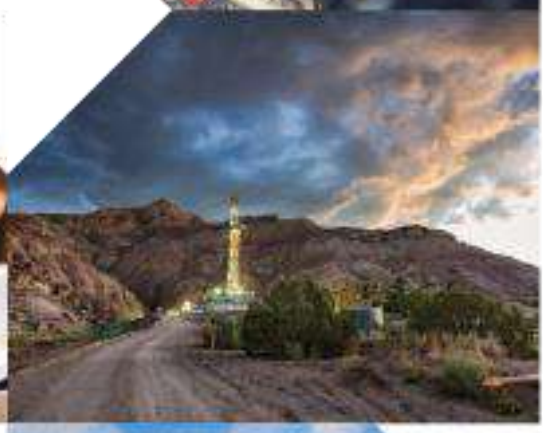




Cambium Networks™









Installation Guide

PTP 820C and PTP 820C Assured

System Release 11.5



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About This Installation Guide

This guide describes the PTP 820C installation procedures and provides additional information concerning system parts and frequency bands.

This guide contains the following chapters:

- Chapter 1 : Before You Start
- Chapter 2 : Product Hardware Description
- Chapter 3 : Cable Installation and Grounding
- Chapter 4 : PoE Injector Installation and Connection
- Chapter 5 : Generic Installation Procedures
- Chapter 6 : Installation Procedures per Configuration Type
- Chapter 7 : Acceptance and Commisioning Procedures

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Main website:	http://www.cambiumnetworks.com
Sales enquiries:	solutions@cambiumnetworks.com
Support enquiries:	https://support.cambiumnetworks.com
Repair enquiries	https://support.cambiumnetworks.com
Telephone number list:	http://www.cambiumnetworks.com/support/contact-support
Address:	Cambium Networks Limited, Linhay Business Park, Eastern Road, Ashburton, Devon, UK, TQ13 7UP

Purpose

Cambium Networks Point-To-Point (PTP) documents are intended to instruct and assist personnel in the operation, installation and maintenance of the Cambium PTP equipment and ancillary devices. It is recommended that all personnel engaged in such activities be properly trained.

Cambium Networks disclaims all liability whatsoever, implied or express, for any risk of damage, loss or reduction in system performance arising directly or indirectly out of the failure of the customer, or anyone acting on the customer's behalf, to abide by the instructions, system parameters, or recommendations made in this document.

Cross references

References to external publications are shown in italics. Other cross references, emphasized in blue text in electronic versions, are active links to the references.

This document is divided into numbered chapters that are divided into sections. Sections are not numbered, but are individually named at the top of each page, and are listed in the table of contents.

Feedback

We appreciate feedback from the users of our documents. This includes feedback on the structure, content, accuracy, or completeness of our documents. Send feedback to support@cambiumnetworks.com.

Problems and warranty

Reporting problems

If any problems are encountered when installing or operating this equipment, follow this procedure to investigate and report:

1. Search this document and the software release notes of supported releases.
2. Visit the support website.
3. Ask for assistance from the Cambium Networks product supplier.
4. Gather information from affected units, such as any available diagnostic downloads.
5. Escalate the problem by emailing or telephoning support.

Repair and service

If unit failure is suspected, obtain details of the Return Material Authorization (RMA) process from the support website.

Hardware warranty

Cambium Networks's standard hardware warranty is for one (1) year from date of shipment from Cambium Networks or a Cambium distributor. Cambium Networks warrants that hardware will conform to the relevant published specifications and will be free from material defects in material and workmanship under normal use and service. Cambium Networks shall within this time, at its own option, either repair or replace the defective product within thirty (30) days of receipt of the defective product. Repaired or replaced product will be subject to the original warranty period but not less than thirty (30) days.

To register PTP products or activate warranties, visit the support website. For warranty assistance, contact the reseller or distributor.



Caution

Using non-Cambium Networks parts for repair could damage the equipment or void warranty. Contact Cambium Networks for service and repair instructions.

Portions of Cambium Networks equipment may be damaged from exposure to electrostatic discharge. Use precautions to prevent damage.

Security advice

Cambium Networks systems and equipment provide security parameters that can be configured by the operator based on their particular operating environment. Cambium recommends setting and using these parameters following industry recognized security practices. Security aspects to be considered are protecting the confidentiality, integrity, and availability of information and assets. Assets include the ability to communicate, information about the nature of the communications, and information about the parties involved.

In certain instances Cambium Networks makes specific recommendations regarding security practices, however the implementation of these recommendations and final responsibility for the security of the system lies with the operator of the system.

Warnings, cautions, and notes

The following describes how warnings and cautions are used in this document and in all documents of the Cambium Networks document set.

Warnings

Warnings precede instructions that contain potentially hazardous situations. Warnings are used to alert the reader to possible hazards that could cause loss of life or physical injury. A warning has the following format:



Warning

Warning text and consequence for not following the instructions in the warning.

Cautions

Cautions precede instructions and are used when there is a possibility of damage to systems, software, or individual items of equipment within a system. However, this damage presents no danger to personnel. A caution has the following format:



Caution

Caution text and consequence for not following the instructions in the caution.

Notes

A note means that there is a possibility of an undesirable situation or provides additional information to help the reader understand a topic or concept. A note has the following format:



Note

Note text.

Caring for the environment

The following information describes national or regional requirements for the disposal of Cambium Networks supplied equipment and for the approved disposal of surplus packaging.

In EU countries

The following information is provided to enable regulatory compliance with the European Union (EU) directives identified and any amendments made to these directives when using Cambium Networks equipment in EU countries.



Disposal of Cambium Networks equipment

European Union (EU) Directive 2002/96/EC Waste Electrical and Electronic Equipment (WEEE)

Do not dispose of Cambium Networks equipment in landfill sites. For disposal instructions, refer to http://www.cambiumnetworks.com/support/weee-compliance

Disposal of surplus packaging

Do not dispose of surplus packaging in landfill sites. In the EU, it is the individual recipient's responsibility to ensure that packaging materials are collected and recycled according to the requirements of EU environmental law.

In non-EU countries

In non-EU countries, dispose of Cambium Networks equipment and all surplus packaging in accordance with national and regional regulations.

Chapter 1: Before You Start

Cambium Networks PTP 820C represents a new generation of radio technology, capable of high bit rates and longer reach and suitable for diverse deployment scenarios.

PTP 820C is a MultiCore system that utilizes parallel radio signal processing in a compact, all-outdoor device combining radio, baseband, and Carrier Ethernet functionality to offer a future proof solution for PTP connectivity applications.

PTP 820C supports cutting edge capacity-boosting techniques, such as LoS MIMO, QPSK to 2048 QAM, and Header De-Duplication, to offer a high capacity solution for every network topology and every site configuration.

This chapter includes:

- Important Notes
- Safety Precautions & Declared Material
- Pre-installation Instructions
- PTP 820 Assured Platform

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 820C is intended for installation in a restricted access location.
- PTP 820C 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

Public and Occupational Boundary Distances Under Article 3.1(a) of the RE Directive

Based on the highest nominal output power of the PTP 820C:

- The public exposure of compliance boundary distance is 4.8m.
- The occupational exposure of compliance boundary distance is 1.2m. This is the worst case for the highest nominal output power, using 10-13 GHz frequency bands and antennas up to 1 ft. For all other configurations, the compliance boundary distance is 0.

Note that even when the compliance boundary is a non-zero value, this only applies within the bore sight of the antenna dish. Therefore, during work within and close to the front of the antenna, make sure the transmitters are turned off. As long as the transmitters are turned off during any work on the system, the occupational exposure limit is not of concern to workers operating in or around the parabolic dish antenna.

General Equipment Precautions



Caution

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.



Caution

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



Caution

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



Caution

When working with a PTP 820C, 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.



Caution

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



Anti Static

Static electricity may cause body harm, as well as harm to electronic components inside the device. Anyone responsible for the installation or maintenance of the PTP 820C must use an ESD Wrist Strap. ESD protection measures must be observed when touching the unit. To prevent damage, before touching components inside the device, all electrostatic must be discharged from both personnel and tools.



Caution

In 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.



Caution

Précautions générales relatives à l'équipement



Caution

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.



Caution

L’usage de PTP 820C 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.



Caution

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.

Précautions générales relatives à l'équipement

	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.
	L’usage de PTP820C 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.
	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

	**Caution** Wenn andere Steuerelemente verwendet, Einstellungen vorgenommen oder Verfahren durchgeführt werden als die hier angegebenen, kann dies gefährliche Strahlung verursachen.
	**Caution** Beachten Sie beim Arbeiten mit PTP 820C das folgende Stromschlag- und Gefahrenrisiko: Durch Abtrennen einer Stromquelle wird nur ein.
	**Caution** Stromversorgungsmodul abgetrennt. Um die Einheit vollständig zu isolieren, trennen Sie alle Stromversorgungen ab. Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70 dB(A) oder weniger gemäß EN ISO 7779.

Pre-installation Instructions

Packing

The equipment must 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 must 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 Cambium Networks support by e-mailing to support@cambiumnetworks.com.

PTP 820 Assured Platform

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 140-2, including:

- Compliance with FIPS 140-2 specifications for cryptography module.
- FIPS 140-2 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 820C Assured
- PTP 820C-HP Assured
- PTP 820S Assured
- PTP 820G Assured



Note

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

Chapter 2: Product Hardware Description

This chapter describes the hardware components of the PTP 820C product. This chapter consists of the following sections:

- PTP 820C Hardware Overview
- MultiCore Mediation Devices (MCMD)
- PoE Injector
- System Components
- Adaptors and Installation Kits
- Antenna Connection
- Power Specs

PTP 820C Hardware Overview

PTP 820C features an all-outdoor dual-carrier architecture consisting of a single unit directly mounted on the antenna.

Figure 1 PTP 820C Rear View (Left) and Front View (Right)

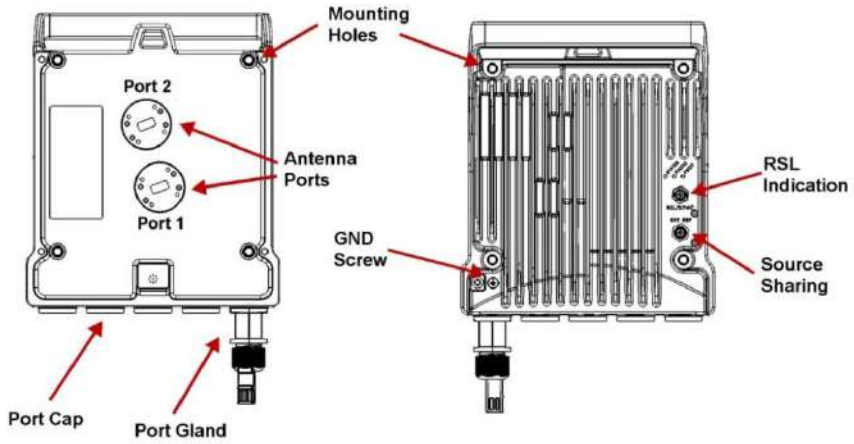
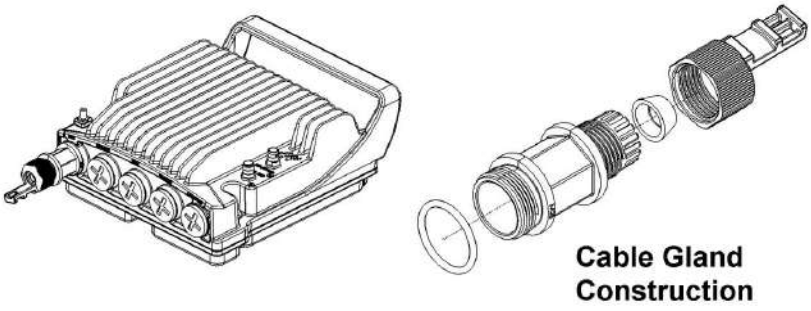


Figure 2 Cable Gland Construction



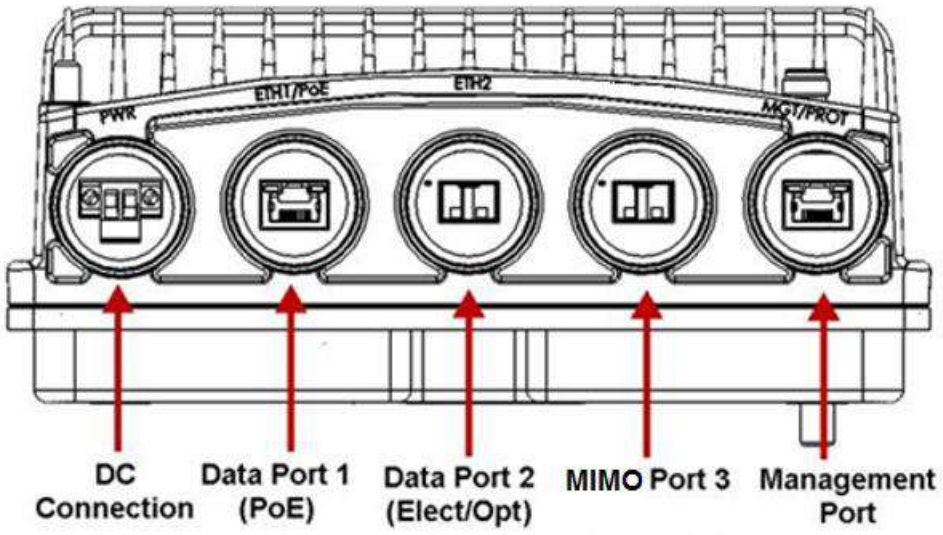
PTP 820C Interfaces

PTP 820C is available in several hardware models:

- PTP 820C ESS – Includes one RJ-45 port and two SFP ports for Ethernet traffic.
- PTP 820C ESX – Includes one RJ-45 port and one SFP port for Ethernet traffic, and an SFP+ port for use as an Extension port with MIMO 4x4 and Space Diversity 2+2 configurations.

Two labelling formats are available for the PTP 820C ESS and ESX hardware models, as shown in the following figures. Except for the interface labelling, these versions are identical.

Figure 3 PTP 820C Interfaces - **Descriptive Labels**



- Data Port 1 for GbE traffic:
  - Electric: 10/100/1000Base-T. Supports PoE.
- Data Port 2 for GbE traffic:
  - Electric: 10/100/1000Base-T
  - Optical: 1000Base-SX (or X-LX-ZX/XD)
- Data Port 3 - GbE traffic/expansion port:
  - Electric: 10/100/1000Base-T
  - Optical: 1000Base-SX (or X-LX-ZX/XD)
- Power interface (-48VDC)
- Management Port: 10/100Base-T
- 2 RF Interfaces : Standard interface per frequency band
- RSL interface: BNC connector
- Source sharing: TNC connector
- Grounding screw

Channel-Port Mapping to Polarization

Two transceiver chains and two diplexers are embedded in each PTP 820C unit. In most cases, both diplexers are the same exact type. When the diplexers are the same type, radio ports 1 and 2 cover the exact same frequency range.

In the 6-11GHz frequency bands, where channelization and diplexers are relatively narrow, a single PTP 820C unit might have to operate in two channels that are not covered by the same diplexer.

When this is required, the PTP 820C can be ordered with two different diplexer types to cover two different channel ranges within the same frequency band.

An PTP 820C with the same type of diplexer assembled on both transceiver chains has the following marketing model structure:

- Example: PTP 820C-HP-6L-252A-1W4-H-ESX

In this example, 1W4 indicates that both transceivers cover channels 1 through 4.

An IP-20C with two different types of diplexers has the following marketing model structure:

- Example: PTP 820C-HP-6L-252A-1W27W8-H-ESX

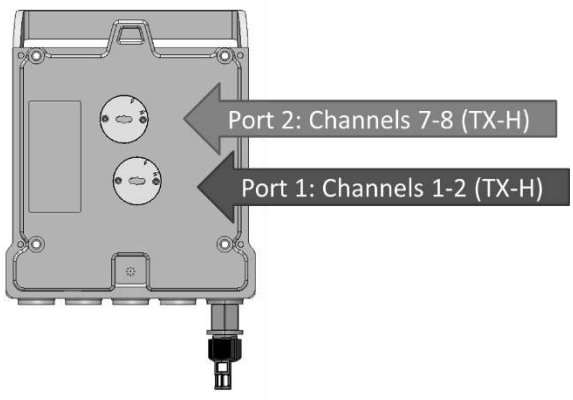
In this example, 1W27W8 indicates that channels 1 through 2 are covered by Port1, while channels 7 through 8 are covered by Port2.

An PTP 820C assembly for this example would look as follows:

Table 1: Channel-Port Mapping, 1W27W8

Radio Port ID (EMS ID)	Channels Coverage
Port 2	**Ch 7-8**
Port 1	**Ch 1-2**

Figure 4: Channel Ranges

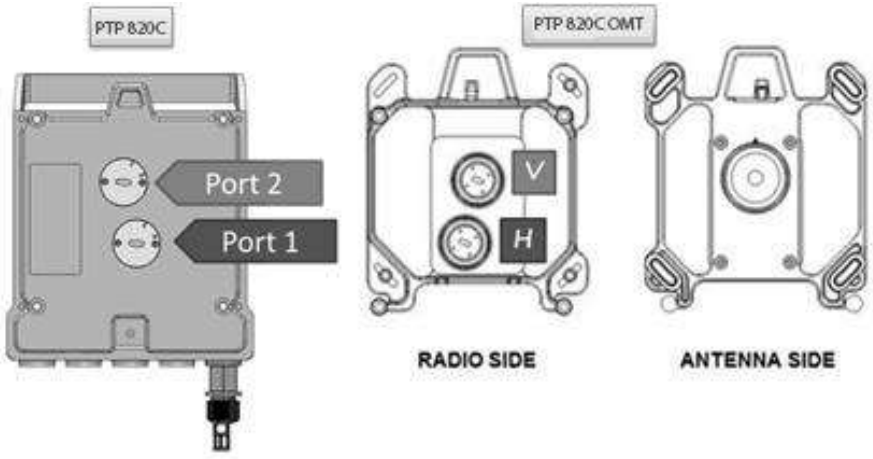


Note: The same orientation is maintained for TX-H and TX-L units.

When installing an PTP 820C unit with two different diplexers in a Multicore 2+0 DP Direct Mount configuration, the V and H ports of the OMT are mechanically connected to Port 2 and 1 respectively.

This means that in the above example, V polarization is covered by channels 7 through 8 (Port 2) and H polarization is covered by channels 1 through 2 (Port 1).

Figure 5: V and H Polarization



To assign the channels to different polarizations, a different system with a different marketing model should be ordered.

The following marketing model represents a system in which V polarization is covered by channels 1 through 2 (Port 2) and H polarization is covered by channels 7 through 8 (Port 1):

Figure 6: PTP 820C-HP-6L-252A-7W81W2-H-ESX

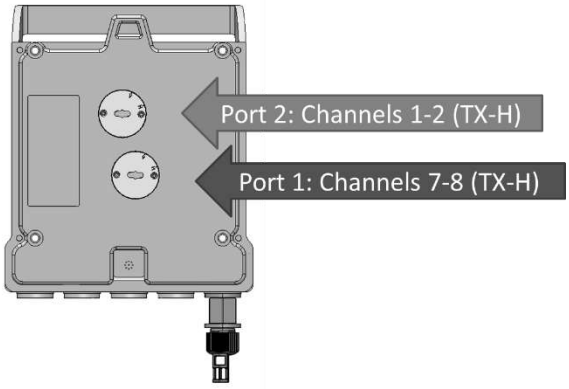
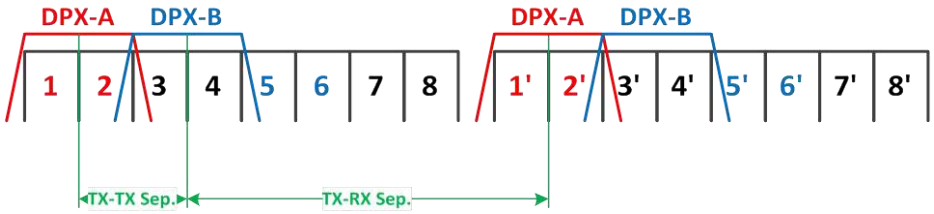


Table 2: Channel-Port Mapping, 7W81W2

Radio Port ID (EMS ID)	Channels Coverage
Port 2	Ch 1-2
Port 1	Ch 7-8

operational channels that are not covered by the same diplexer, certain TX-TX separation and TX-RX separation criteria should be met.

