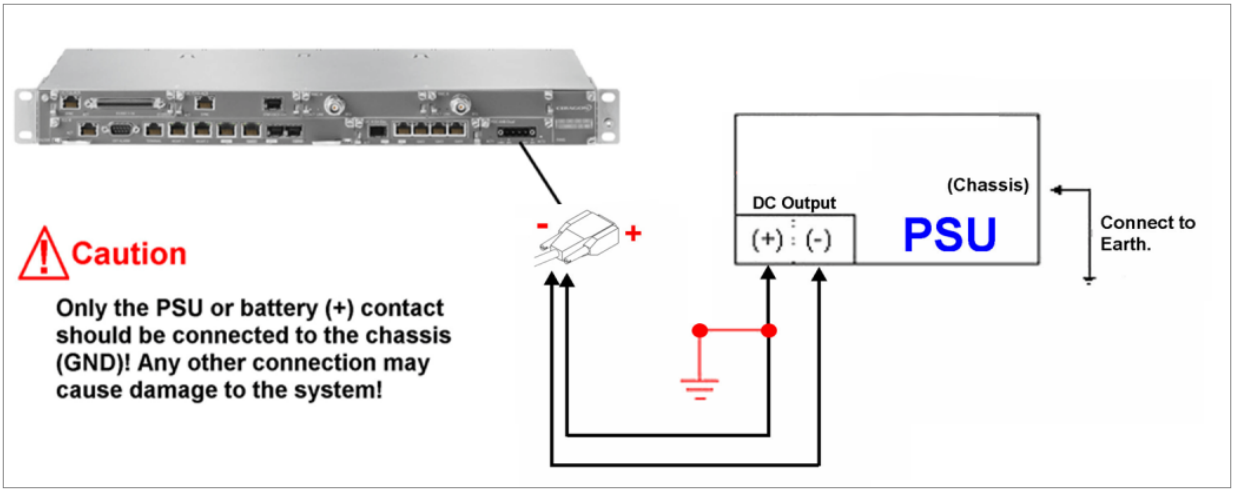
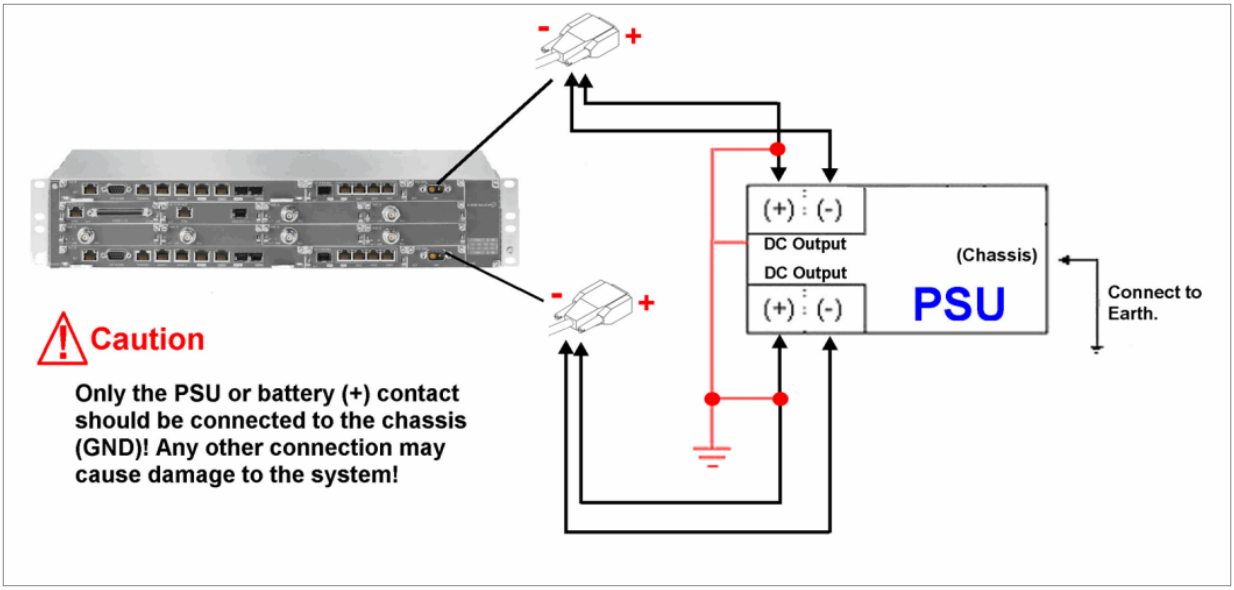


Figure 60: *Power Supply Grounding – 2RU Chassis*



IDU-RFU Cable Connection

RFU-C and RFU-HP/1500HP RFUs are connected to the RMC by a coaxial cable RG-223 (up to 100 m/300 ft), Belden 9914/RG-8 (up to 300 m/1000 ft) or equivalent, with an N-type connector (male) on the RFU and a TNC connector on the RMC in the PTP 820A chassis.

RFU-D, RFU-D-HP, RFU-E, and RFU-S can be connected to a RIC-D via a standard CAT-5e or preferably CAT-6/6a cable, with RJ-45 connectors on the RFU and an RJ-45 connector on the RIC-D. They can also be connected to the RIC-D over optical fiber cables via the optical (SFP) RFU interface on the RIC-D.

For an RFU-D, RFU-E, or RFU-S connecting to an electrical RFU interface, the cable can carry both the data and the DC power required for the RFU. For configuration instructions, refer to the *User Guide for PTP 820A, PTP 820A, and Evolution PTP 820LH*.

For an RFU-D, RFU-E, or RFU-S connecting to an optical RFU interface, and for an RFU-D-HP connecting to either an electrical or an optical RFU interface, an external DC power cable is required to supply power to the RFU.

The following are the maximum numbers of RFU ports per chassis that can provide PoE:

- 2RU chassis: 12 RFU ports
- 1RU chassis: 6 RFU ports

For available cable types and maximum lengths, refer to the Installation Guide for the RFU you are using.

Checking Electrical Ethernet Cables

When using electrical Ethernet cables to connect the RFU with the IDU, it is strongly recommended to run a special CLI command to check that the cable is functioning properly. This command is recommended for electrical cables longer than 10m.