Figure 7: Separation Criteria when Working with Two Diplexer Types



Because diplexer coverage and channelization plans vary in different parts of the world for specific applications, please consult with Ceragon pre-sales representatives for support.

MultiCore Mediation Devices (MCMD)

The MultiCore Mediation Devices (MCMD) are designed to offer a simple and compact solution for a direct mount installation of the dual-carrier PTP 820C on a standard RFU-C antenna.

PTP 820C is equipped with two antenna ports, which mandates the use of the following MCMDs for direct mount connections. The specific MCMDs depend on the configuration.

The following table describes some of the available MCMDs. For a full list of components, see *System Components on page 2-11*.

Note

MCMDs are not grounded. To add grounding, the MCMD can be connected to the PTP 820C using a Grounding Jumper.

Table 3 MCMD **Comparison**

MCMD type	Functionality
Splitter	Combines the two carriers using the same polarization
OMT	Combines the two carriers on alternate polarizations (H,V)

Figure 8 Splitter

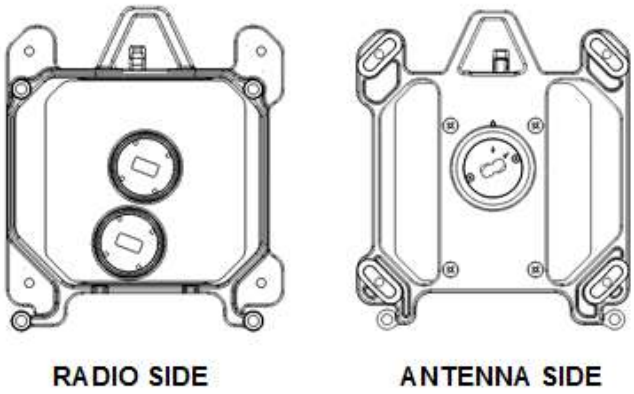
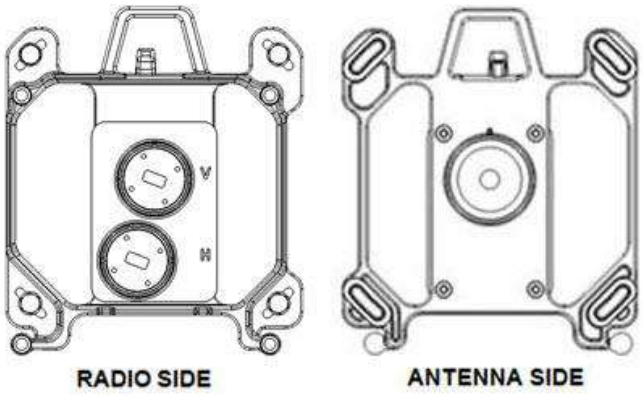


Figure 9 OMT



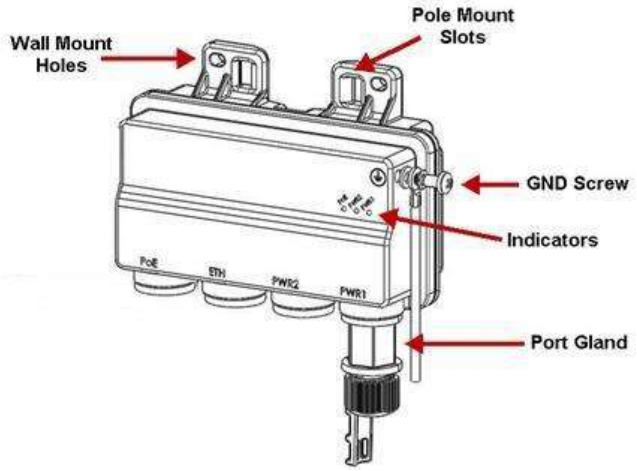
PoE Injector

The PoE injector is an outdoor unit which can be mounted on a wall, pole, or indoor rack.

Each PoE Injector kit includes the following items:

- PoE injector
- 2 DC power connectors

Figure 10 PoE Injector



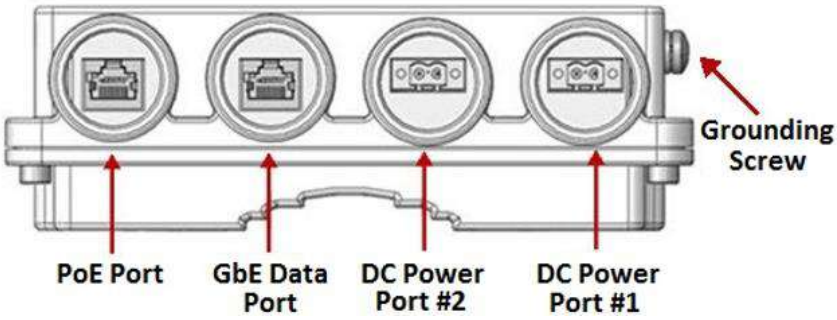
Two models of the PoE Injector are available:

- PoE_Inj_AO_2DC_24V_48V – Includes two DC power ports with power input ranges of -(18-60)V each.
- PoE_Inj_AO – Includes one DC power port (DC Power Port #1), with a power input range of -(40-60)V.

PoE Injector Interfaces

- Power-Over-Ethernet (PoE) Port
- GbE Data Port supporting 10/100/1000Base-T
- DC Power Port 1 ±(18-60)V or ±(40-60)V
- DC Power Port 2 ±(18-60)V
- Grounding screw

Figure 11 PoE Injector Ports



System Components

The following figures show the main components used in the PTP 820C installation procedures.

Note

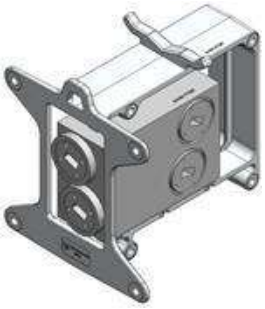
The availability of the installation components follows the PTP 820C frequency rollout as stated in the published roadmap.
The presence of a specific component in this manual does not indicate that it is available for ordering. Please consult with your respective pre-sales engineer for specific component availability.

Figure 12 System Components

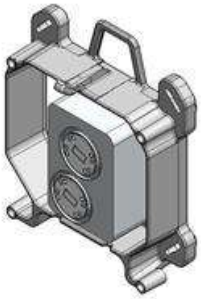
PTP 820C



Dual Core Coupler/Splitter



DC OMT



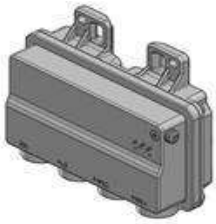
DC Splitter



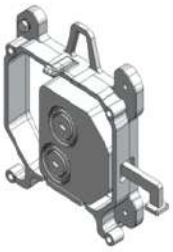
Adaptor for 6 GHz - 13 GHz



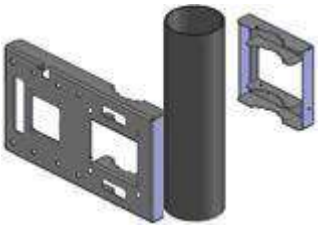
PoE Injector



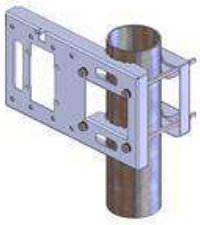
Dual Core Mediation Device



Remote Pole Mount



Remote Dual Pole Mount



Adaptors and Installation Kits

Adaptors and Installation Kits

Table 4 Adaptors and Installation kits for 6 to 18 GHz

Description	6 GHz	7-8 GHz	10-11 GHz	13 GHz	15 GHz	18 GHz
PTP 820C DUAL COUPLER KIT	N060082L135A	N070082L292A	N110082L080A	N130082L054A	N150082L076A	N180082L042A
PTP 820C DUAL SPLITTER KIT	N060082L136A	N070082L293A	N110082L081A	N130082L055A	N150082L077A	N180082L043A
PTP 820C SPLITTER KIT	N060082L138A	N070082L295A	N110082L083A	N130082L057A	N150082L079A	N180082L045A
PTP 820C OMT KIT	N060082L137A	N070082L294A	N110082L082A	N130082L056A	N150082L078A	N180082L044A
PTP 820C DUAL CORE MD KIT	N060082L134A	N070082L291A	N110082L079A	N130082L053A	N150082L075A	N180082L041A

Table 5 Adaptors and Installation kits for 23 to 38 GHz

Description	23 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
PTP 820C DUAL COUPLER KIT	N230082L032A	N260082L026A	N280082L035A	N320082L019A	N380082L043A
PTP 820C DUAL SPLITTER KIT	N230082L033A	N260082L027A	N280082L036A	N320082L020A	N380082L044A
PTP 820C SPLITTER KIT	N230082L035A	N260082L029A	N280082L038A	N320082L022A	N380082L046A
PTP 820C OMT KIT	N230082L034A	N260082L028A	N280082L037A	N320082L021A	N380082L045A
PTP 820C DUAL CORE MD KIT	N230082L031A	N260082L025A	N280082L034A	N320082L018A	N380082L042A

Table 6 Remote Mount – 6 to 15 GHz

Remote Mount	6 GHz	7 GHz - 8GHz	10 GHz - 11GHz	13 GHz	15 GHz
RFU-C REMOTE MOUNT KIT	N000082L121A	N000082L121A	N000082L121A	N000082L121A	N000082L121A
PTP 820C DC REMOTE MOUNT KIT	N000082L120A	N000082L120A	N000082L120A	N000082L120A	N000082L120A
RFU-C WG Kit	N060082L156A	N070082L004A	N110082L105A	N130082L070A	N150082L092A
RFU-C REMOTE MOUNT ADAPTOR KIT	N060082L003A	N070082L002A	N110082L002A	N130082L002A	
REMOTE MOUNT ADAPTOR KIT	N060082L002A	N060082L001A	N060082L001A	N060082L001A	

Table 7 Remote Mount – 18 to 38 GHz

Remote Mount	18 GHz	23 GHz	26 GHz	28 GHz	32 GHz	38 GHz
RFU-C REMOTE MOUNT KIT	N000082L121A	N000082L121A	N000082L121A	N000082L121A	N000082L121A	N000082L121A
PTP 820C DC REMOTE MOUNT KIT	N000082L120A	N000082L120A	N000082L120A	N000082L120A	N000082L120A	N000082L120A
RFU-C WG KIT	N180082L058A	N180082L058A	N180082L058A	N280082L048A	N280082L048A	N280082L048A

Antenna Circ Adaptors

Table 8 Antenna circ. Adaptors for 6 to 18GHz

Antenna Circ. Adapters for OMT	6 GHz	7 GHz - 8GHz	10 GHz - 11GHz	13 GHz	15 GHz	18 GHz
CommScope	N060082L147A	N070082L303A	N110082L092A	N130082L060A	N150082L082A	N180082L048A
Radio Waves	N060082L154A	N070082L310A	N110082L103A	N130082L068A	N150082L090A	N180082L056A
CNT	N060082L155A	N070082L311A	N110082L104A	N130082L069A	N150082L091A	N180082L057A

Table 9 Antenna circ. Adaptors for 23 to 38 GHz

Antenna Circ. Adapters for OMT	23 GHz	24 GHz	26 GHz	28 GHz	32 GHz	38 GHz
CommScope	N230082L039A	-	N260082L032A	N280082L042A	N320082L025A	N380082L049A
Radio Waves	N230082L046A	-	N260082L038A	N280082L046A	NA	N380082L054A
CNT	N230082L047A	N260082L039A	N260082L039A	N280082L047A	N320082L030A	N380082L055A

PoE Injector

Table 10 PoE Injector

Marketing Model	Description
N000082L022A	PoE Injector all outdoor, redundant DC input, +24VDC support
N000082L020A	PoE Injector 19” Rack Mount Kit
N000082L021A	PoE Injector 23” rack mount KIT

Antenna Connection

PTP 820C can be mounted directly for all frequencies (6 GHz - 38 GHz) using the following antenna types (for integrated antennas, specific antennas part numbers are required):

- CommScope: VHLP series
- RFS: SB/SC series
- Xian Putian: WTC/WTG series

For remote mount installations, the following Flexible Waveguide flanges should be used (millimetric). The same antenna type (integrated) as indicated above can be used (recommended).

Other antenna types using the flanges listed in the table below may also be used.

Table 11 Other antenna types

Frequency		Circ. WG Diameter	Rect. WG Flange Des.	Radio Side (Remote) Flange Des.	Flex WG Side A Flange Des.	Flex WG Side B Flange Des.	Antenna (Remote) Flange Des.
Band	Range (GHz)						
6(L/U) GHz	5.8-7.1	31.8 mm	WR137	UDR70	PDR70	PDR70	UDR70
7/8 GHz	7.1-8.5	26 mm	WR112	UBR84	PBR84	PBR84	UBR84
10/11 GHz	10.0-11.7	18 mm	WR90	UBR100	PBR100	PBR100	UBR100
13 GHz	12.7-13.3	15 mm	WR75	UBR120	PBR120	PBR120	UBR120
15 GHz	14.5-15.4	13.5 mm	WR62	UBR140	PBR140	PBR140	UBR140
18 GHz	17.7-19.7	10.5 mm	WR42	UBR220	PBR220	PBR220	UBR220
23 GHz	21.2-23.6	9 mm					
26 GHz	24.5-26.6	8 mm					
28-31 GHz	27.3-29.5	7 mm	WR28	UBR320	PBR320	PBR320	UBR320
32 GHz	31.8-33.4	6.5 mm					
38 GHz	37.0-40.0	5.5 mm					

If a different antenna type (CPR flange) is used, a flange adaptor is required. Please contact your Camibum Networks representative for details.



Note

Appropriate lubricant or grease can be applied to the screws that connect the PTP 820C to the antenna interface.

Power Specifications

Electrical Requirements

- -48V DC Nominal
- Maximum current rating 1.5 A
- Maximum Cable length 300 meter
- Maximum cable size for PoE cable is 24 AWG, with maximum current up to 2A from the power source.

Important Notes

- The unit must only be installed by service personnel.
- The unit must have a permanent connection to protective grounding.
- Data port 2, Data port 3, the Management port and the TNC connector do not provide protection from over-voltages on telecommunication networks for host equipment users.
- The RSL interface connector is intended for technician use only.
- Disconnect device (circuit breaker) in the building installation:
- Should be readily accessible and incorporated external to the equipment.
- The maximum rating of the overcurrent protection shall be up to 6 Amp.

Environmental Specifications

Operating: ETSI EN 300 019-1-4 Class 4.1

Temperature range for continuous operating temperature with high reliability:
-33°C (-27°F) to +55°C (131°F)

Temperature range for exceptional temperatures; tested successfully with limited margins:
-45°C (-49°F) to +60°C (140°F)

Humidity: 5%RH to 100%RH
IEC529 IP66

Storage: ETSI EN 300 019-1-1 Class 1.2

Transportation: ETSI EN 300 019-1-2 Class 2.3

Chapter 3: Cable Installation and Grounding

This chapter describes the installation procedure of the PTP 820C product. This chapter consists of the following sections:

- Minimum and Maximum Cable Diameter
- Cable Grounding
- Surge Protection
- Available Cable Options
- Securing the Cables
- Special Instructions for use of Glands
- Connecting an Optical Fiber Cable and SFP
- Connecting a DC Power Cable
- Connecting the Ethernet Cable
- Management Connection for 4x4 MIMO and 1+1/2+2 HSB Configurations

Minimum and Maximum Cable Diameter

To fit the gland, the outer cable diameter should be between 6-10 mm. This applies to all glands on both the PTP 820C unit and the PoE Injector.

To fit the grounding clamp, the outer diameter of CAT5E Ethernet cable must be between 6-7.1mm.

Grounding the cables

Cables must be grounded as follows:

- For Fiber cables *(see Connecting an Optical Fiber Cable and SFP on page3-21)*, no grounding is required.
- For DC power cables *(see connecting a DC power cable on page 3-25)*, no grounding is required.
- For Ethernet cables *(see Connecting the Ethernet Cable on page3-28*), the shielded Ethernet cable (SF/UTP construction must be grounded to the antenna tower at the top (next to the PTP 820 unit). The entry to the indoor cabinet and every 50m, using the kit N000082L017A.

Figure 13 Cable Grounding Kit

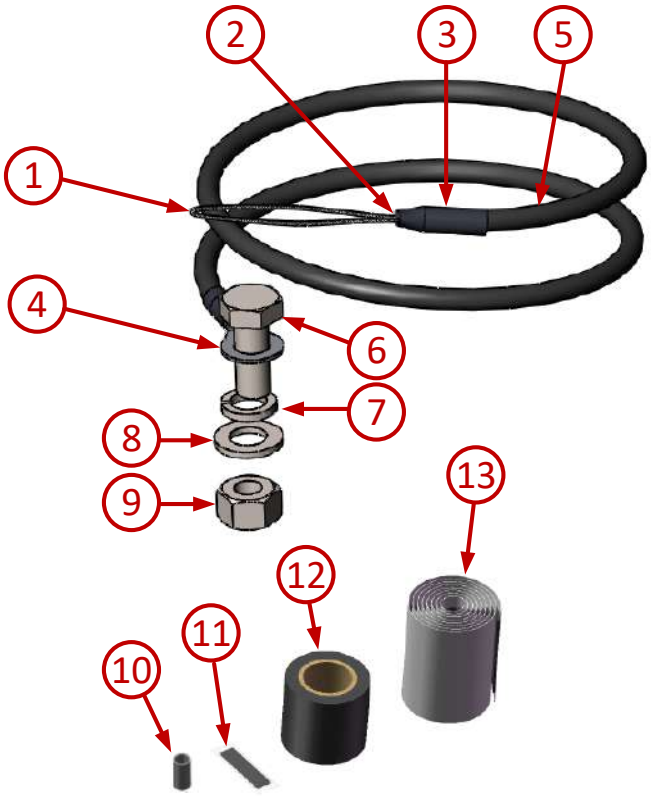
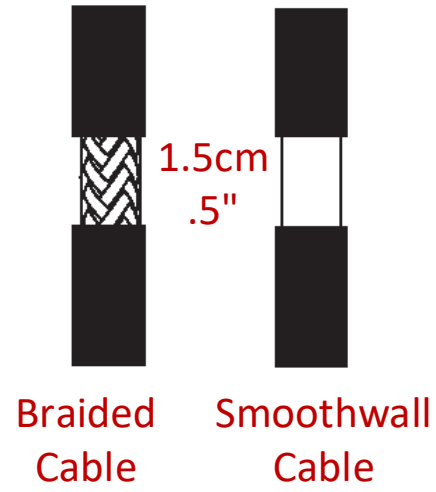


Table 12 Cable Grounding Kit

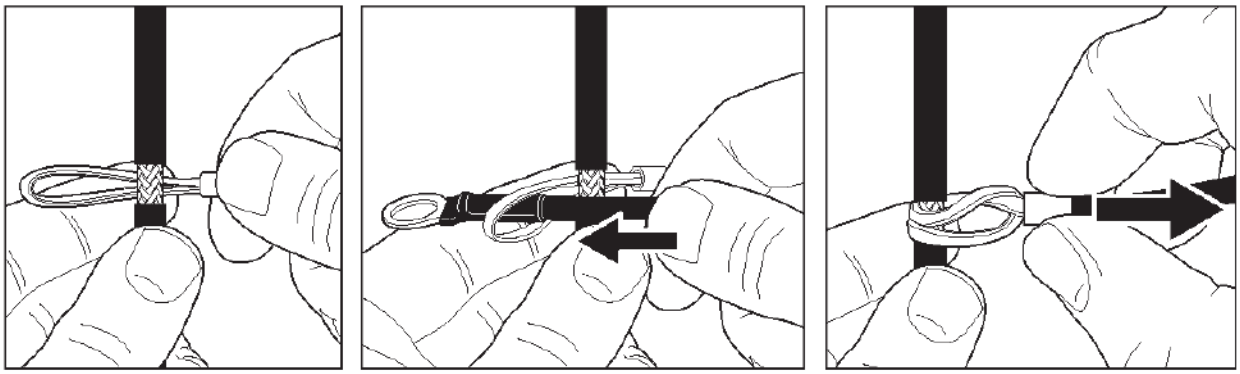
Part Number	Description
CAT6a_gnd_Kit	Universal Grounding Kit

To connect the grounding kit:

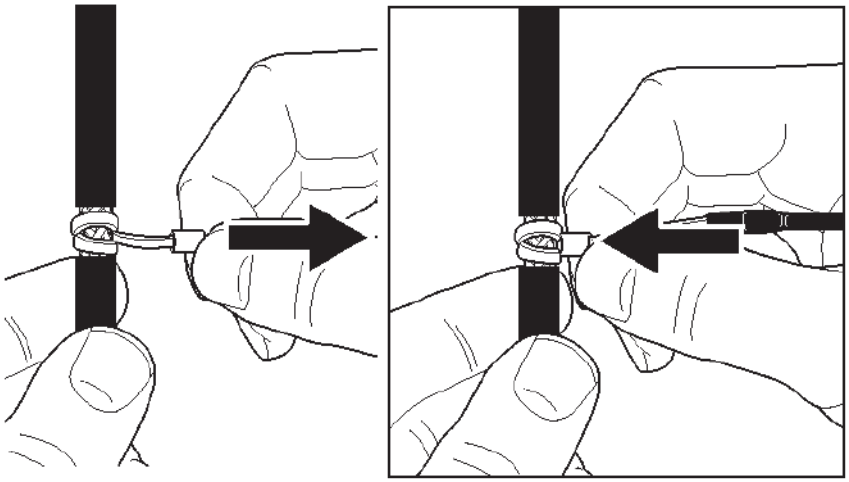
1. Strip the cable jacket about 1.5 cm (.5”).



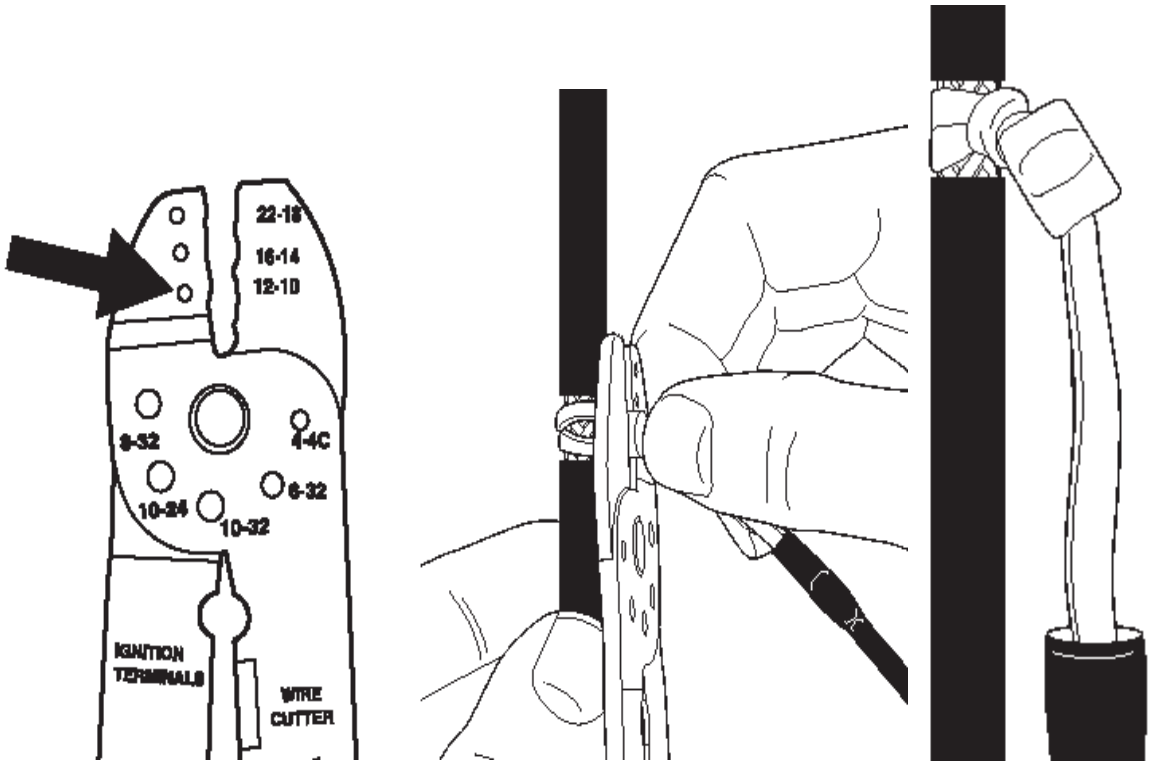
2. Loop the grounding wire’s braid belt (1) around the stripped portion of the cable, insert the rest of the grounding wire (5) through the braid belt, and tighten to form a knot, as shown in the figure below.



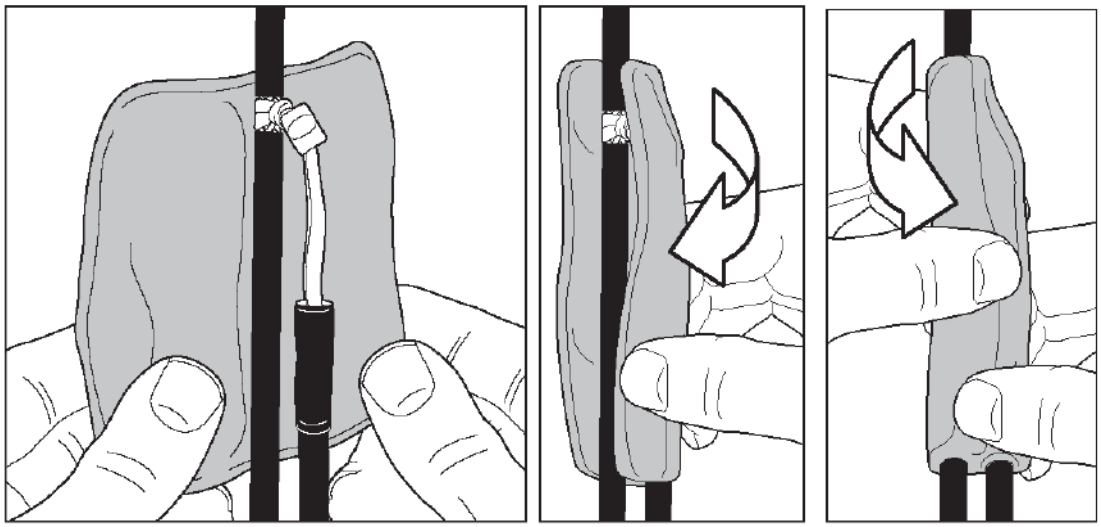
3. Grasp the terminal of the braid belt (2) and slide it flush with the knot around the cable, as shown in the figure below.



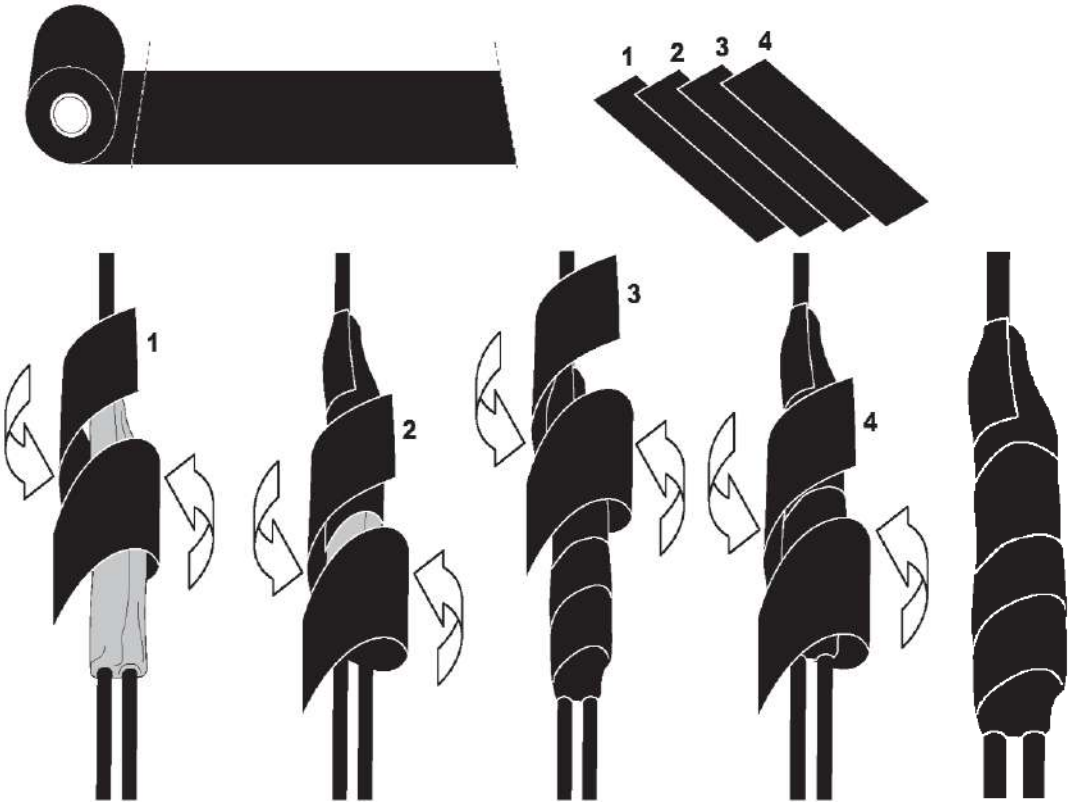
4. Crimp the knotted braid belt (1) and the bare terminal (10) together, as shown in the figures below.



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.



Grounding the PTP 820C Unit.

Required Tools

- Metric offset wrench key wrench #3
- Metric wrench 10mm

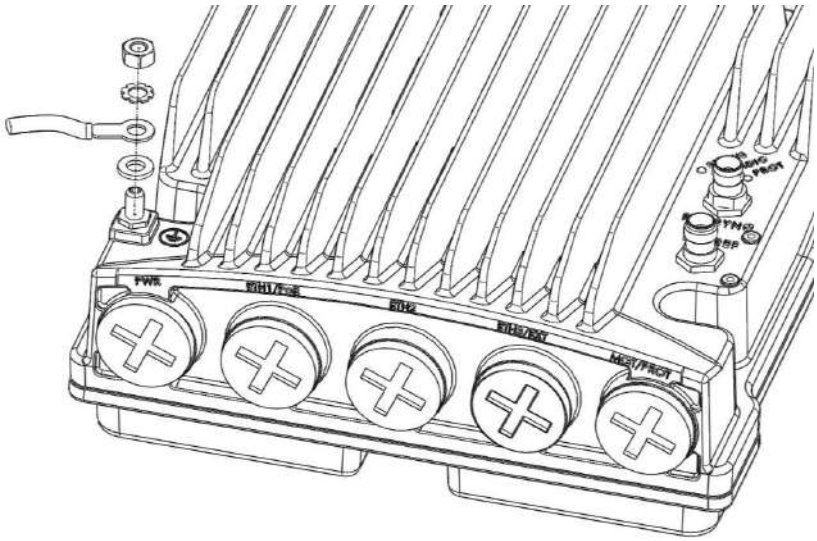
Procedure

The grounding of the PTP 820C and the PoE must be connected with a grounding cable to the closest main grounding point. The grounding cable must be at least 6 AWG or wider. The recommended length of the grounding cable is up to 2 meters, but in any case not more than 6 meters. The recommended resistance between the tower's main grounding point and the PTP 820C chassis is 2.5 mΩ or less, but in any case not more than 10 mΩ.

If a PoE is used, the recommended resistance between the tower's main grounding point and the PoE chassis is:

- If the PoE is installed outdoors: 2.5 mΩ or less, but in any case not more than 10 mΩ.
- If the PoE is installed indoors: 5 mΩ or less.

1 On the front of each PTP 820C unit, loosen the nut, plain washer and serrated washer from the GND stud, using the metric offset hexagon key and the wrench.



2 Place the cable lug (supplied with the PTP 820C grounding kit) in place on the screw.

3 Secure the cable lug.

4 The second side of the GND cable should be connected to the main ground bar or terminal ground bar of the site.

5 Perform a resistance test between the 2 lugs of the GND cable. Verify that the result is 0-2 ohms



Note

The unit's grounding screw terminal must be connected to protective earth in a building installation always in accordance with applicable national code and regulations by a service person.

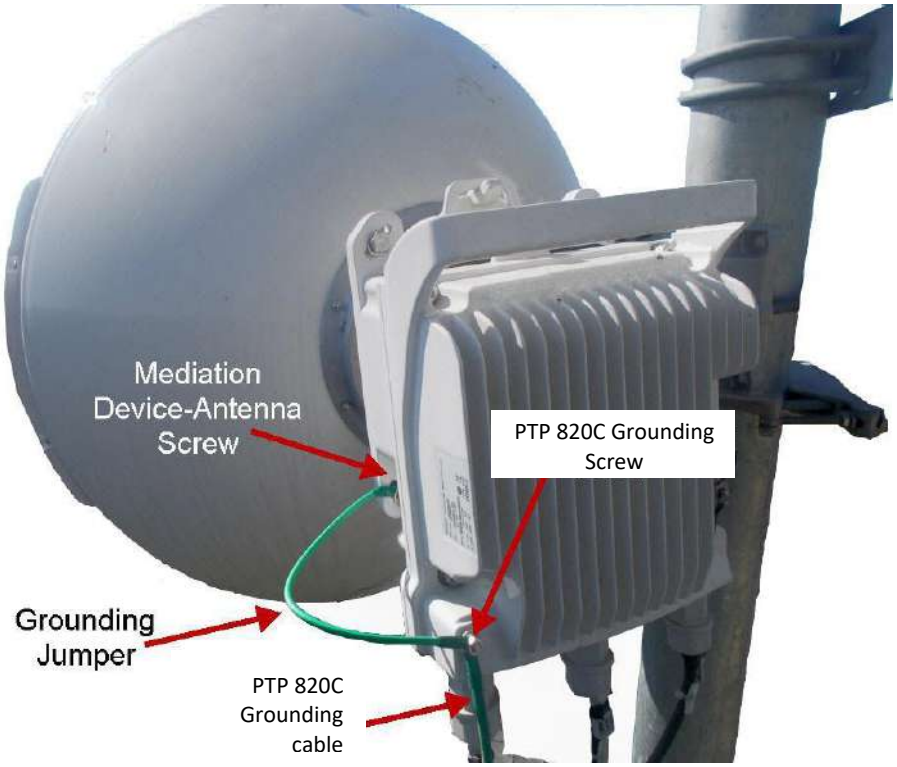
A 2-pole circuit breaker, a branch circuit protector, suitably certified in accordance with applicable national code and regulations, rated maximum 20A, must be installed for full power disconnection in a building installation.

Any outdoor antenna cable shield must always be connected to protective earth in a building installation.

Grounding for MultiCore Mediation Devices

MultiCore Mediation Devices (MCMDs) are nor grounded. To add grounding, connect MCMD to the PTP 820C using a Grounding Jumper. To connect the Grounding Jumper:

1. When the user secures the MCMD to the antenna, connect one end of the Grounding Jumper to the lower left screw that connects the MCMD to the antenna.
2. When the user performs the PTP 820C grounding procedure described in Grounding Procedure, connect the other end of the Grounding Jumper to the PTP 820C grounding screw, along with the PTP 820C grounding cable. The order in which you place the two cables is not important.



Power Source

The power cable must be plugged into the unit before turning on the external power.

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

DC power can be from -40 VDC to -60 VDC.

Note

Availability of UPS (Uninterrupted Power Source), battery backup and emergency power generator is recommended.

The power supply must have grounding points on the AC and DC sides.



Caution

The user power supply GND must be connected to the positive pole in the PTP 820C power supply. Any other connection may cause damage to the system.



Note

For the warranty to be honored, you must install the PTP 820C in accordance with the above instructions.

Surge Protection

PTP 820C includes built-in surge protection for its Ethernet and power interfaces. PTP 820C's surge protection implementation complies with the standards set forth in the *Surge Protection* requirements section of the PTP 820C Technical Description, provided the Ethernet cables were prepared according to the instructions in (Preparing the Ethernet Cable and Plug-in Field on page 3-28)

However, when using an electrical SFP connection with CAT5 or CAT6 Ethernet cable, internal surge protection is not present and an external surge protector is recommended. It is recommended to use the surge protector described in Table 13.



Note

To provide maximum protection, make sure to prepare the Ethernet cables according to the instructions in **Error! Reference source not found.** on page 3-31 and to ground the cables in accordance with the instructions in **Error! Reference source not found.** on page **Error! Bookmark not defined.**.

In areas where severe lighting conditions are likely to occur, it is strongly recommended to add additional protection by placing lightning protectors on all electrical Ethernet cables, near the connection points with the PTP 820C unit.

The following surge protector is available from Ceragon.

Table 13: Surge Protector

Marketing Model	Item Description
Outdoor/LPU/GBE	Outdoor Lightning Protection Unit for 10/100/1000Base-T PoE

Available Cable Options

Fiber Optic Cables

Table 14 Fiber Optic cables part numbers

Marketing P/N	Description
N000082L139A	PTP 820 Optical cable, SM, 30m
N000082L140A	PTP 820 Optical cable, SM, 50m
N000082L141A	PTP 820 Optical cable, SM, 80m
N000082L142A	PTP 820 Optical cable, SM, 100m
N000082L143A	PTP 820 Optical cable, SM, 150m
N000082L146A	PTP 820 Fiber 1+1 Splitter, SM
N000082L147A	PTP 820 Fiber Adapter

DC Cable and Connector

Table 15 DC Cable and Connector part numbers

Marketing P/N	Description
N000082L018A	PTP 820 Outdoor_DC_cbl_2x12AWG_drum
N000082L019A	PTP 820 Outdoor_DC_cbl_2x18AWG_drum
N000082L065A	PTP 820 DC Connnector

Cables for MIMO Connections

Table 16 Cables for MIMO connections part numbers

Marketing P/N	Description
N000082L060A	PTP 820C MIMO or Prot management cable 10m
N000082L061A	PTP 820C MIMO or Prot management cable 1m
N000082L062A	PTP 820C MIMO or Prot management ODU spltr
N000082L063A	PTP 820C Data Sharing Kit 10m
N000082L064A	PTP 820C Source Sharing 10m
N000082L136A	PTP 820C/S MIMO or Prot management cable 20m
N000082L137A	PTP 820C, Source Sharing 20M
N000082L138A	PTP 820C, Cable, SFP, 4x4 MIMO_DATA_SHARING_KIT_20M

Ethernet Cable and Specifications

Table 17 Ethernet cable part numbers

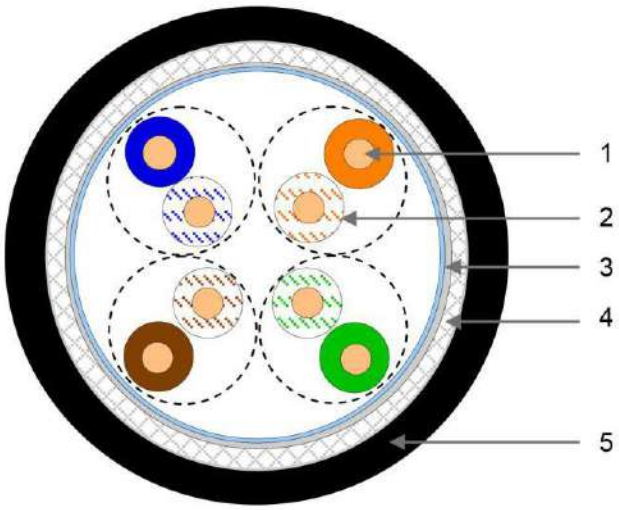
Marketing P/N	Description
N000082L016A	PTP 820 CAT5E Outdoor 100m drum

This cable is suitable for:

- Fast Ethernet
- Gigabit Ethernet
- PoE

The following figure shows the cable design. The numbers in the figure refer to the items listed beneath the figure.