To run this command, you must first enter radio-unit view for the RFU you want to check. To enter radio-unit view, enter the following command in root view:

```
root> radio unit slot <slot> port <port>
```

For example, to check the cable connected to RFU interface 1 of a RIC-D in slot 5, enter the following command:

```
root> radio unit slot 5 port 1
radio-unit [5/1]>
```

Once you are in radio-unit view, enter the following command to run the cable checking operation:

```
radio-unit [x/x]>cable-bist-run
```

Note:

Running this command affects traffic and resets the RFU. If you need to run the command a second time, you must wait until the RFU comes back up. This usually takes from three to five minutes.

After running the cable-bist-run command, and once the RFU comes back up, it is recommended to run the following command (also in radio-unit view), to ensure that traffic is passing through the cable and interfaces properly:

```
radio-unit [x/x]> show counters
```

The result of the cable-bist-run command should be Pass in every row. If any Fail result occurs, the following troubleshooting steps are recommended:

1. Run the test again, after the RFU comes back up.
2. Verify that the cable is physically secure. You should be able to lightly move or shake the cable without triggering an alarm in the system.

If the test continues to produce Fail results, perform the following additional troubleshooting steps:

1. Verify that all grounding has been properly installed according to the Installation Guide for the RFU you are using, including both RFU grounding and cable grounding.
2. Verify that the cable specifications are consistent with the cable specifications listed in the Installation Guide for the RFU you are using.
3. Verify that the RJ-45 connection was installed in according with the instructions for connecting Cat5e cables described in the Installation Guide for the RFU you are using.
4. Replace the cable.

RFU-D Startup Troubleshooting Procedure

It normally takes about two minutes from power-up until the RFU-D is up and operational. During this time, the RFU resets itself several times as the RFU software aligns itself with the IDU software.

If after two minutes the Operational Status of the slot connected to the RFU is not **Up**, or if the Status LED on the RFU-D has not stabilized on Green, the following steps should be performed *together*:

- Restart the RIC-D connected to the problematic RFU-D. This is performed in the Chassis Configuration page of the Web EMS or by using the following CLI command:

  ```
  root> platform shelf-manager card reset slot <slot>
  ```

- Physically disconnect the power to the RFU, wait five seconds, then reconnect the power.

Wait another two minutes for the Operational Status of the RFU-D to stabilize as **Up**. If again the RFU-D fails to stabilize, it is recommended to wait an additional 20 minutes for the automatic recovery mechanism to establish the IDU-RFU connection.

Grounding the Cables

To fit the gland, the outer cable diameter should be between 6-10 mm.

Cables must be grounded as follows.

- For fiber cables, no grounding is required.
- For DC power cables, no grounding is required.
- For CAT-5e/CAT-6 cables, the shielded Ethernet cable (SF/UTP construction) must be grounded to the antenna tower at the top (next to the RFU), the entry to the indoor cabinet, and every 50m using the kit UNIV_GRD_KIT_1/2.

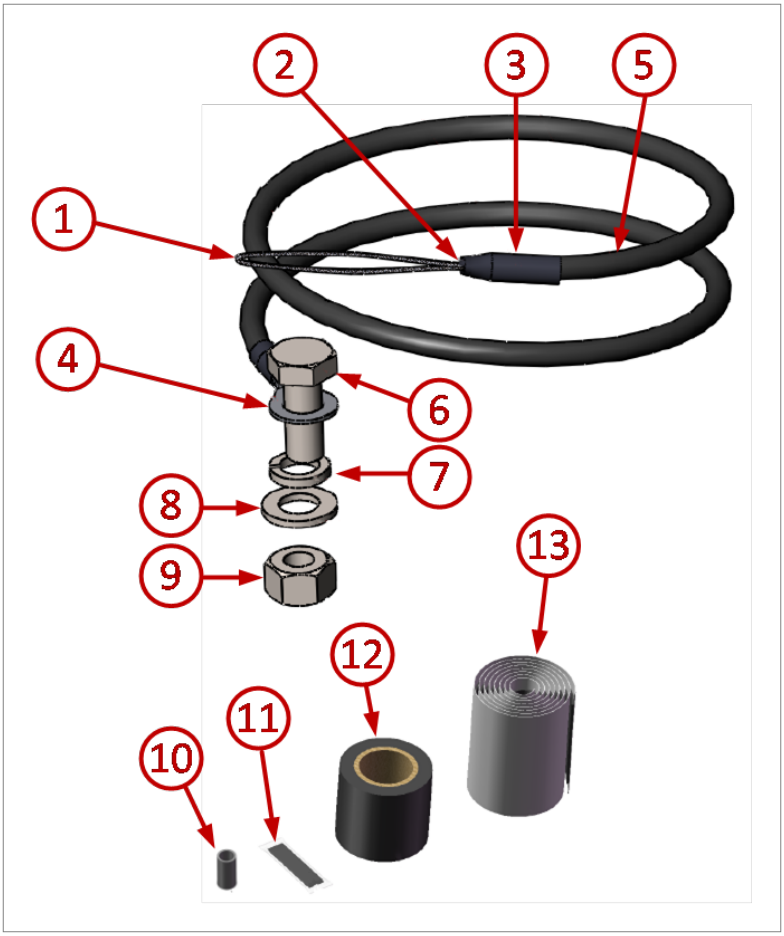
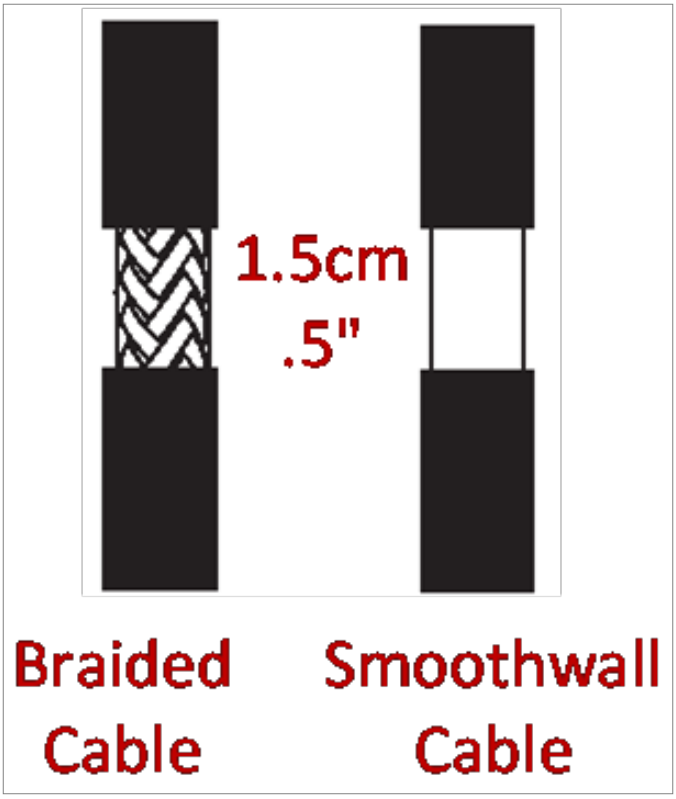