Figure 14 Ethernet cable design



- [1]Conductor
- [2]Insulation
- [3]Screen: Alu/Pet foil. Alu outside
- [4]Tinned copper braid
- [5]Jacket

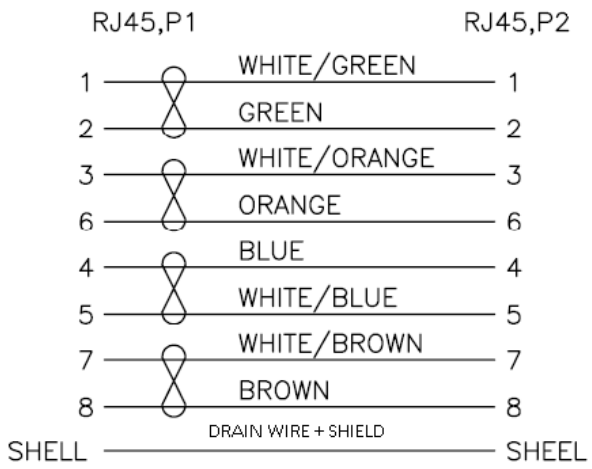
Table 18 Ethernet cable color code

Pair	Wire A	Wire B
1	WHITE-blue	BLUE
2	WHITE-orange	ORANGE
3	WHITE-green	GREEN
4	WHITE-brown	BROWN

Outdoor Ethernet Cable Specifications

Table 19 Outdoor Ethernet cable specifications – Electircal requirements.

Electrical Requirements	
Cable Type	CAT-5e SFUTP, 4 pairs, according to ANSI/TIA/EIA-568-B-2
Wire gauge	24 AWG
Stranding	Solid

Electrical Requirements	
Voltage rating	70V
Shielding	Tinned copper Braid (Coverage: >80%) = Alluminum Foil
Pinout	

Mechanical/ Environmental Requirements	
Jacket	UV resistant
Outer diameter	6-10 mm
Operating and Storage temperature range	-40°C - 85°C
Flammability rating	According to UL-1581 VW1, IEC 60332-1
RoHS	According to Directive/2002/95/EC

Outdoor DC Cable Specifications

Table 20 Outdoor DC cable specifications – Electrical Requirements

Electrical Requirements	
Cable type	2 tinned copper wires
Wire gauge	18 AWG (for <100m installations) 12 AWG (for >100m installations)
Stranding	stranded
Voltage rating	600V

Electrical Requirements	
Spark test	4KV
Dielectric strength	2KV AC min
Mechanical/ Environmental Requirements	
Jacket	UV resistant
Outer diameter	7-10 mm
Operating and Storage temperature range	-40°C - 85°C
Flammability rating	According to UL-1581 VW1, IEC 60332-1
RoHS	According to Directive/2002/95/EC

Securing the Cables

All cables must be secured at every meter on-site using either a T-Rups kit or cable clamps. When using the T-Rups kit, take special care to apply the proper amount of force in order to avoid damage to the cable. This is especially important for optical (SFP) cables.

The following cable clamps are available:

Table 21: Cable Clamps

Part Number	Marketing Model	Item Description
SI-1229-0	Fiber_clamp_2cbl_4.0-7.0mm	DUAL FEADER CLAMP FOR 4.0-7.0mm CABLE 2 WAY.
SI-1230-0	Fiber_clamp_4cbl_4.0-7.0mm	DUAL FEADER CLAMP FOR 4.0-7.0mm CABLE 4 WAY.
SI-1231-0	Fiber_clamp_6cbl_4.0-7.0mm	DUAL FEADER CLAMP FOR 4.0-7.0mm CABLE 6 WAY.

Special Instructions for use of Glands

Note
Each PTP 820C unit is supplied with two glands. If additional glands are required, they must be ordered separately, in kits of five glands each.

Table 22 Ethernet cable part numbers

Marketing P/N	Description
N000082L014A	PTP 820 Glands_x5_KIT

In addition, gland caps can be ordered to protect the cable and connector from damage when elevating the cable and gland to the radio unit. See Step **Error! Reference source not found.** in Section **Error! Reference source not found.**, **Error! Reference source not found.**. Gland caps are ordered separately, in kits of 10 caps each.

Table 23: Gland Caps

Marketing Model	Marketing Description
Cable_Prot_10Caps_kit	Cable protective caps kit 10 pcs, IP-20C/S/E

In order to remove the plastic plugs from the unit, you can use the flange of supplied glands to disconnect them. See figures below:

Figure 15 Glands

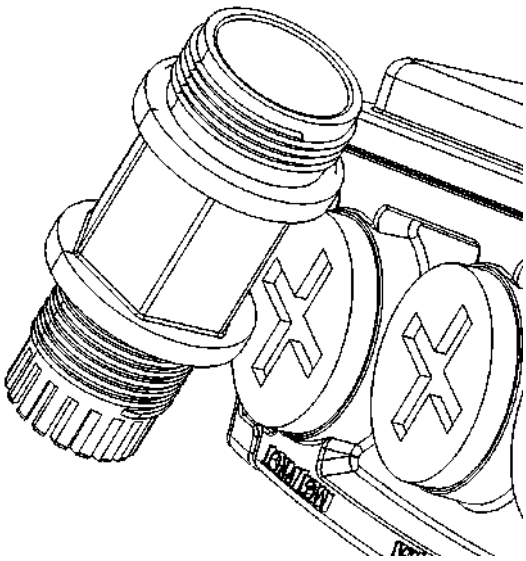
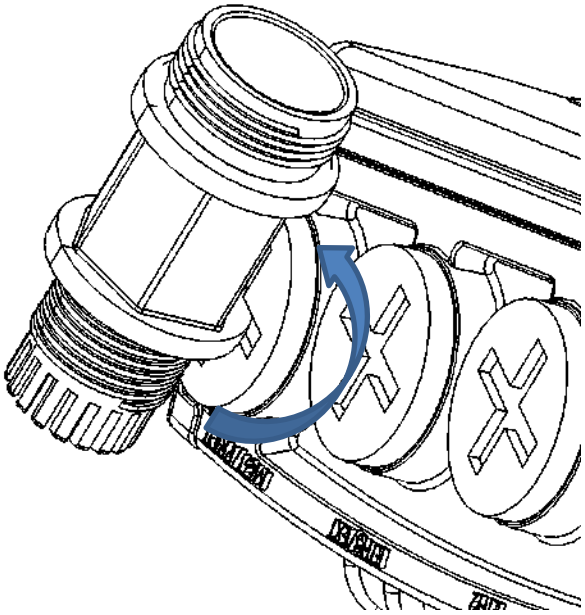


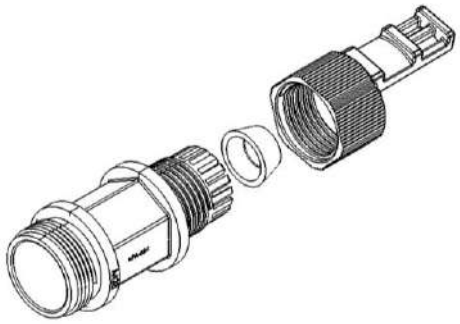
Figure 16 Removing glands



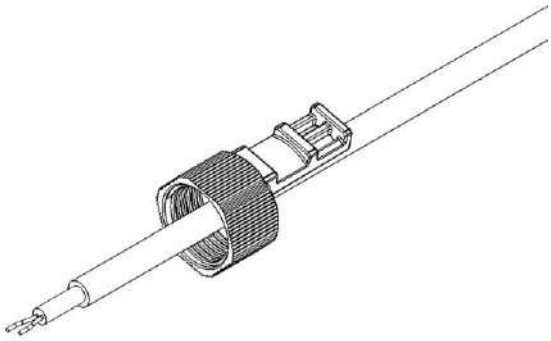
General Installation Procedure

This procedure applies to all cable types, and explains how to install the cables using long glands. The gland is supplied pre-assembled.

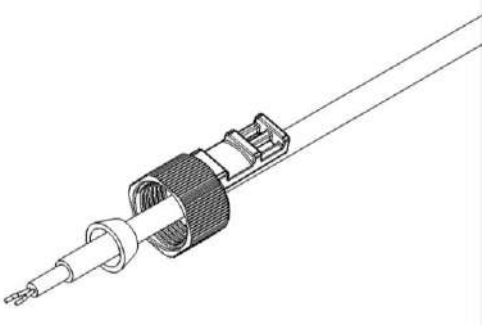
1 Before inserting a cable, you must disassemble the gland cap and gland rubber from the gland body.



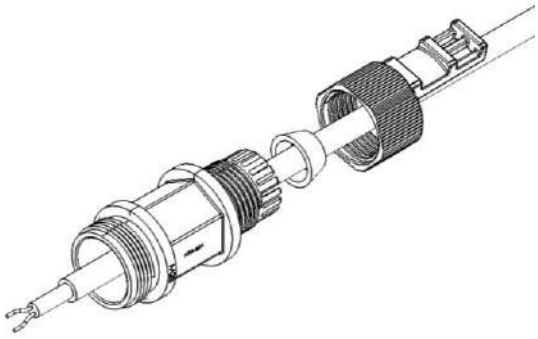
2 Slide the gland cap into the cable.



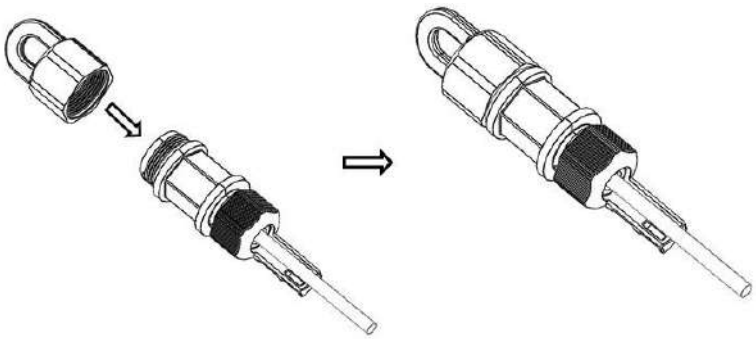
3 Slide the gland rubber into the cable.



4 Slide the cable into the body of the gland. If a gland cap is being used (see Step 5), make sure to leave enough space for the gland cap to fit into the gland without disturbing the cable.



5 Optionally, after securing the cable into the body of the gland, close the other side of the gland with an M28 gland cap. The gland cap protects the cable and connector from damage when elevating the cable and gland to the radio unit.



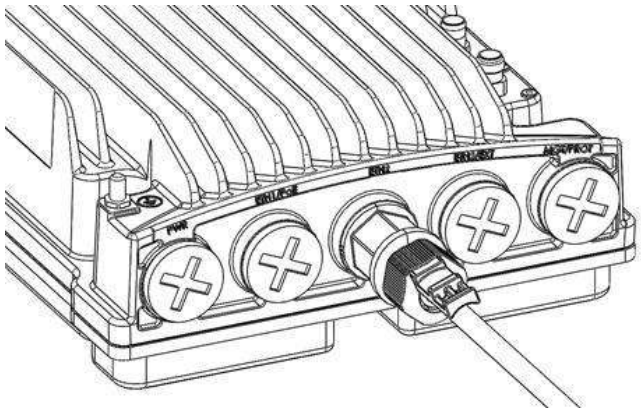
6 The M28 gland cap has a hook on top. After attaching the gland cap to the gland, connect a rope to the hook and use this to lift the gland and cable up to the radio unit. Before securing the gland into the radio unit, remove the gland cap.



7 If an M28 gland cap is used to close the gland when raising the gland and cable to the radio unit, remove the gland cap from the gland at this point by unscrewing the cap.

8 Connect the cable to the port.

9 Screw the gland into the radio unit until there is full contact between the gland and the radio unit.



Note
Before tightening the gland, make sure the gland is aligned with the taped hole in the unit. Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface.

Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately, and thread out the gland. Verify that the gland thread is not damaged and tighten the gland again.

10 Insert the main part of the gland into the thread in the radio body and tighten until there is full contact and the gasket is fully contained between the gland and the radio and cannot be seen. Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately, and thread out the gland. Verify that the gland thread is not damaged and tighten the gland again.

Caution
Ensure that the gland rubber is properly located and not damaged during the tightening of the gland cap.

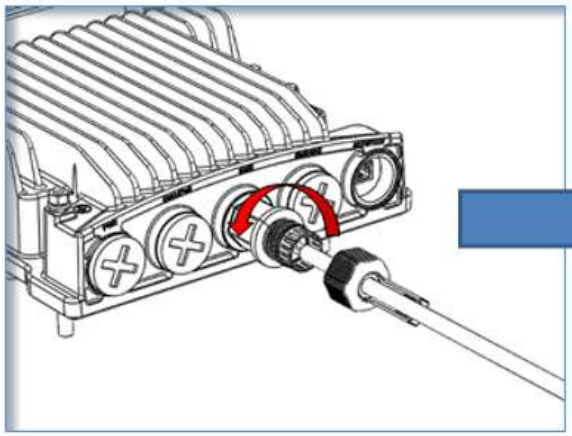


11 Tighten the rear portion of the gland onto the main part of the gland and make sure that the main part of the gland does not have an additional swivel after the rear portion is secured.

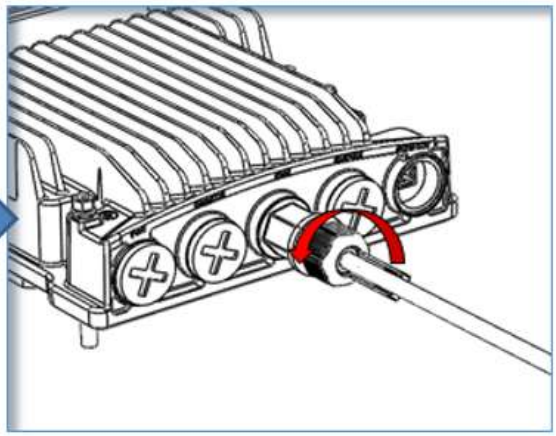
Note

If the main portion of the gland is rotated while the rear portion is seizing the cable, this may ruin the cable connector.

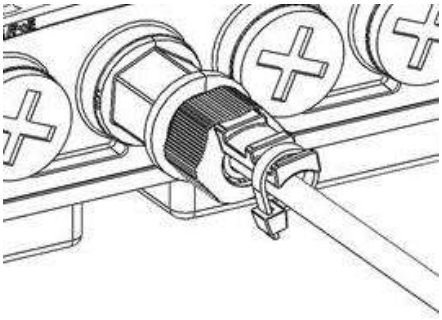
Tightening the Front Portion of the Gland



Tightening the Rear Portion of the Gland



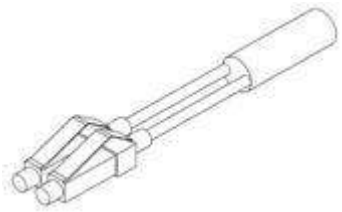
12 Secure the cable to the lip of the gland using a tie wrap.



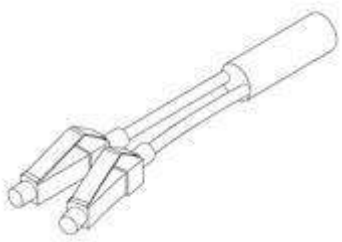
Connecting an Optical Fiber Cable and SFP

To connect an optical fiber cable and the SFP transceiver:

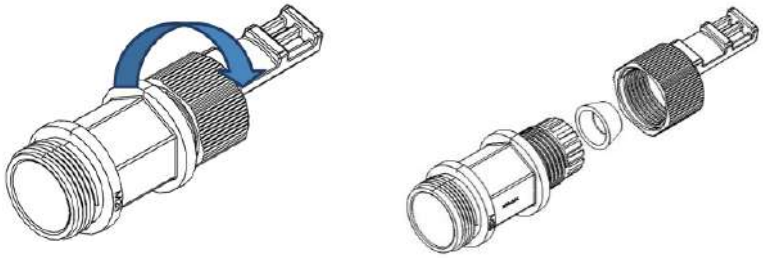
1 Use a pre-assembled cable.



2 Split the connector into two separate LC Connectors (one for each fiber).



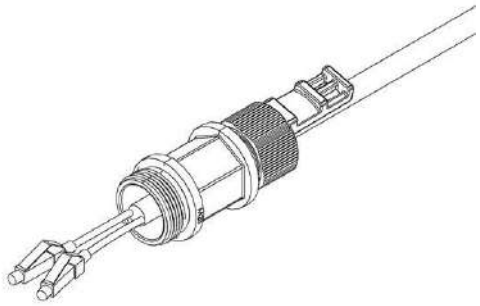
3 Remove the gland cap and rubber from the gland body.



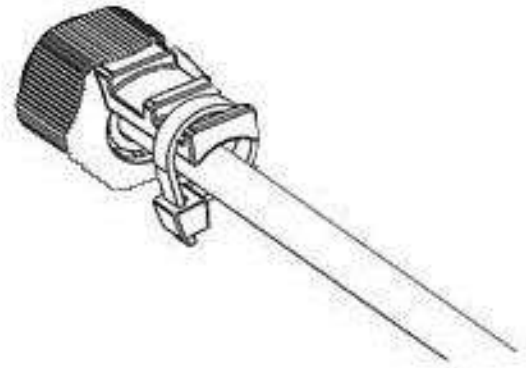
4 Slide the gland cap into the cable.

5 Slide the rubber into the cable.

6 Insert the fibers with the connector one by one into the cable gland.



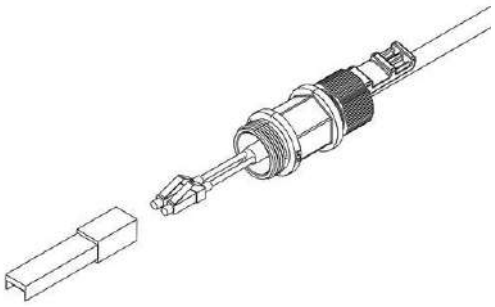
7 Secure the cable to the lip of the gland using a tie wrap.



Note

If you are raising the cable to a radio unit on a tower, this step is crucial to prevent the cable from slipping from the gland, which could damage the connector.

8 Connect the fibers to the SFP transceiver. Listen for the “click” to ensure that they are fully inserted.

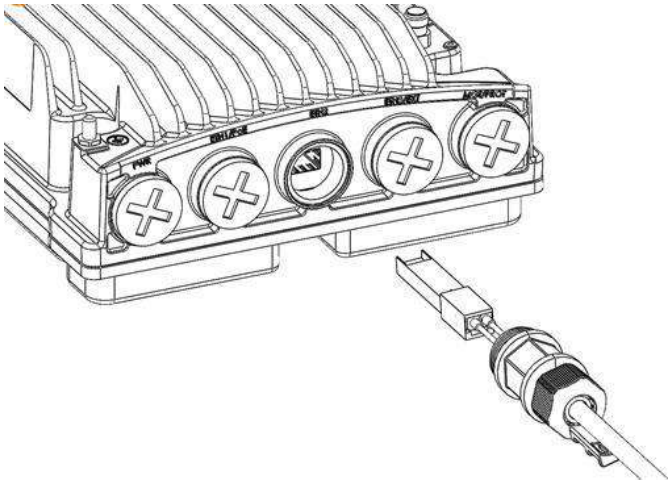


9 Remove the tie wrap securing the cable to the gland.

Note

A new tie wrap must be used to secure the cable to the gland at the end of the procedure, as described in Step 13.

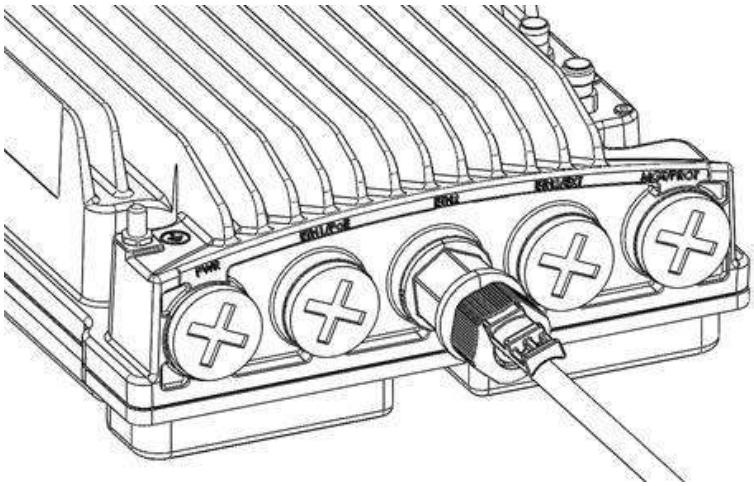
10 Connect the connector into the PTP 820C plug connector.



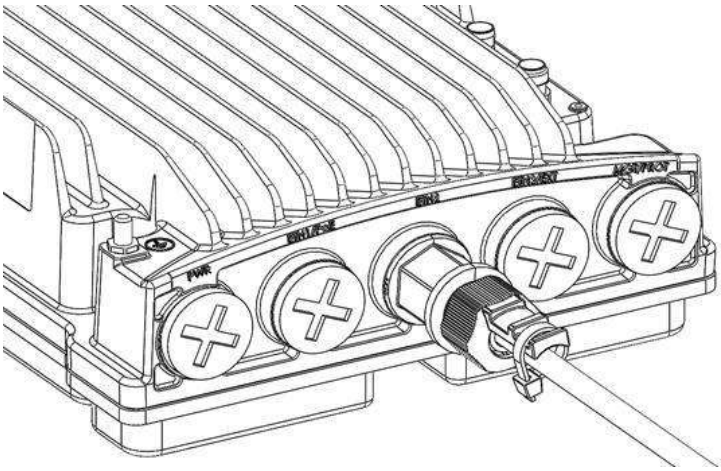
11 Tighten the gland to the radio unit until there is full contact between the gland and the radio unit.

12 Tighten the gland cap.

	**Note** Before tightening the gland, make sure the gland is aligned with the taped hole in the unit. Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately, thread out the gland, and verify that the gland threads are not damaged. Then, tighten the gland again.
	**Caution** If the gland thread is damaged, do not use it.



13 Secure the cable to the gland using a tie wrap.



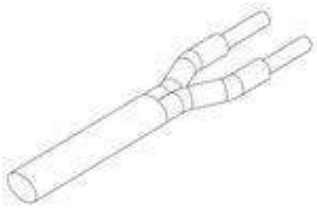
Connecting a DC Power Cable

Note
The DC power cable and connector must be ordered separately.

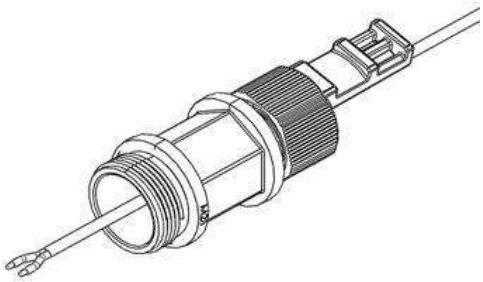
To connect a DC power cable:

1 Strip off 45 mm from the cable jacket.

2 Expose 10 mm at the edge of each of the two wires.

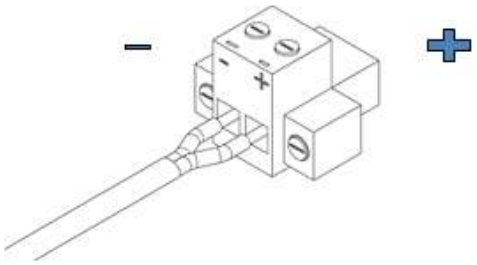


3 Insert the power cable into the gland.

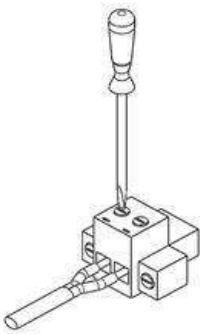


4 Insert the power cable wires into the power connector.

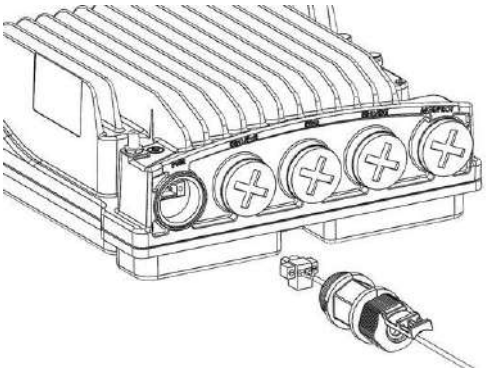
5 Insert the power cable wires into the power connector. Match “+” to the 0V wire and “-“ to the -48V wire.



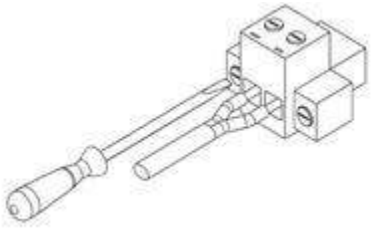
6 Tighten the two top screws.



7 Plug the power cable with connector into the PTP 820C power connector.



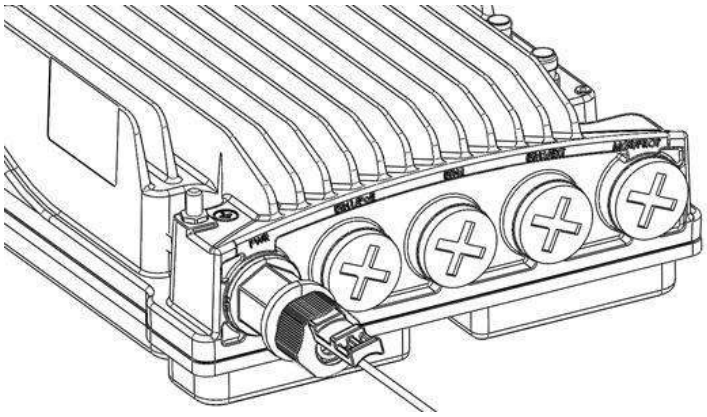
8 Tighten the two front screws.



9 Screw the gland into the radio unit

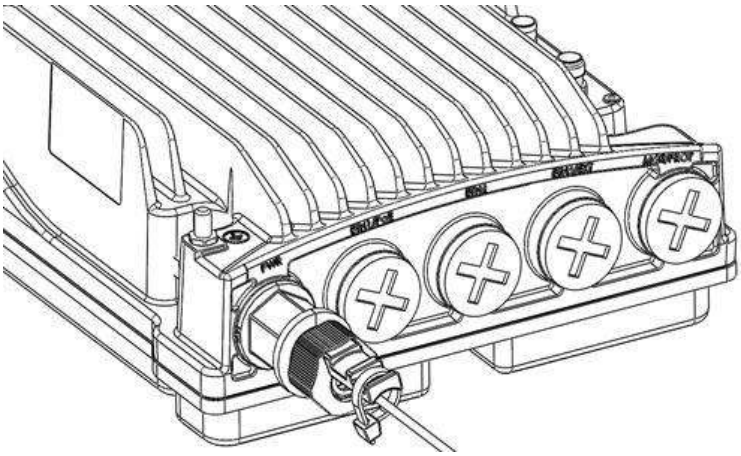
Note

Before tightening the gland, make sure the gland is even with the cover. Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately and verify that the gland is not being inserted at an angle. Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface.



10 Tighten the gland cap.

11 Secure the cable to the gland with a tie wrap.



Connecting the Ethernet Cable

If you need to assemble the Ethernet cable, follow the instructions in section **Error! Reference source not found.**, **Error! Reference source not found.**, then proceed to section **Error! Reference source not found.**, **Error! Reference source not found.**.

If you using a pre-assembled Ethernet cable, follow the instructions in section **Error! Reference source not found.**, **Error! Reference source not found.**, then proceed to section **Error! Reference source not found.**, **Error! Reference source not found.**.

Note

To ensure proper grounding and connectivity, it is recommended to use pre-assembled Ethernet cables.

Preparing the Ethernet Cable and Plug-in Field

Note

To ensure proper grounding, the RJ-45 plug must be shielded, with a crimping tail.



Table 24 Materials for preparing Ethernet Data Cables

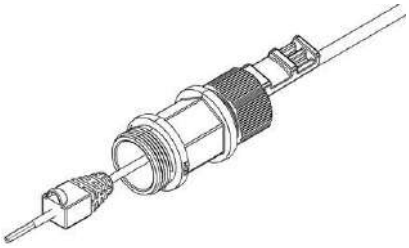
Marketing P/N	Description
N000082L016A	PTP 820 CAT5E Outdoor 100m drum
N000082L014A	PTP 820 Glands_x5_KIT
N000082L017A	PTP 820 Grounding Kit for CAT5e F/UTP 8mm cable
N000082L073A	PTP 820 GBE_Connector_kit

To prepare the Ethernet cable and plug-in field:

1. Prepare the gland and insert the cable, as described in General Installation Procedure.
2. Strip off approximately 45 mm of the outer insulation jacket from the CAT5E cable.
3. Do not strip off the end of the cableshield, but rather, twist the shield to form a braid.



4. Roll back the foil shield insulation and wrap the drain wire around the foil. Do not remove any insulation from the conductors.



5. Align the colored wires.

Note
Cord colors must be matched to the same pins on both ends of the cable.

6 Trim all wires to the same length. About 12 mm on the left must be exposed from the inner sheath.

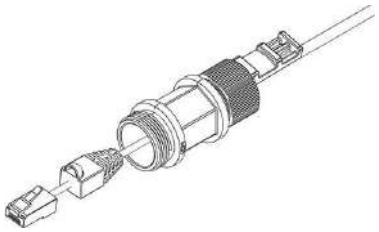
7 Separate the wires and place the twisted shield between the separated wires.



8 Insert the wires into the RJ45 plug. Verify that each wire is fully inserted into the front of the RJ45 plug and in the correct order according to the pinouts shown in Outdoor Ethernet Cable Specifications. The sheath of the Ethernet cable must extend into the plug by about 13 mm and held in place by the crimp.



9 Extend the cable jacket with the shield into the connector about 5 mm for strain relief and shielding connection.



10 Wrap the twisted braid firmly around the cable jacket and let the crimping tail of the RJ45 plug envelop it.



Note
To ensure proper grounding, it is essential that the twisted braid be firmly connected to the RJ45 plug.

11 Crimp the RJ45 plug with the crimp tool. Make sure the twisted shield is crimped firmly to the RJ45 plug.



12 Verify that the wires ended up the correct order and that the wires extend to the front of the RJ45 plug and make good contact with the metal contacts in the RJ45 plug.

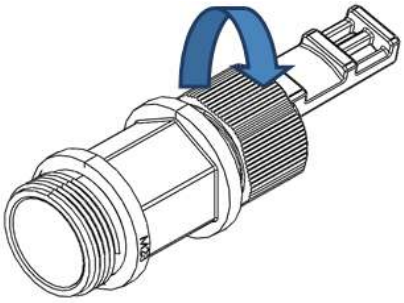
13 Push back the CAT5E plug cover on the connector plug.

Note
It is recommended that the newly prepared cable be tested with a Cable Analyzer such as the FLUKE DTX-1800 (or the equivalent), to make sure the cable complies with ANSI/TIA/EIA-568-B-2. Make sure to verify both connectivity and grounding continuity at both ends of the cable.

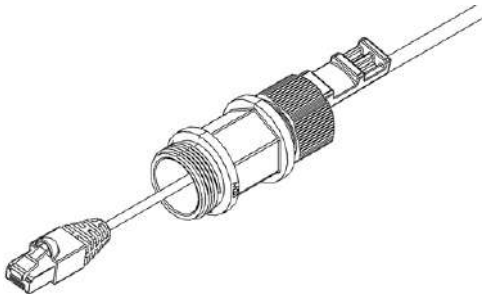
Preparing the Ethernet Cable Already Assembled

To prepare the Ethernet cable already assembled:

1 Release the gland cap and the gland rubber slightly.



2 Insert the CAT5E cable into the gland cap and into the rubber gland.

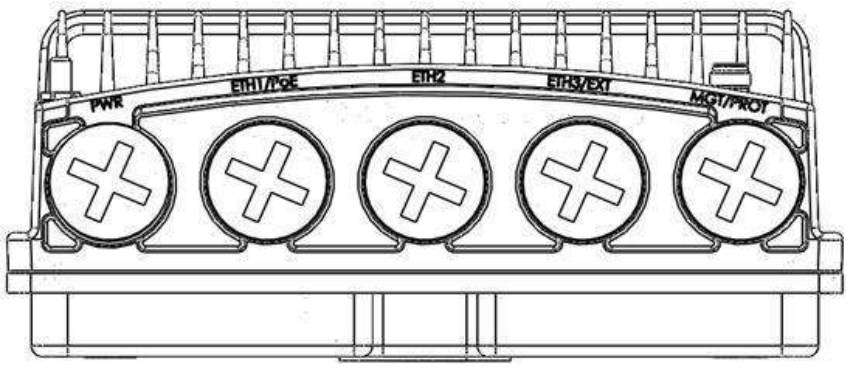


3 Insert the CAT5E cable into the gland body.

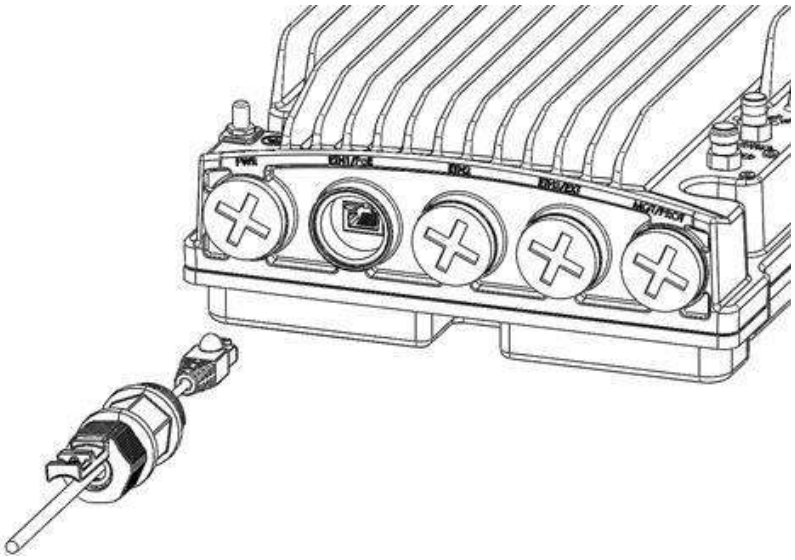
Connection of Ethernet Cable to PTP 820C

To connect the Ethernet cable to the PTP 820C:

1 Remove the relevant cap from the PTP 820C radio. You can use the side of the gland to unscrew the cap.



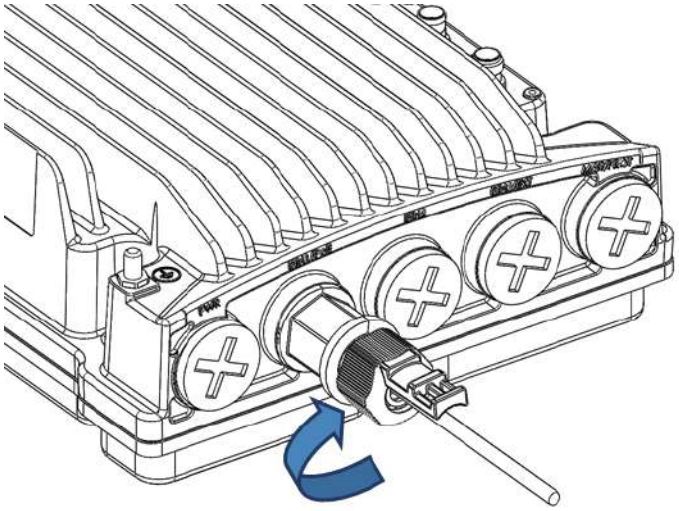
2 Connect the CAT5E cable to the PTP 820C.



3 Screw the gland into the radio unit.

Note

Before tightening the gland, make sure the gland is even with the cover. Tighten the gland gently and make sure there is no resistance. If there is resistance, stop immediately and verify that the gland is not being inserted at an angle. Tightening the gland at an angle can ruin the thread on the gland and prevent proper sealing of the interface.



4 Tighten the gland cap.

5 Secure the cable to the gland using a tie wrap.

Management Connection for 4x4 MIMO and 1+1/2+2 HSB Configurations

In 4x4 MIMO ASD (two units) and all HSB protection configurations, two Y-splitter cables and a special signaling cable must be used to connect the management ports (MGT/PROT) of the two PTP 820C units and provide management access to each unit.

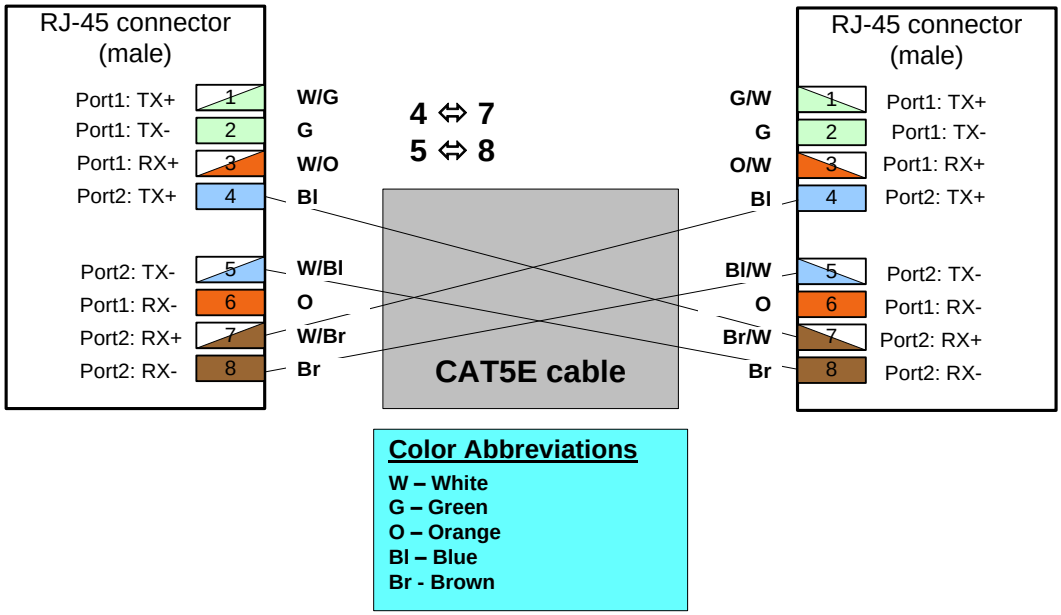
The MIMO/Protection signaling cables are available pre-assembled from Cambium Networks in various lengths, but users can also prepare them in the field.