Table 7 *Cable Grounding Kit*

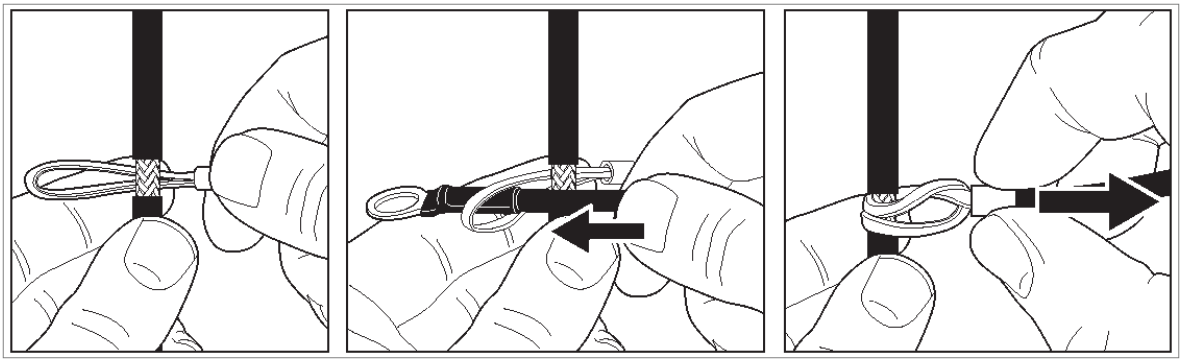
Marketing Model	Description
N000082L173A	Universal Grounding Kit up to 1/2” cable

To connect the grounding kit:

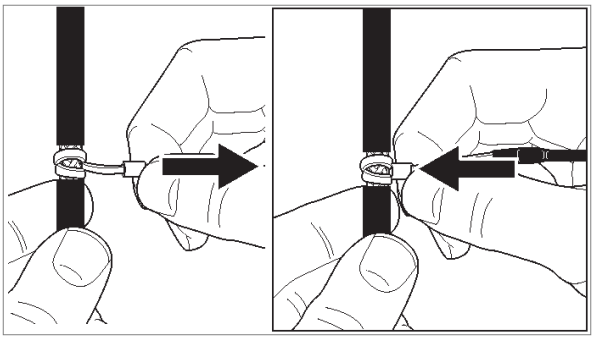
1. Strip the cable jacket about 1.5 cm (.5”).



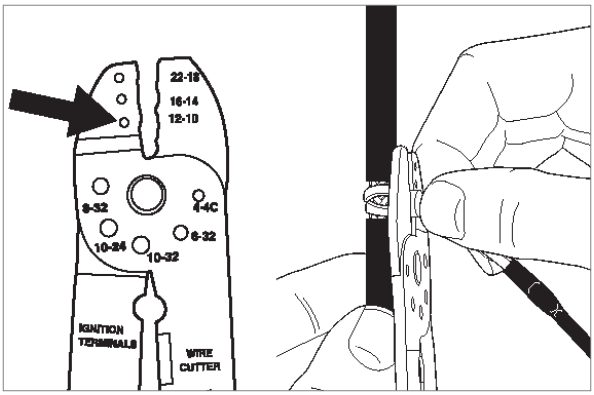
2. Loop the grounding wire’s braid belt (1) around the stripped portion of the cable, insert the rest of the grounding wire (5) through the braid belt, and tighten to form a knot, as shown in the figure below.

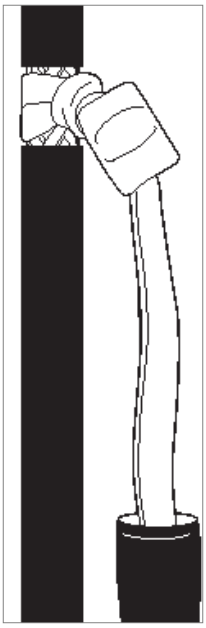


3. Grasp the terminal of the braid belt (2) and slide it flush with the knot around the cable, as shown in the figure below.

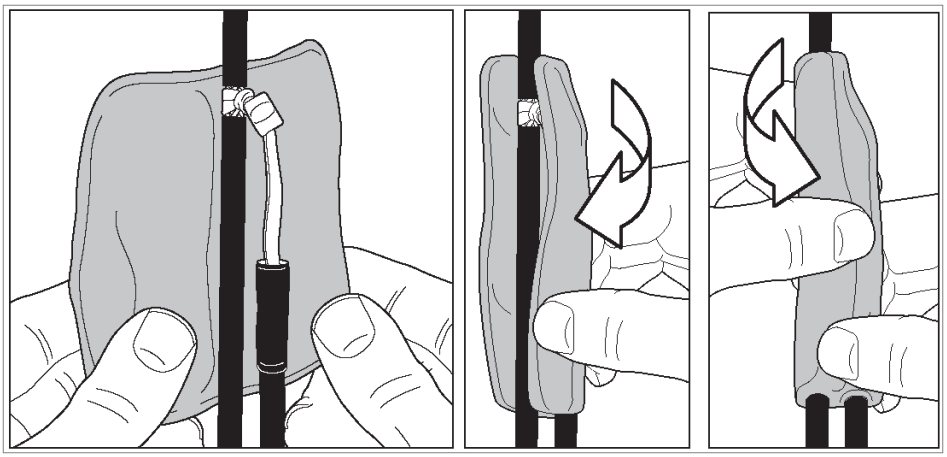


4. Crimp the knotted braid belt (1) and the bare terminal (10) together, as shown in the figures below.

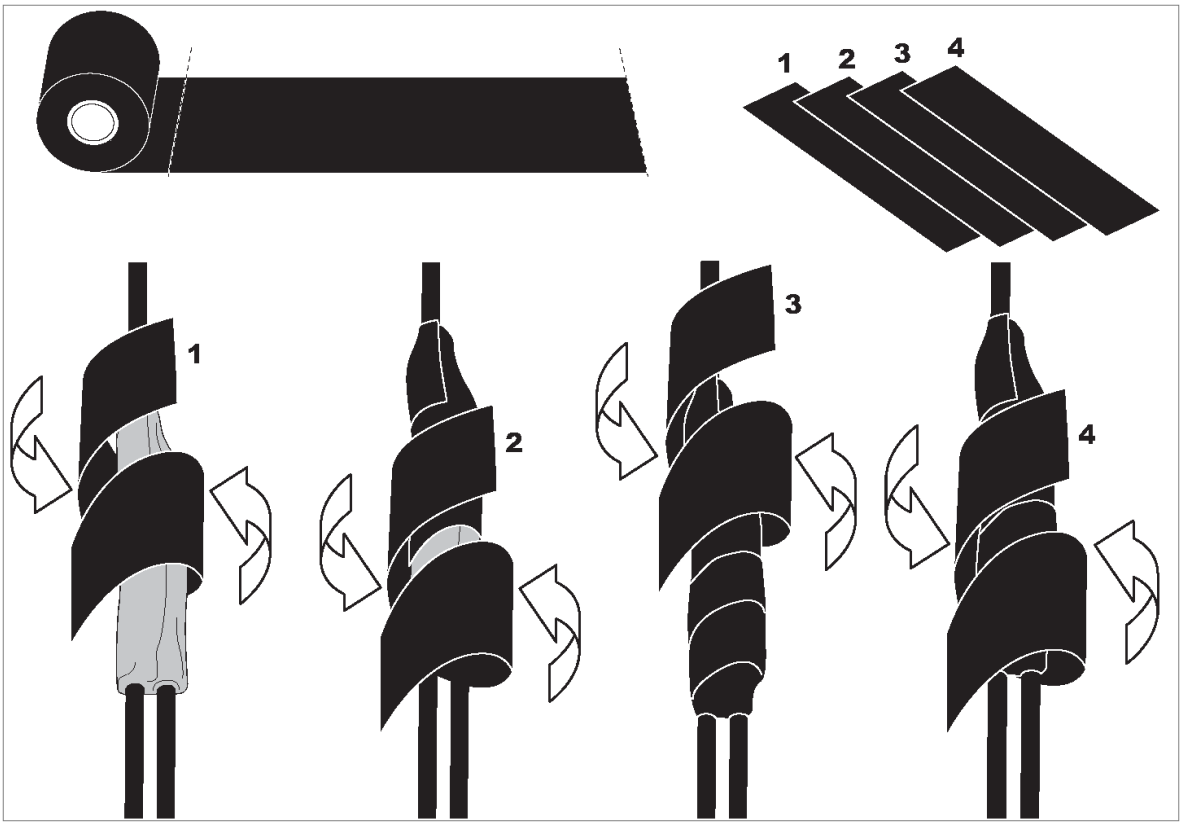


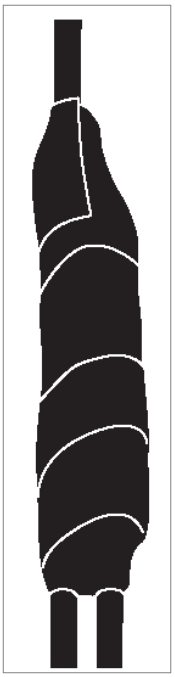


5. Wrap the butyl rubber sealing clay (13) around the cable and the grounding wire, as shown in the figures below.

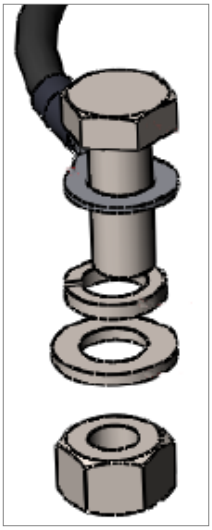


6. Cut four strips of the tape (12), approximately 20 cm (8”) each, and wrap these strips of tape around the butyl rubber sealing clay (13), as shown in the figures below.





7. Pass the hex bolt (6) through the copper lug at the end of the grounding wire (4), and secure it to the grounding bar using the flat washer (7), the spring washer (8), and the nut (9). Use conductive grease (11) on the bolt and nut to ensure proper contact.



Performing Initial Configuration

This section describes how to establish a management connection with the PTP 820A 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 Chassis-Based Systems: PTP 820A, PTP 820A, PTP 820LH, and Evolution PTP 820LH.

Establishing a Connection

You can connect to the PTP 820A unit via a serial or a LAN connection.

Connecting to the Unit with a Serial Connection

1. Connect a serial RS-232 cable with an RJ-45 interface from the laptop or PC you are using to configure the unit, to the Terminal Interface on the TCC.