The following sections explain how to prepare and connect these cables.

Preparing a MIMO/Protection Signaling Cable

The MIMO/Protection signaling cables require the following pinouts.

MIMO/Protection Signaling Cable Pinouts



Note

Other than the pinout connection described above, the cable should be prepared according to the cable preparation procedure described in **Error! Reference source not found.**.

Connecting the MIMO/Protection Splitters and Protection Signaling Cable

Each splitter has three ports:

- System plug (“Sys”) – The system plug should be connected to the PTP 820C’s management port.
- Management port (“Mng”) – A standard CAT5E cable should be connected to the splitter’s management port in order to utilize out-of-band (external) management.

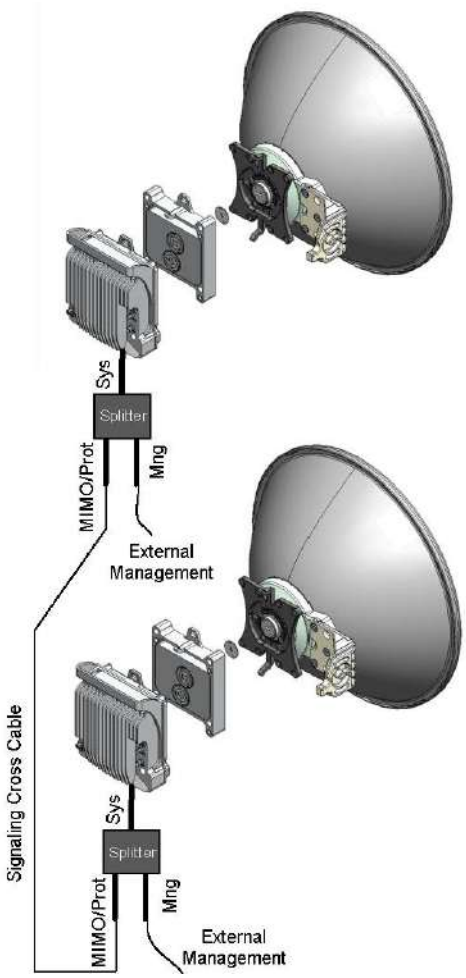


Note

Even for systems that use in-band management, initial configuration of a 4x4 MIMO and any HSB protection configuration must be performed manually using out-of-band management.

- MIMO/Protection signaling port (“MIMO/Prot”) – A MIMO/Protection signaling cross cable, as described above, should be connected between this port and the other “MIMO/Prot” port of the second splitter on the mate PTP 820C unit.
- The following figure demonstrates a 4x4 MIMO configuration in which both PTP 820C units are connected to an external management station and to each other, using two splitters.

Figure 13 4x4 MIMO or HSB Protection Configuration with External Management



Chapter 4: PoE Injector Installation and Connection

This chapter describes the PoE Injector installation and connection procedure of the PTP 820C product. This chapter consists of the following sections:

- PoE Injector Cable Connection
- PoE Injector Grounding
- PoE Injector 19” Rack Installation
- PoE Injector ETSI Rack Installation

PoE Injector Cable Connection

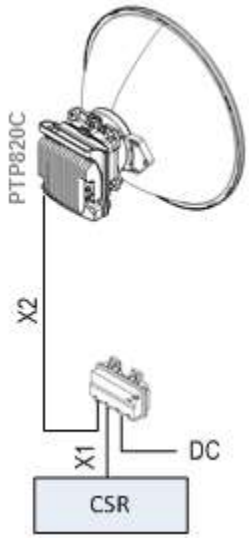
The PoE Injector cables are connected similar to the PTP 820C.

- To connect the Ethernet (CAT5E) cable to the PoE or Data port, *see Connection of Ethernet Cable to PTP 820C on page 3-36.*
- To connect the DC power cable to the power port or dual feed port, *see Connecting a DC Power Cable on page 3-28*.
- The total length of the cable between the PTP 820C port and the Switch/Router the device is connected to must not exceed 100m/328ft. This length includes the connection between the PTP 820C and the PoE Injector (X1 + X2 ≤ 100m/328ft in the figure below).

Note

The length of the cable connecting the customer equipment to the PoE injector should not be longer than 10m (according to ANSI/TIA-568 standard).

Figure 14 PoE Injector cable connection



Note

For the warranty to be honored, the connection must be through the glands only. Do not open the PoE injector box cover.

PoE Injector Grounding

To ground the PoE Injector:

1. On the right side of each PoE Injector, loosen the screw, plain washer, and serrated washer.
2. Place the cable lug (supplied with the PoE injector kit) between the plain and serrated washer.
3. Tighten the screw.
4. Perform a resistance test between the 2 lugs of the GND cable. Verify that the result is 0-2 ohms.

PoE Injector Wall Mount Installation

List of Items

Item	Description	Quantity	Remarks
1	PoE Injector	1	
1	Glands Kit	1	For outdoor installations.



Note

Glands are required for outdoor installations. The glands kit (three or five glands) is not supplied with the PoE Injector, and must be ordered separately.

Glands Kit

Marketing Model	Marketing Description
PTP 820_3xGlands_kit	PTP 820_3xGlands_kit
PTP 820_Glands_kit	PTP 820_Glands_x5_kit

Required Tools

- Metric offset wrench key wrench set
- Hammer
- Drilling Machine

Procedure

1. Mount and tighten the PoE Injector to a wall using two M6 bolts and anchors. The M6 bolts and anchors must be purchased separately.

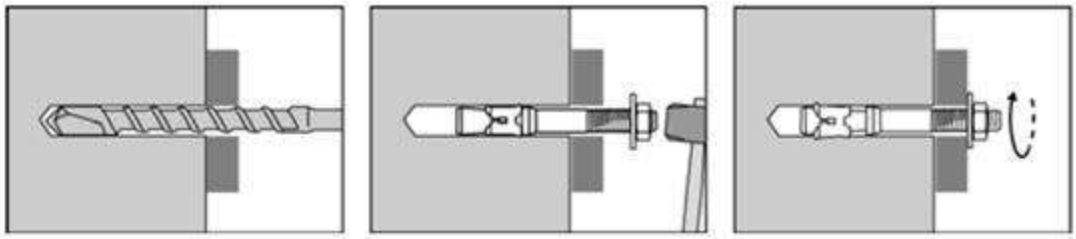
   Note: Use Anchor Stainless Steel with flanged Hexagonal nut M6X70.

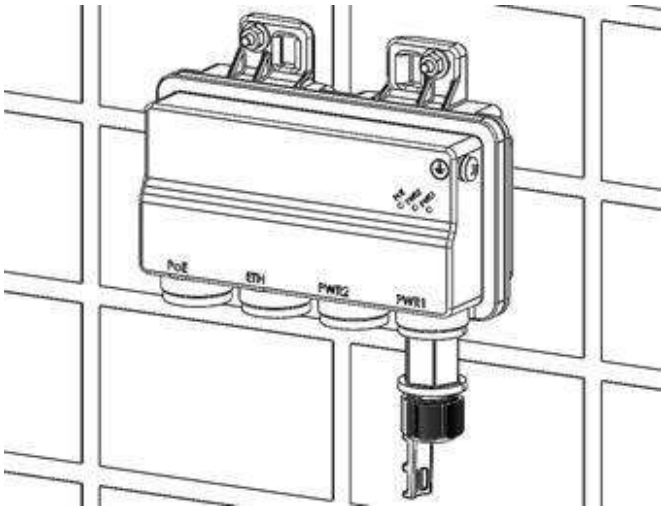
2 Drill two 6mm diameter holes with 100mm distance between the centers of the holes.

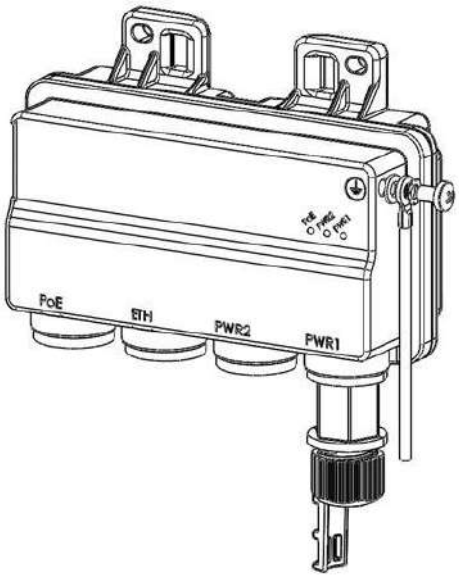
3 Insert the anchors with the bolts.

4 Place the washers on the bolt.

5 Tighten the nuts.







PoE Injector Pole Mount Installation

List of Items

Item	Description	Quantity	Remarks
1	PoE Injector	1	

Required Tools

- Slot Screwdriver

Procedure

1 Mount and tighten the PoE Injector to a pole with a diameter of 114 mm using a stainless steel hose clamp.

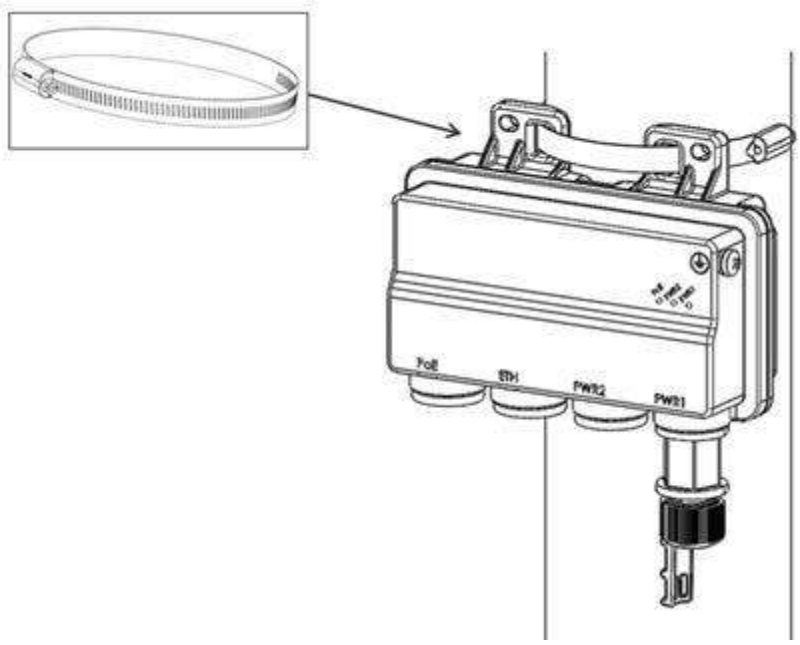
2 Pass the hose clamp through the pole mount slots.

Note: The Hose Clamp is not supplied with PoE injector kit.

3 Attach the PoE injector to the pole.

4 Connect the ends of the hose clamp.

5 Tighten the hose clamp using the captive screw.



PoE Injector 19” Rack Installation

List of Items

Table 25 Required items for PoE Injector 19” rack installation

Item	Description	Quantity	Remarks
1	PoE Injector	1	
2	PoE Injector 19” Rack Mount Kit	1	

Required Tools

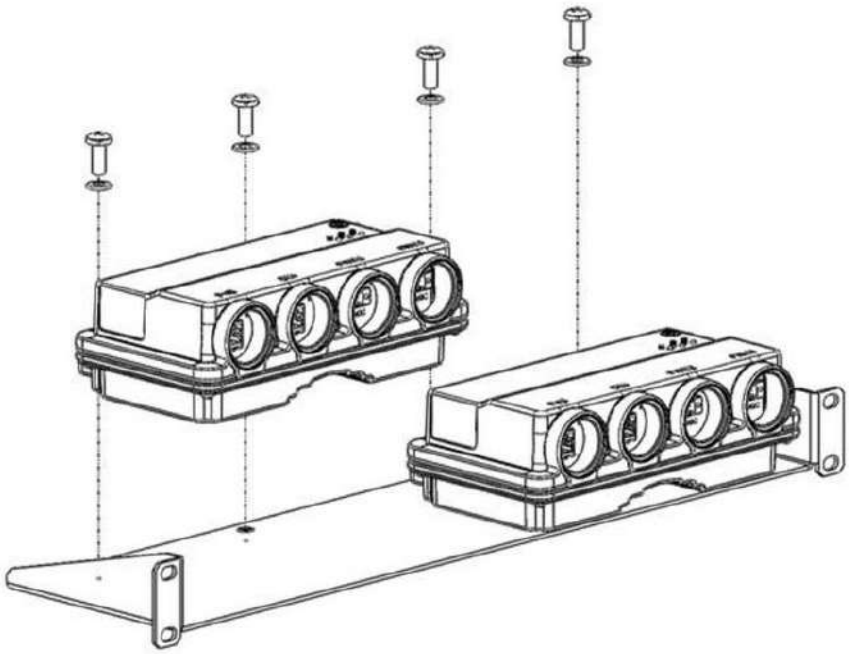
- Philips Screwdriver

Procedure

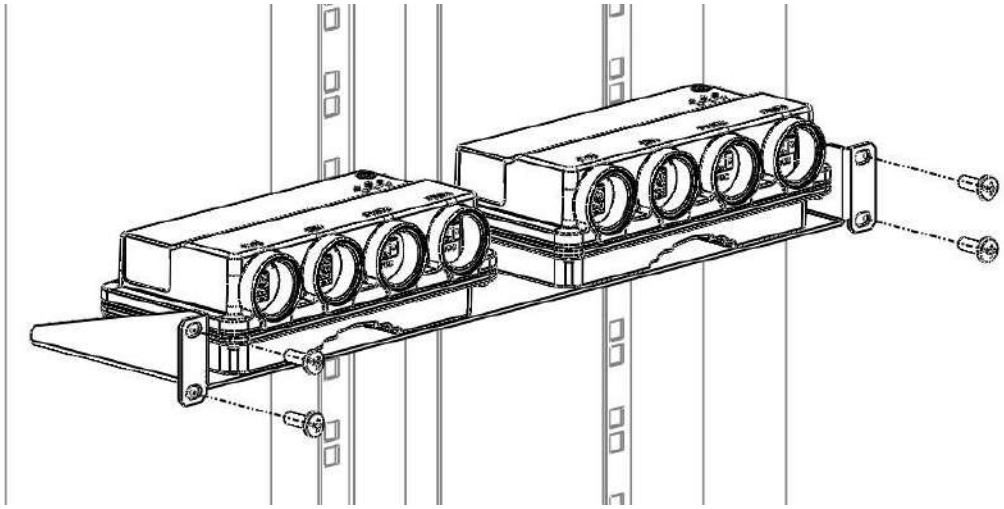
To mount the PoE Injector on a rack:

1 Mount the PoE Injector to a 19” rack using a 19” rack adaptor.

2 Mount the PoE Injector on the 19” adaptor through the wall mounting holes, using M6 screws and washers.



2 Mount the 19” rack adaptor to a 19” rack using four M6 screws and cage nuts.



PoE Injector ETSI Rack Installation

List of Items

Table 26 Required items for PoE Injector ETSI rack installation

Item	Description	Quantity	Remarks
1	PoE Injector	1	
2	PoE Injector ETSI Rack Mount Kit	1	

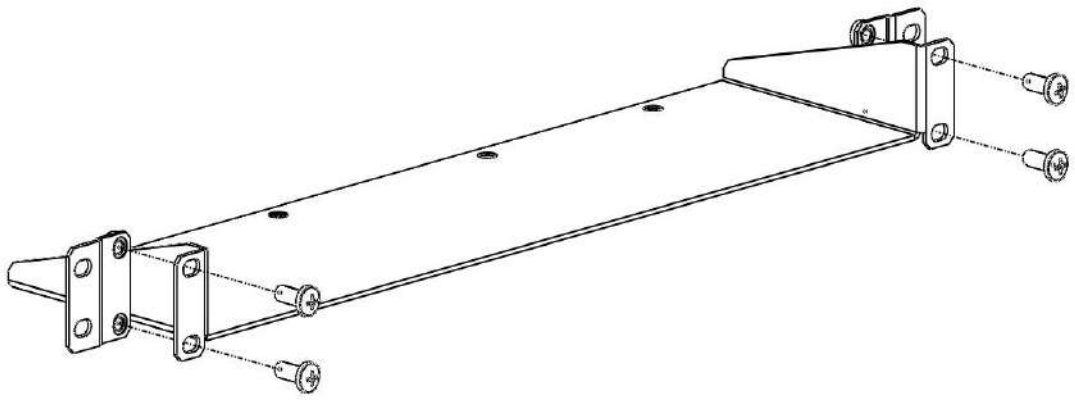
Required Tools

- Philips Screwdriver

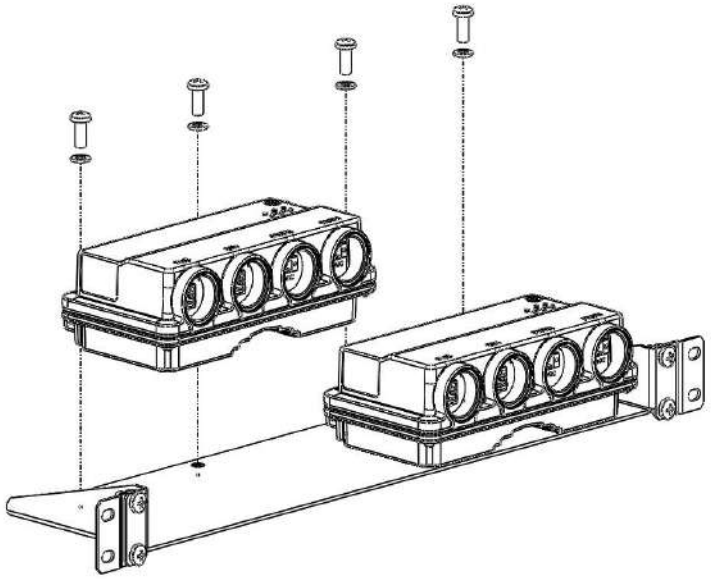
Procedure

To mount the PoE Injector to an ETSI rack:

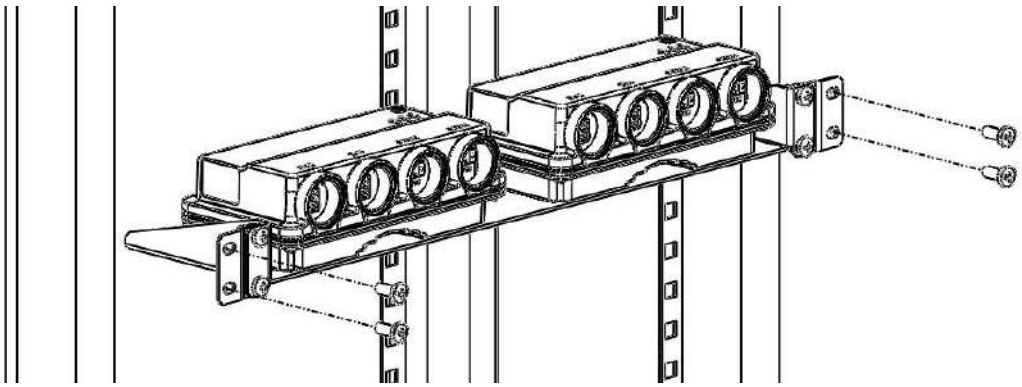
1. Mount the PoE Injector to an ETSI rack using a 19” rack adaptor and ETSI adapting ears.
2. Connect the ETSI adapting ears to a 19” rack adaptor using four M6 screws.



3 Mount the PoE Injector on the adaptor through the wall mounting holes using M6 screws and washers.



4 Mount the 19” rack adaptor with the ETSI ears on the ETSI rack using four M6 screws and cage nuts.



Note

For this type of installation, a 2RU space is required.