Figure 61: *Terminal Interface on TCC-U*

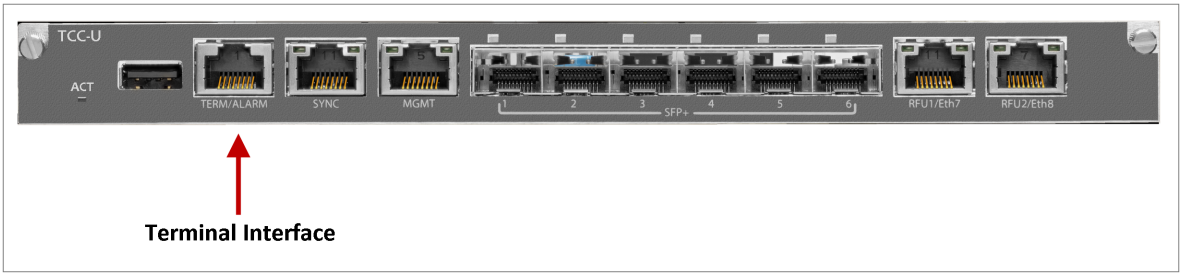


Figure 62: *Terminal Interface on TCC-B2 or TCC-B2-XG-MC*

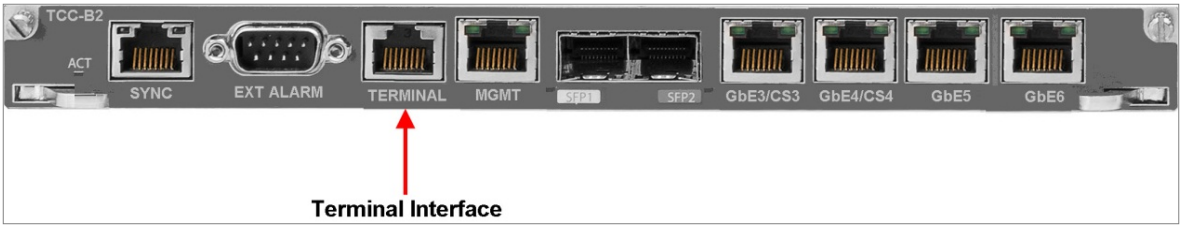
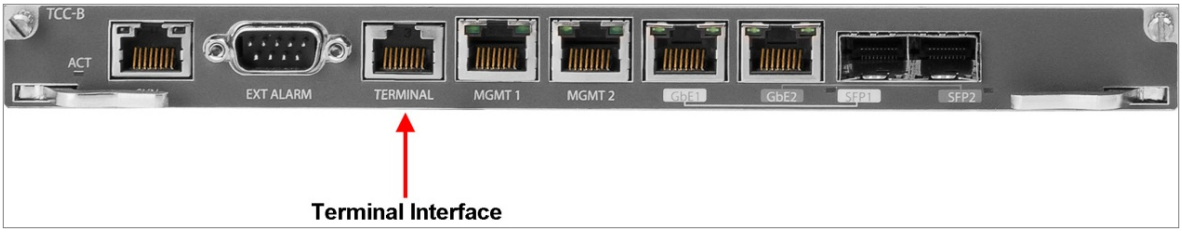


Figure 63: *Terminal Interface on TCC-B and TCC-B-MC*



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

Connecting to the Unit with a LAN Connection

Connect an Ethernet cable from the LAN port on the laptop or PC you are using to configure the unit to one of the management interfaces (MGMT on TCC-U, TCC-B2, or TCC-B2-XG-MC, MGMT1 or MGMT2 on TCC-B or TCC-B-MC)on the TCC.

Figure 64: *Management Interfaces on TCC-U*

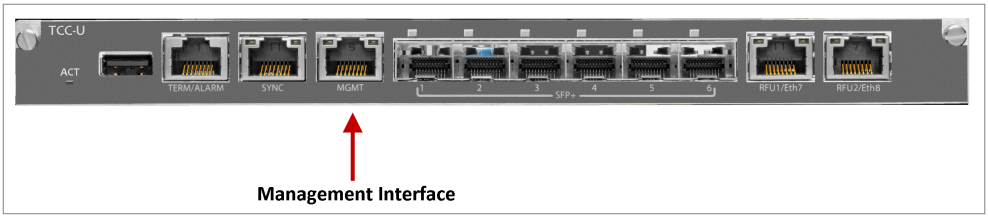


Figure 65: *Management Interface on TCC-B2 and TCC-B2-XG-MC*

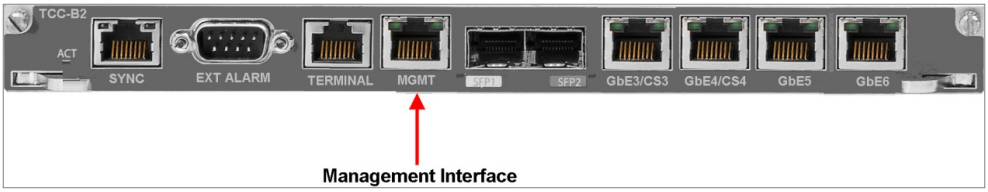
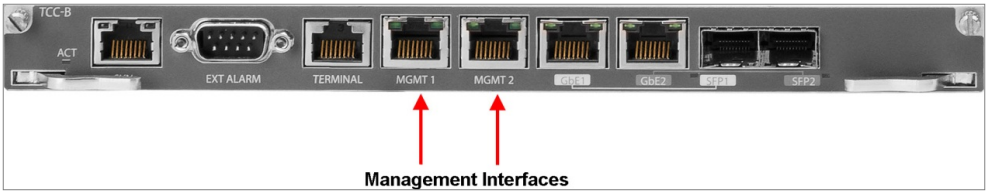


Figure 66: *Management Interfaces on TCC-B and TCC-B-MC*



To establish a connection with the PTP 820A unit, it is necessary to configure an IP address on the PC or laptop within the same subnet as the PTP 820A unit. The default chassis IP address is 192.168.1.1. For example, you can set the PC or laptop address to 192.168.1.10 and the subnet mask to 255.255.255.0. Note the initial settings before changing.

Note:

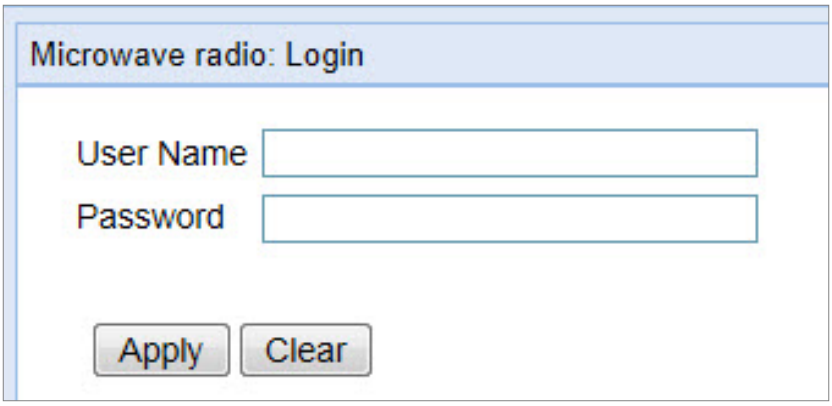
The chassis IP address, as well as password, should be changed before operating the system.

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)** and set the following parameters:
   - IP address: 192.168.1.10
   - Subnet mask 255.255.255.0
   - No default gateway
4. Click **OK** to apply the settings.

Logging On

1. Open an Internet browser (Internet Explorer, Mozilla Firefox, or Google Chrome).
2. Enter the default IP address "**192.168.1.1**" in the Address Bar. The Login page opens.

   Figure 67: *Login Page*



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

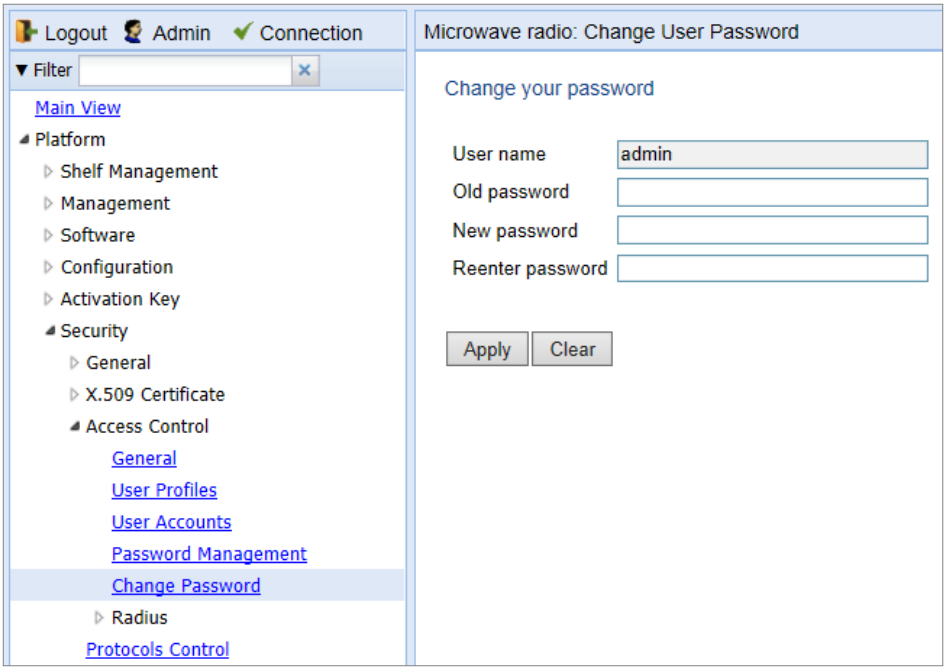
Changing Your Password

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 68: *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:
   - 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. For purposes of meeting this requirement, upper case letters at the beginning of the password and digits at the end of the password are not counted.
   - The last five passwords you used cannot be reused.
4. 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 PTP 820A User Guide, DOC-00036540.

- Change the Management IP Address
- Configure the License
- Set the Time and Date (Optional)
- Configure the Radio (MRMC) Script(s) (Optional)
- Set the Radio Frequencies
- Enable the Radio Slots
- Enable the Radio Interfaces
- Unmute the Radio
- Configure Radio Grouping (Optional – Multi-Carrier ABC, HSB Protection, and/or XPIC)
- Configure LAG (Optional)
- Create Ethernet Service(s)

Applying a Pre-Defined Configuration File

PTP 820 units can be configured from the Web EMS in a single step by applying a pre-defined configuration file. A pre-defined configuration file can be prepared for multiple PTP 820 units, with the relevant configuration details specified and differentiated per-unit.

The pre-defined configuration file is generated by Cambium Professional Services and provided as a service.

The pre-defined configuration file must be compatible with the System Release version the PTP 820 device is running. Configuration files created for System Release 9.2 cannot be used with System Release 9.2.5 or higher. Configuration files must also be compatible with the type of PTP 820 device. For example, a configuration file created for PTP 820C cannot be applied to an PTP 820A device.

If you need to change the capacity mode of a slot section from the default setting of 1 Gbps, you must do so manually after applying the pre-defined configuration file. For details, see Slot Sections and 2.5 Gbps Mode on page Slot Sections and 2.5 Gbps Mode. For configuration instructions, see *Configuring Slot Section Capacity Mode* in the *User Guide for PTP 820A, PTP 820A, and Evolution PTP 820LH*.

For units using one or more RIC-D cards, if you need to change the IDU-RFU connection settings from the default settings of RJ-45 with PoE, you must do so manually after applying the pre-defined configuration

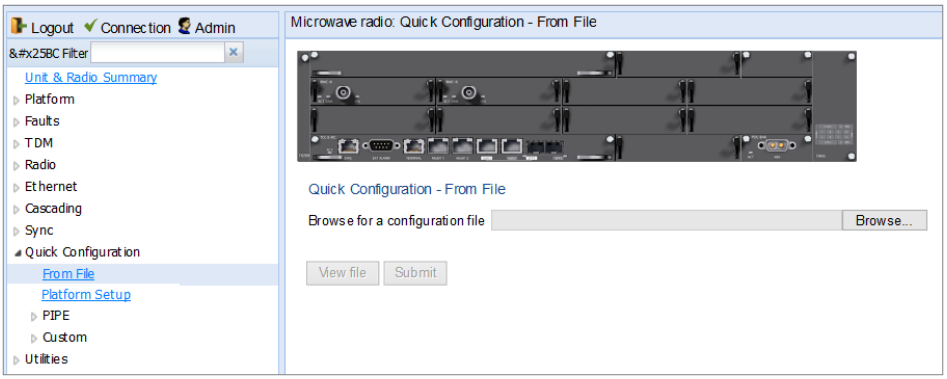
file. See IDU-RFU Cable Connection. For configuration instructions, see the *User Guide for PTP 820A, PTP 820A, and Evolution PTP 820LH*.

For further information on the creation of pre-defined configurations, consult your Cambium representative.

To apply a pre-defined configuration file:

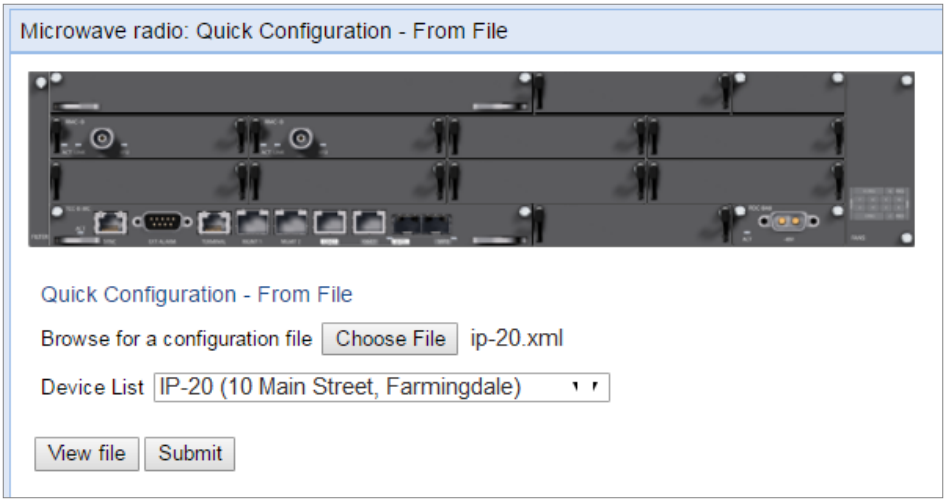
1. Select Quick Configuration > From File. The Quick Configuration – From File page opens.