Chapter 5: Generic Installation Procedures

This chapter describes generic installation procedures of PTP 820C product. This chapter consists of the following sections:

- General Notes Concerning All Installation Procedures
- Torque Requirements
- PTP 820C DC Pole Mount Procedure
- Remote Mount Installation for Single Polarization with an Remote Mount kit

General Notes Concerning All Installation Procedures

Since the PTP 820C architecture is of a Dual Core nature, each dual core configuration can be considered as single core configuration hardware ready for its dual core counterpart. Therefore, you must follow the same procedure for *2+0 SP* installation, if you want to install a *1+0 SP HW ready for 2+0 SP*.

One of the major benefits of the PTP 820C and the dual core architecture is that upgrading can be done remotely by uploading the correct software license.

When installing a 1+0 link which is hardware ready for 2+0 Dual Polarization (XPIC), make sure to plan and install the link as if it is immediately being configured as an XPIC link. This includes both link budget calculation and hardware installation.

The OMT must be carefully aligned according to the XPIC alignment procedure. Use activation key Demo Mode to activate the second radio interface for purposes of alignment. After completing alignment, install the regular activation key and configure the unit for 1+0 operation.

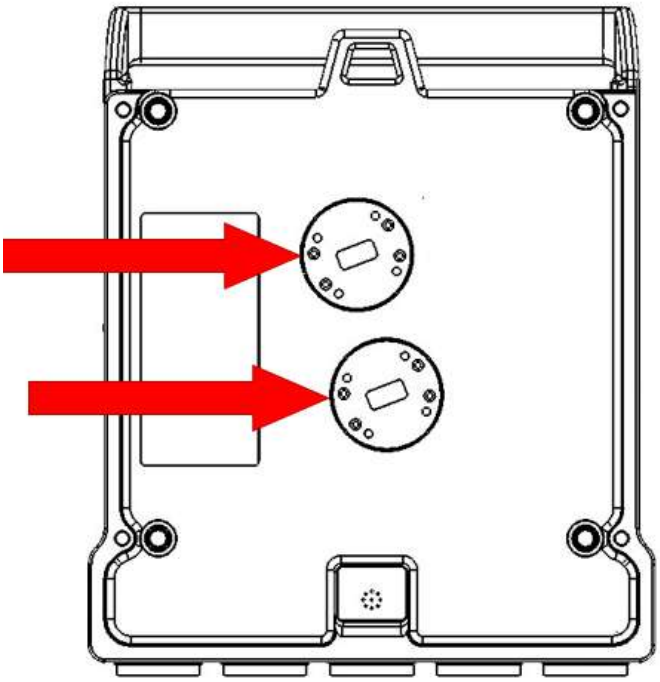
Failure to follow these steps may limit your ability to upgrade a 1+0 link to a 2+0 XPIC link at a later date from a remote location.Before starting an installation, use a leveler to make sure that the poles are 100% vertical. You need to check both sides of each pole at 90 degrees separation. This is a critical step in any link but most important when installing MIMO or XPIC



Note

Do not remove the transparent pressure windows located on the antenna interfaces.

Figure 17 Transparent Pressure Windows.



Torque Requirements

When tightening the captive screws, use 20 Nm torque for radio-antenna, radio-mediation device, and mediation device-antenna connections. In order to avoid misalignment, screws should be tightened progressively.

When fastening a waveguide to the radio or mediation device, use the following torque, according to frequency and screw type:

- 6 GHz: M5/#10-32: 3.5 Nm
- 7/8-15 GHz: M4/#8-32: 2.5 Nm
- 18-42 GHz: M3/#4-40: 1Nm

PTP 820C DC Pole Mount Procedure

Note

The pole diameter range for pole mount installations is 8.89 cm – 11.43 cm (3.5 inches – 4.5 inches).

List of Items

Table 27 DC Pole Mount part numbers

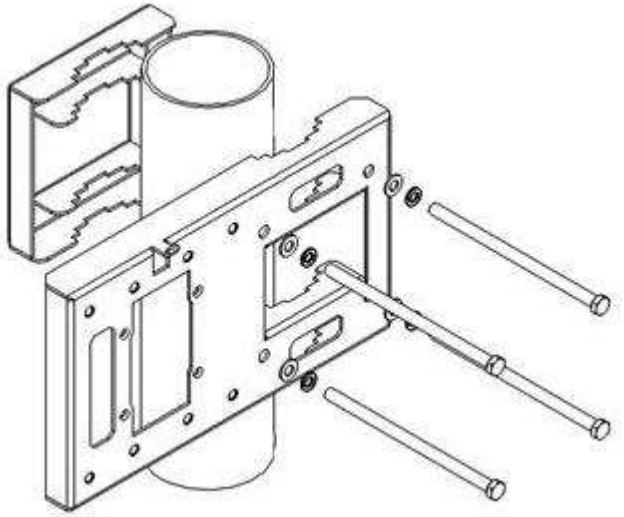
Marketing P/N	Description
N000082L120A	PTP 820C DC Remote Mount Kit
N060082L002A	PTP 820C 6 GHz Remote Mount adaptor - UDR70
N070082L001A	PTP 820C 7-8 GHz Remote Mount adaptor - UBR84
N110082L001A	PTP 820C 10-11 GHz Remote Mount adaptor - UBR100
N130082L001A	PTP 820C 13 GHz Remote Mount adaptor - UBR120

Required Tools

Metric offset wrench key wrench set

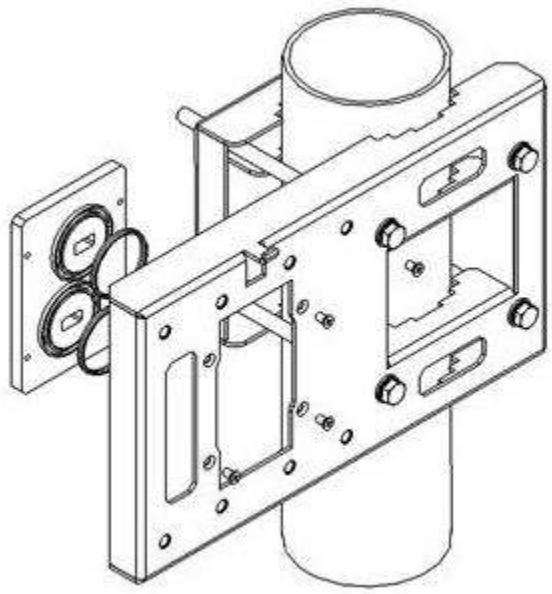
To install the PTP 820C pole mount:

Mount and tighten the PTP 820C DC pole mount to a pole with a diameter of 114 mm using the four washers and screws supplied with the PTP 820C DC pole mount kit.



For 6-13 GHz Only

Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



Remote Mount Installation for Single Polarization with an Imperial Waveguide

List of Items

Table 28 Required items for Remote mount Installation single polarization

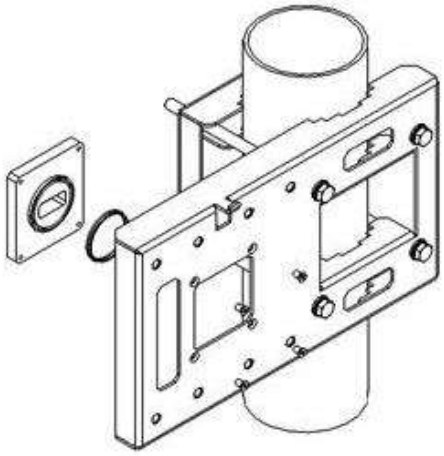
Marketing P/N	Description
N060082L003A	PTP 820 RFU-C ADPT 6 GHz Remote Mount Adpator - UDR70
N070082L002A	PTP 820 RFU-C ADPT 7_8 GHz Remote Mount Adaptor - UBR84
N110082L002A	PTP 820 RFU-C ADPT 10_11 GHz Remote Mount Adaptor - UBR100
N130082L002A	PTP 820 RFU-C ADPT 13GHz Remote Mount Adaptor - UBR120
N000082L121A	P 820 RFU-C Pole Mount kit
N060082L138A	PTP 820C Splitter Kit 6 GHz
N070082L295A	PTP 820C Splitter Kit 7-8 GHz
N110082L083A	PTP 820C Splitter Kit 10-11 GHz
N130082L057A	PTP 820C Splitter Kit 13 GHz
N150082L079A	PTP 820C Splitter Kit 15 GHz
N180082L045A	PTP 820C Splitter Kit 18 GHz
N230082L035A	PTP 820C Splitter Kit 23 GHz
N260082L029A	PTP 820C Splitter Kit 26 GHz
N280082L038A	PTP 820C Splitter Kit 28 GHz
N320082L022A	PTP 820C Splitter Kit 32 GHz
N380082L046A	PTP 820C Splitter Kit 38 GHz

Required Tools

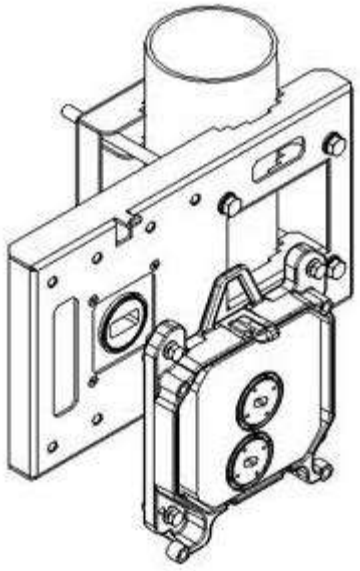
- Metric offset hexagon key wrench set
- Imperial offset hexagon key wrench set
- Phillips #1, #2 screwdriver

6-13 GHz Installation Procedure

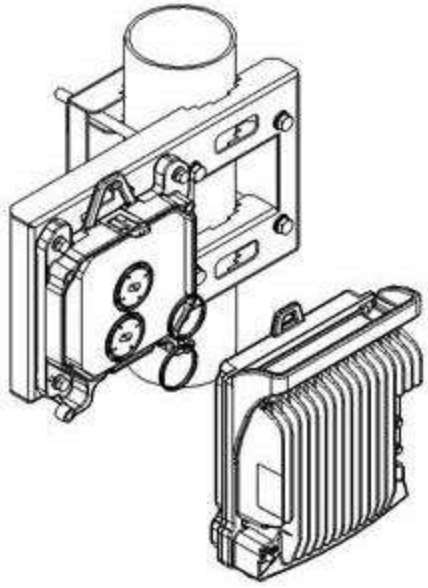
1 Mount and tighten the RFU-C Adaptor plate (supplied in RFU-C Adaptation kit to RFU-C Adaptor Remote Mount Kit) to the RFU-C Remote Pole Mount using the four flat screws supplied with the RFU-C Adaptation kit to RFU-C Adaptor Remote Mount Kit.



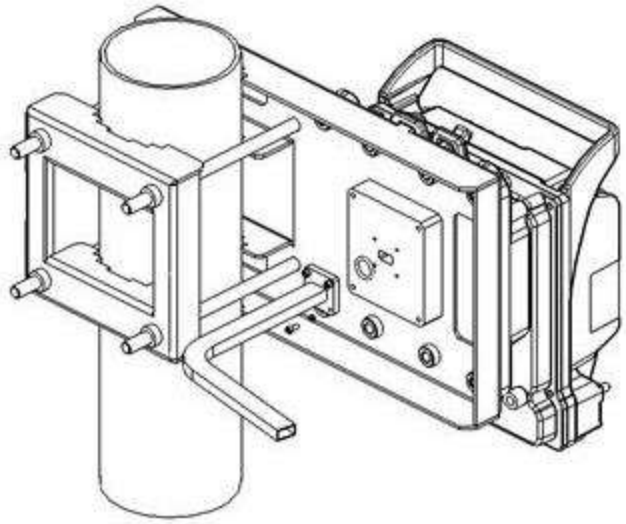
2 Mount and tighten the PTP 820C Splitter to the RFU-C Remote Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



3 Mount and tighten the PTP 820C radio to the PTP 820C Splitter using the four captive screws and washers that are assembled to the PTP 820C radio. Pay attention that the O-rings are mounted on the PTP 820C Splitter kit.

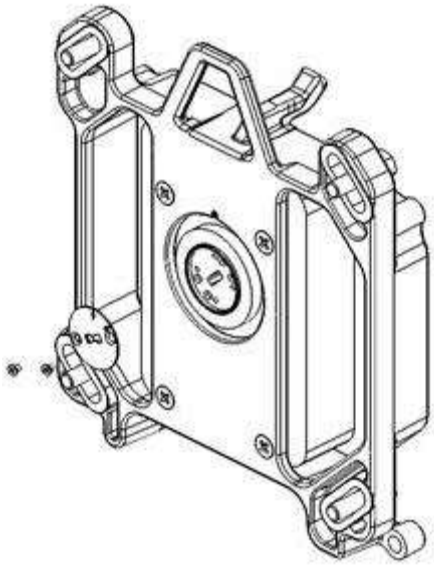


4 Connect the Flexible Waveguide and Sealing Gasket supplied with the RFU-C Adaptor Remote Mount Kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the RFU-C Adaptor Remote Mount Kit.

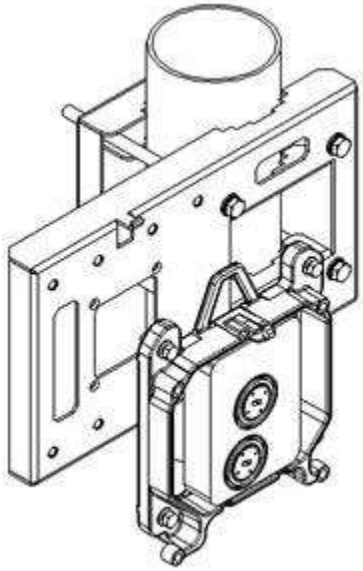


15-38 GHz Installation Procedure

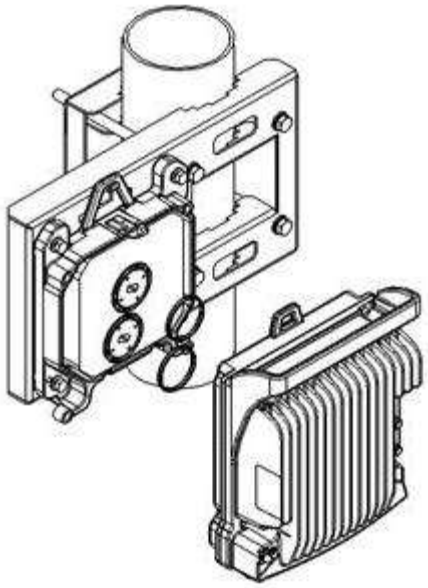
1 Loosen the two screws, and remove the twist plate from the PTP 820C Splitter.



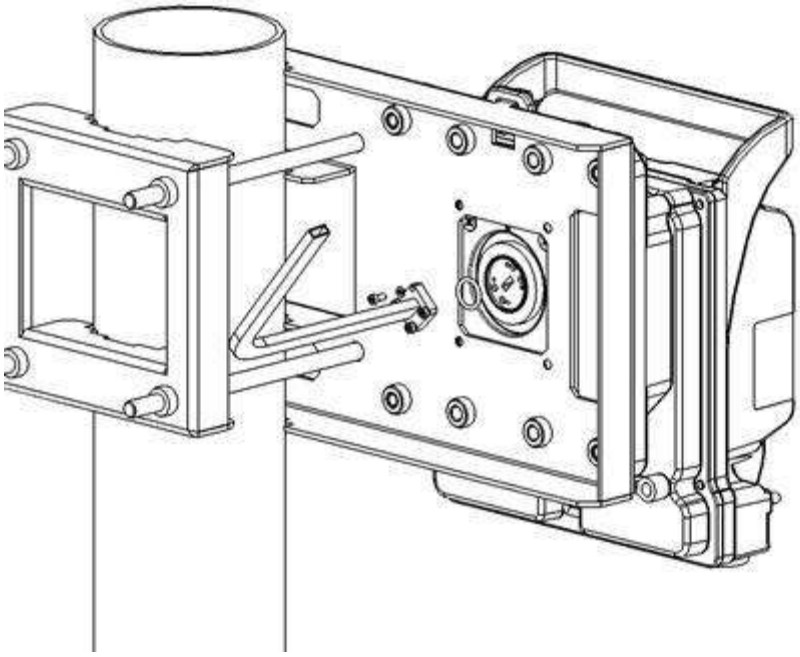
2 Mount and tighten the PTP 820C Splitter to the RFU-C Remote Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.

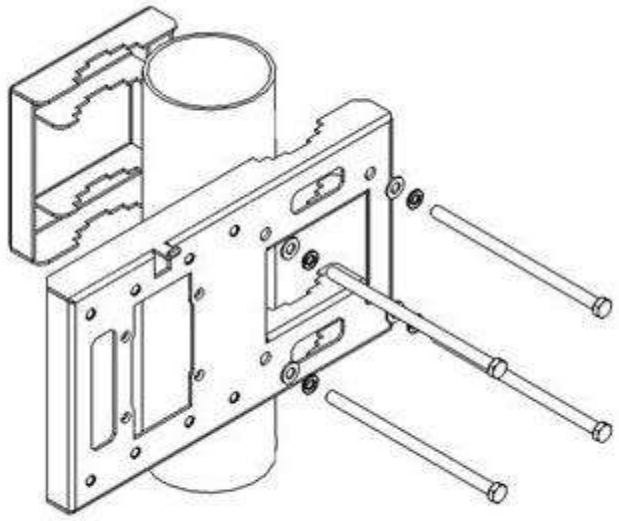


3 Mount and tighten the PTP 820C radio to the PTP 820C Splitter using the four captive screws and washers that are assembled to the PTP 820C radio. Make sure the O-rings are mounted on the PTP 820C Splitter kit.



4 Connect the Flexible Waveguide and Sealing O-ring supplied with the RFU-C Adaptor Remote Mount Kit to the PTP 820-C Splitter kit. Tighten the four screws supplied with the RFU-C Adaptation kit to the RFU-C Adaptor Remote Mount Kit.





Management Connection for MIMO and Protection Configurations

In MIMO and all HSB protection configurations, a special signaling cable must be used to connect the management ports (MGT/PROT) of the two PTP 820C units.

When Out-of-Band management is used, a splitter must be used to connect the management ports to local management and to each other.

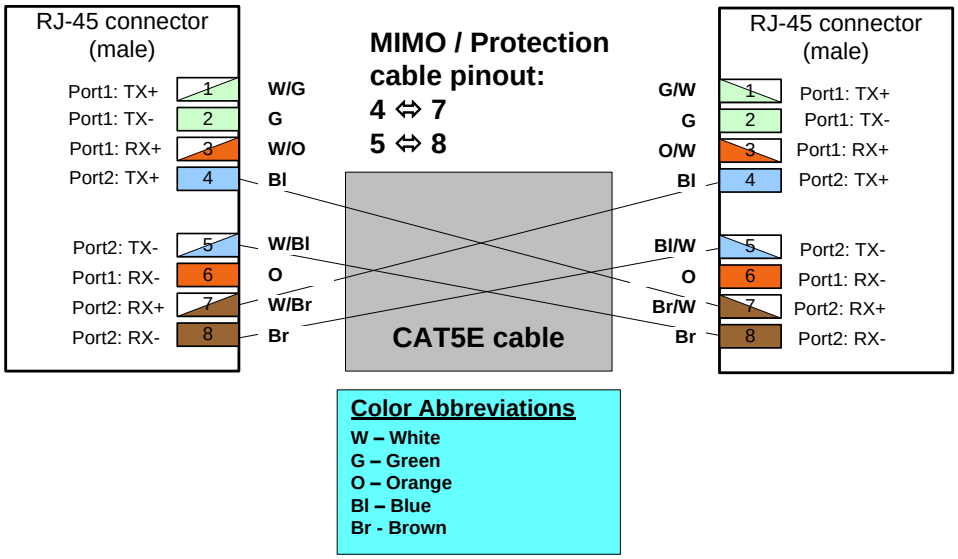
The MIMO/Protection signaling cables are available pre-assembled from Cambium Networks in various lengths (see Cables for MIMO Connections on page 3-13), but you can also prepare them in the field.