Figure 69: *Quick Configuration – From File Page*



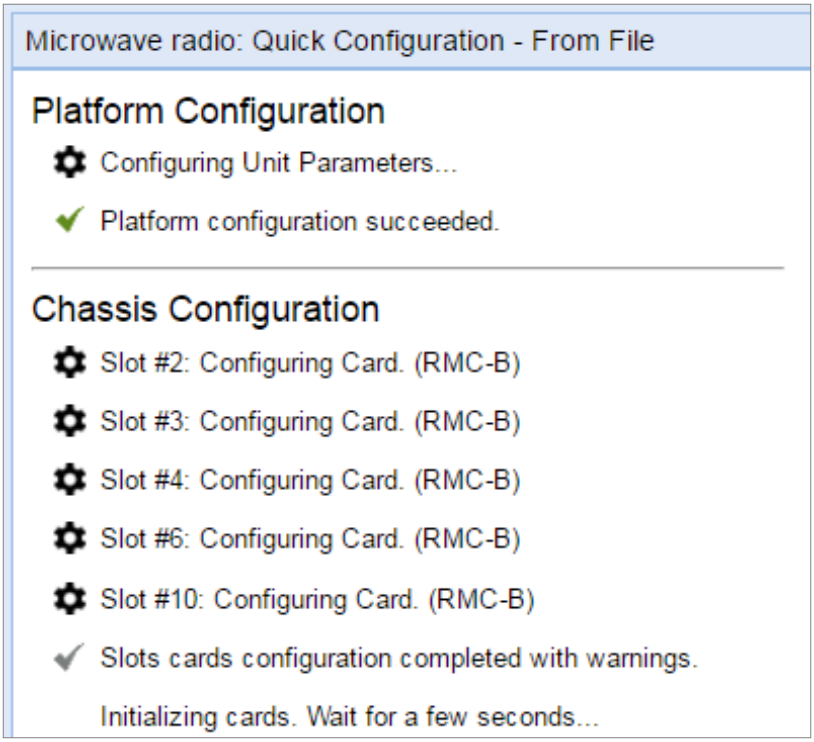
2. Click Browse, and select the configuration file for your unit.

Figure 70: *Quick Configuration – From File Page – Configuration File Loaded*



3. In the Device List field, select the PTP 820 unit you are configuring.
4. Optionally, click View file to display the configuration file (read-only).
5. To initiate the configuration, click Submit. Progress is updated in the Quick Configuration – From File page.

Figure 71: *Quick Configuration – From File Page – Configuration Status*



When the configuration is complete, the unit reboots.

If the configuration file includes changing from ETSI to ANSI mode, the unit reboots at that point in the configuration. After the reboot, you must return to the Quick Configuration – From File page and re-initiate the configuration.

Note:

If the pre-defined configuration file included a new IP address for the unit, make sure to configure an IP address on the PC or laptop you are using to perform the configuration within the same subnet as the PTP 820 unit's new IP address.

Interfaces and Pin-Outs

Special Procedure for FIPS-Compliant Installations

PTP 820A can be configured to be FIPS 140-3 level-2 compliant, in specific hardware and software configurations. For a full list of FIPS requirements, refer to the *FIPS 140-3 Non-Proprietary Security Policy*, available upon request.

Note:

FIPS is only available with the PTP 820 Assured platform. Only certain System Release versions support FIPS. For details, refer to the Release Notes for the System Release version you are using.

It is the responsibility of the user to ensure that the above FIPS requirements are met.

Note:

For TCC Redundancy, only Cold Switchover (CSO) can be used in a FIPS-compliant unit. Hot Switchover (HSO) in not supported with FIPS.

In order for an PTP 820A node to be FIPS-compliant, the following components must be FIPS-compliant:

- The PTP 820A chassis – The PTP 820A chassis must be FIPS-compliant. FIPS-compliant chassis are available for 2RU nodes. The FIPS compliant chassis includes, among other things:
  - A FIPS-compliant fan tray and filter, to ensure that the internal content of the chassis is opaque from external visibility.
  - Tamper-evident labels.
- RMC-B – Only FIPS-compliant RMC-Bs can be used in a FIPS-compliant PTP 820A unit.
- TCC – Only a FIPS-compliant TCC or TCCs (for an PTP 820A with TCC redundancy) can be used in a FIPS-compliant PTP 820A unit.

FIPS-compliant PTP 820A components have unique marketing models ending in the letters AF, as shown in the following table.

Table 8 *FIPS-Compliant Marketing Models*

Marketing Model	Description
IP-20N-2RU/10-Slot-Bs-2x48v-AF	IP-20N 2RU/10-slot base package w/ 2x48v, FIPS
IP-20 TCC-U-AF	IP-20 TCC-U, w/ SD-Card, FIPS
IP-20-TCC-B2-XG-MC+SD-AF	IP-20 TCC-B2-XG-MC, w/ SD-Card, FIPS
IP-20-RMC-B-AF	IP-20 RMC-B , FIPS

Other PTP 820A components do not need to be FIPS-compliant in order to be used in a FIPS-compliant PTP 820A node. These are:

- LIC-X-E4-Elec (4x GbE)
- LIC-X-E4-Opt (4x GbE)
- LIC-X-E10 (1x10G)
- LIC-T16 (16 x E1)
- LIC-T155 (1 x ch-STM-1)
- LIC-STM1/OC3-RST (1 x STM-1)

FIPS-compliant TCCs and RMC-Bs can operate with a non-FIPS chassis in non-FIPS mode. Non-FIPS TCCs, RMC-Bs, and RIC-Ds can operate in a FIPS chassis as long as FIPS mode is not enabled.

When FIPS mode is enabled, only RMC-B-AF cards will be able to function in the unit. Non-FIPS RMC-Bs will not function.

RIC-D cards can be used in FIPS-enabled units. However, AES-256 payload encryption is not supported with RIC-D, and for purposes of FIPS compliance, links using RIC-D are considered non-secured channels.

Special labels must be affixed to a FIPS-compliant PTP 820A unit. Some of these labels are already affixed when the units are delivered. For cards that are inserted into the chassis when the unit is installed (TCC, traffic, and radio cards), labels must be affixed during installation, after the cards have been inserted.

FIPS labels are tamper-evident and must be applied in such a way that it is not possible to remove either a single card or a group of cards without also removing a label and leaving evidence that the label was tampered with.

Figure 72 and Figure 73 illustrate the required positioning of FIPS labels. When applying a FIPS label, make sure to follow these guidelines:

- Use caution to avoid touching the adhesive in such a way as to leave fingerprints and damage the labels.
- The curing time (drying time) for the labels is at least sixty minutes.
- The labels must be replaced whenever modules are added to or removed from the unit. Replacement labels can be ordered from Cambium Networks, part number BS-0341-0.
- When replacing a label, gently cut the label, replace the module, and apply a new label in place of the previous label.
- Tamper-evident labels should be inspected for integrity at least once every six months.

Figure 72: *Applying Tamper-Evident FIPS Labels – Front View*

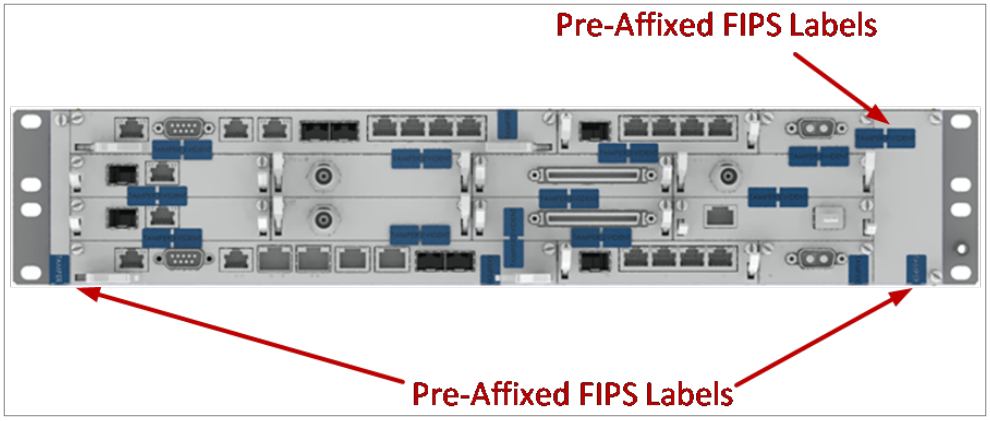
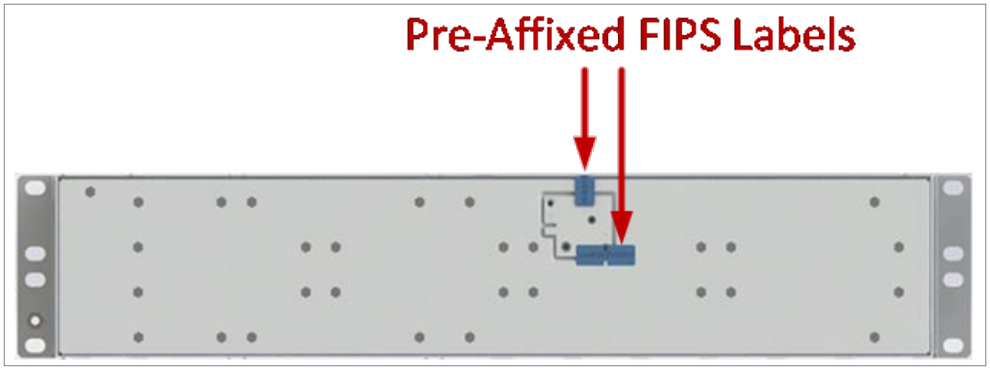


Figure 73: *Applying Tamper-Evident FIPS Labels – Rear View*



Acceptance & Commissioning Procedures

This chapter provides Cambium's recommended Acceptance and Commissioning Procedure for PTP 820A. 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. OUTDOOR UNIT	
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. COAX CABLE	
Overall cable length:	
Cable type:	
N-Type connectors assembled properly on the cable	OK
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	OK

SITE ACCEPTANCE CHECKLIST	
connector	
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
Grounding/lightning protection is as per site specifications	OK
Lightning protection type and model:	
Cable point-of-entry to building/shelter is weather-proof	OK
Cable ends are properly labeled	
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 ODU, 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	

SITE ACCEPTANCE CHECKLIST	
Measured DC voltage input to the IDU:OK	(-40.5 to -60 VDC)
Power-Supply maximum current:	
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 (Radio Frequency 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. IDU (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 820A 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

- "Radio" LED on the IDU front panel is green, indicating the radio link is up.
- 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).
- After connecting test equipment or end equipment to the enabled line interfaces, all LEDs on the IDU front panel green.

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).

E1/T1 Line Interfaces Test

Connect PDH Analyzer to the E1/T1 interface and verify error-free operation for at least 1 hour. Use a physical or software loop at the far end.

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 820A 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 820A LINK COMMISSIONING LOG	
1. GENERAL INFORMATION	
Customer:	
Radio model:	
Configuration:	
Radio link code:	
Site 1 name & add:	
Site 2 name & add:	
2. INDOOR AND OUTDOOR UNIT	
See PTP 820A –Indoor & Outdoor ATP file	

PTP 820A LINK COMMISSIONING LOG		
3. ANTENNA AND RFU MOUNT	Site 1	Site 2
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		
Front panel LEDs:	All green	All green
Line loopback:	Pass	Pass
IDU loopback:	Pass	Pass
RFU loopback:	Pass	Pass
Radio BER:	Pass	Pass
E1/T1 test:	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 820A LINK COMMISSIONING LOG		
8. INSTALLATION INFORMATION		
Installed by:	Name:	
	Company:	
	Signature:	
	Date:	
Commissioned by:	Name:	
	Company:	
	Signature:	
	Date:	

PTP 820A –Indoor & Outdoor ATP file

Figure 74: *Direction A*

Figure 75: *Direction B*

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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