The following sections explain how to prepare and connect these cables.

Preparing a MIMO/Protection Signaling Cable

To prepare your own MIMO/Protection signaling cables, follow the instructions in Preparing the Ethernet Cable and Plug-in Field on page 3-31. You must use the following pinouts:

Figure 18 MIMO/Protection signaling cable 1



Connecting a MIMO/Protection Signaling Cable

This option must be used when you plan to manage the system using in-band management.

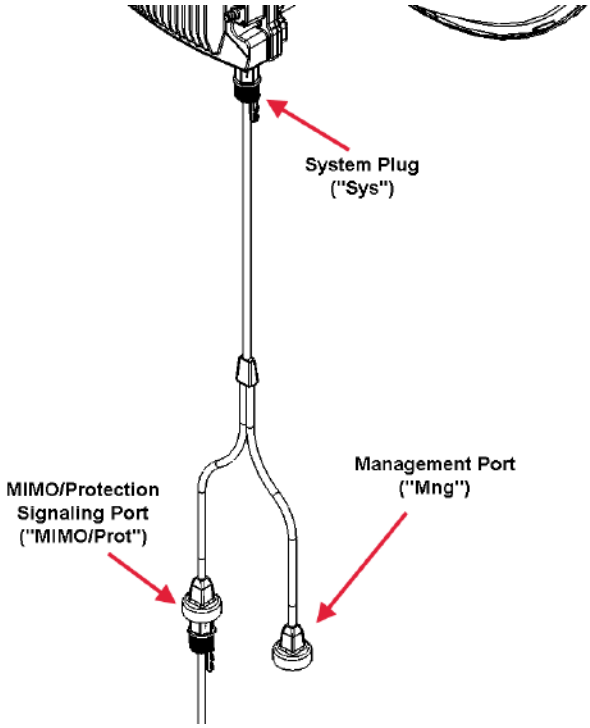
The MIMO/Protection signaling cable must be connected between the management ports of two PTP 820C units operating in either MIMO or HSB protection mode. The physical cable connection is the same as connecting a CAT5E cable to a system data or management port. For details, see Connecting the Ethernet Cable on page 3-31.

Connecting a MIMO/Protection Splitter

This option must be used when you plan to manage the system using out-of-band (external) management rather than in-band management.

The splitter has three ports, as shown in the following figure.

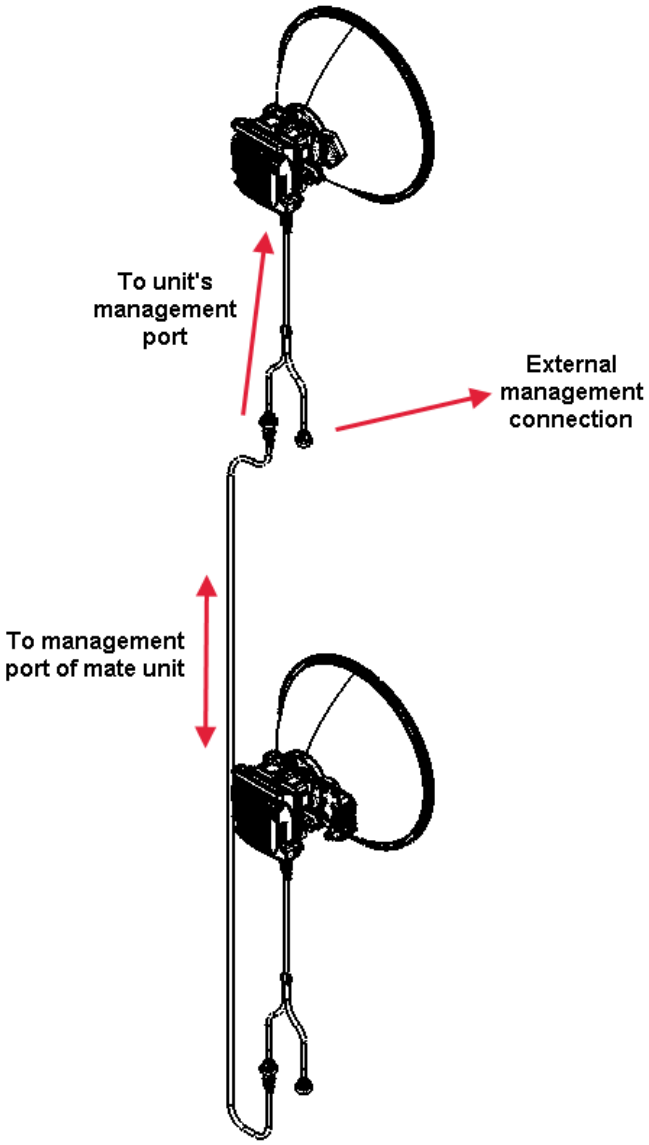
Figure 19 MIMO/Protection signaling cable 2



- System plug (“Sys”) – The system plug must be connected to the PTP 820C’s management port.
- Management port (“Mng”) – A standard CAT5E cable must be connected to the splitter’s management port in order to utilize out-of-band (external) management.
- MIMO/Protection signaling port (“MIMO/Prot”) – A standard CAT5E cable or a MIMO/Protection signaling cable must be connected between this port and the other “MIMO/Prot” port of the second splitter on the mate PTP 820C unit.

The following figures demonstrate a 4x4 MIMO configuration in which both PTP 820C units are connected to an external management station and to each other, using two splitters.

Figure 20 MIMO/Protection signaling cable 3



Chapter 6: Installation Procedures per Configuration Type

This chapter describes the installation procedures per configuration type of the PTP 820C product.

This chapter consists of the following sections:

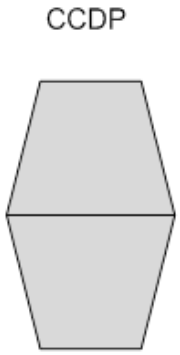
- MultiCore 2+0 Dual Polarization Direct Mount
- MultiCore 2+0 Dual Polarization Remote Mount
- MultiCore 2+0 Single Polarization Direct Mount
- MultiCore 2+0 Single Polarization Remote Mount
- MultiCore 2+2 HSB Double Polarization Direct Mount
- MultiCore 2+2 HSB Double Polarization Remote Mount
- MultiCore 2+2 HSB Single Polarization Direct Mount
- MultiCore 2+2 HSB Single Polarization Remote Mount
- 2 x MultiCore 2+0 Dual Polarization Direct Mount
- 2 x MultiCore 2+0 Dual Polarization Remote Mount
- 2 x MultiCore 2+0 Single Polarization Direct Mount
- 2x2 LoS MIMO Direct Mount
- 2x2 LoS MIMO Remote Mount
- 4x4 LoS MIMO Direct Mount
- 4+0 Dual Polarization, 2+2HSB Single/Dual Polarization Direct Mount
- 4+0 Dual Polarization, 2+2HSB Dual Polarization Remote Mount
- 2+2 HSB Single Polarization Remote Mount
- 1+1 HSB-SD
- AFR 1+0 Hub Site

MultiCore 2+0 Dual Polarization Direct Mount

This procedure can also be used for:

- MultiCore 1+0 DP HW ready for MultiCore 2+0 DP
- Advanced Space Diversity (ASD) (Site 1 – Single Unit).

Figure 16 MultiCore 2+0 Dual Polarization Direct Mount



Note
This procedure can also be used for MultiCore 1+0 DP HW ready for MultiCore 2+0 DP configuration.

List of Items

Table 29 Required items for MultiCore 2+0 Dual Polarization Direct Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	1	
2	PTP 820C OMT kit	1	
3	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

Insertion Loss

Table 30 Insertion loss for MultiCore 2+0 Dual Polarization Direct Mount

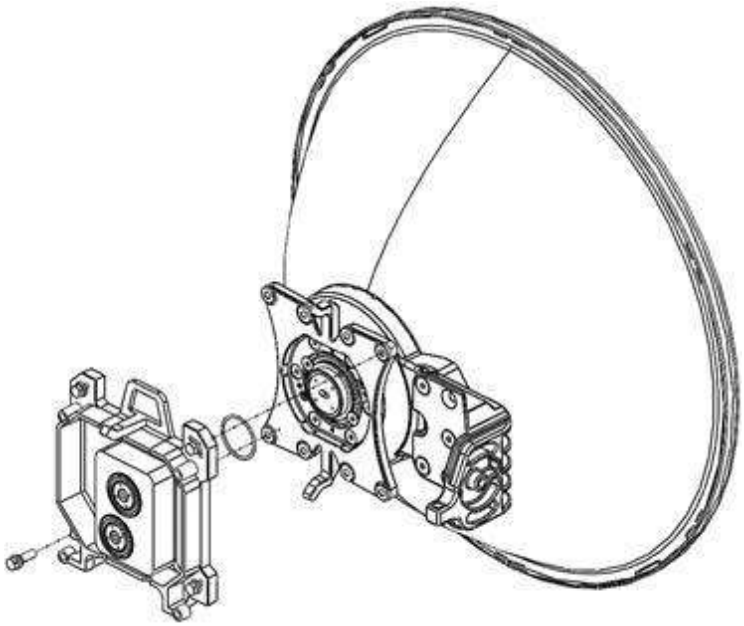
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	1315 GHz	18 GHz	23-26 GHz	28-38 GHz
OMT	Each PTP 820C antenna port to Mediation device antenna port	0.3	0.3	0.3	0.3	0.5	0.5

Procedure

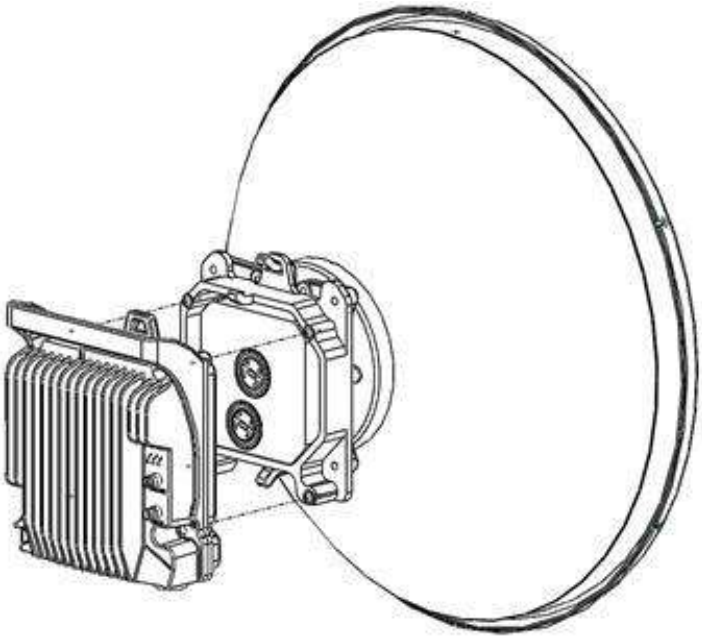
1 Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring and install the circular transition instead.)



2 Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring



3 Connect the PTP 820C radio to the OMT Kit using the four M8 captive screws and washers supplied and tighten the screws.



MultiCore 2+0 Dual Polarization Remote Mount

This procedure is for use with Interface antennas, up to six feet.

For standard interface antennas (six feet and larger), no OMT and no Circ./Circ. Adaptor are used, and the flexible waveguides are connected directly to the antenna flanges. For instructions how to connect the waveguides to the antenna flanges, refer to the antenna vendor's documentation.

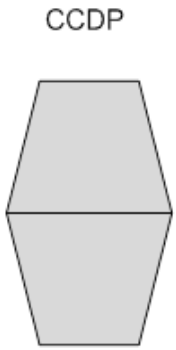
Note

This procedure can also be used for MultiCore 1+0 DP HW ready for MultiCore 2+0 DP configurations.

This procedure can also be used for:

- MultiCore 1+0 DP HW ready for MultiCore 2+0 DP
- Advanced Space Diversity (ASD) (Site 1 – Single Unit)

Figure 21 MultiCore 2+0 Dual Polarization Remote Mount



List of Items

Table 31 List of items for MultiCore 2+0 Dual Polarization Remote Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	1	
2	PTP 820C OMT kit	1	Not used for standard interface antennas (six feet and larger).
3	FLEXIBLE WG KIT	2	
4	PTP 820C DC POLE MOUNT KIT	1	
	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	From 6-13GHz

Item	Description	Quantity	Remarks
	Circ./Circ. Adaptor	1	Per Antenna Vendor. Not used for standard interface antennas (six feet and larger).

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver
- Insertion Loss

Insertion Loss

Table 32 Insertion loss for MultiCore 2+0 Dual Polarization Remote Mount

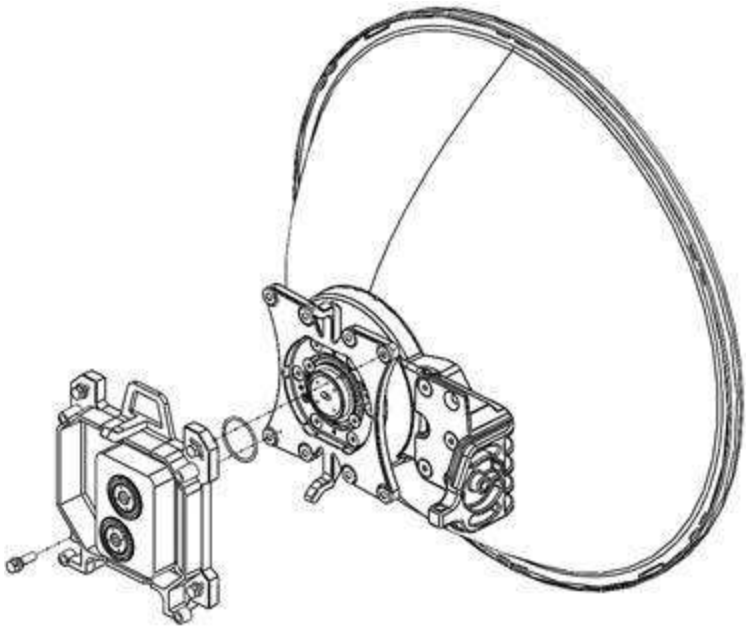
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	1315 GHz	18 GHz	23-26 GHz	28-38 GHz
OMT and two WGs	Each PTP 820C antenna port to Mediation device antenna port	0.8	0.8	1.5	1.5	1.7	2.0

Common Installation

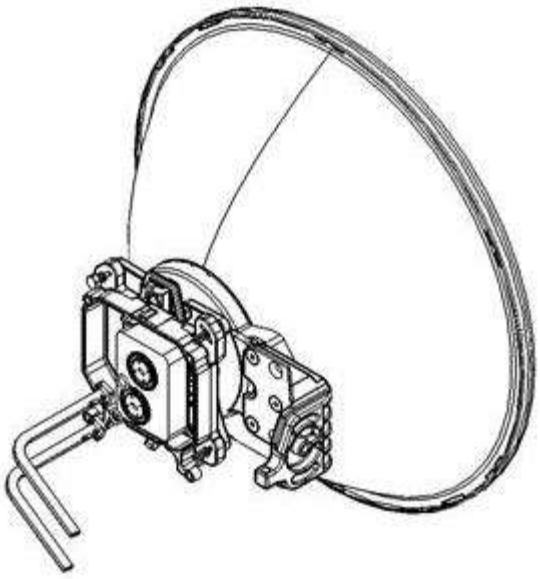
1 Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



2 Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.

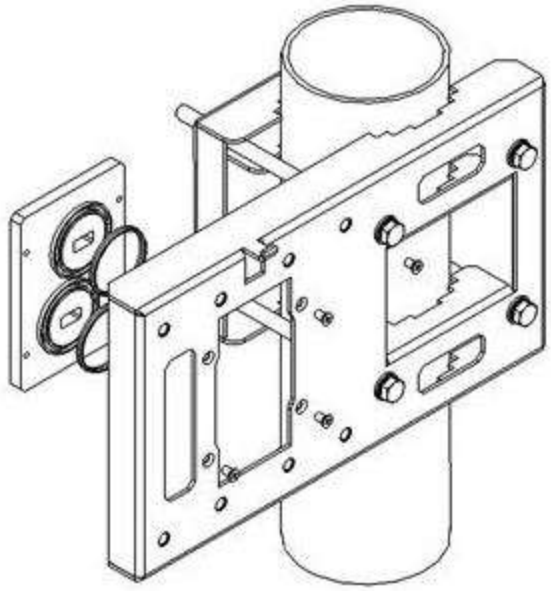


3 Mount and tighten the O-ring and the Flexible WG to PTP 820C OMT ports using the four screws supplied with the Flexible WG kit.

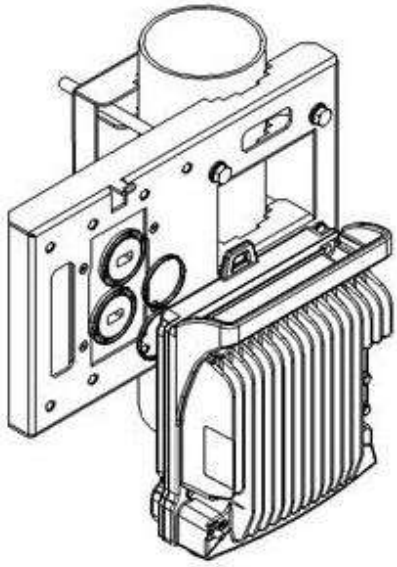


6-13 GHz

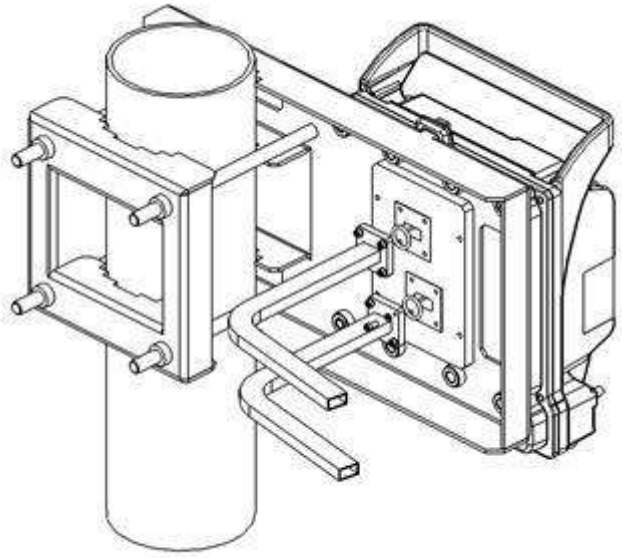
1 Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



2 Mount and tighten the PTP 820C to the PTP 820C Pole Mount using the four captive screws and washers that are supplied with the PTP 820C. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.

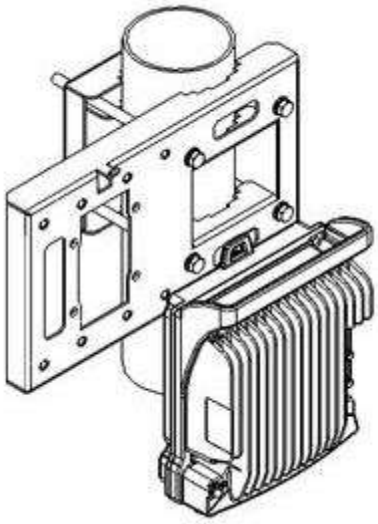


3 Mount and tighten both Flexible WGs with their O-ring to the PTP 820C Remote Mount Adaptor ports using the four screws supplied with each Flexible WG kit.

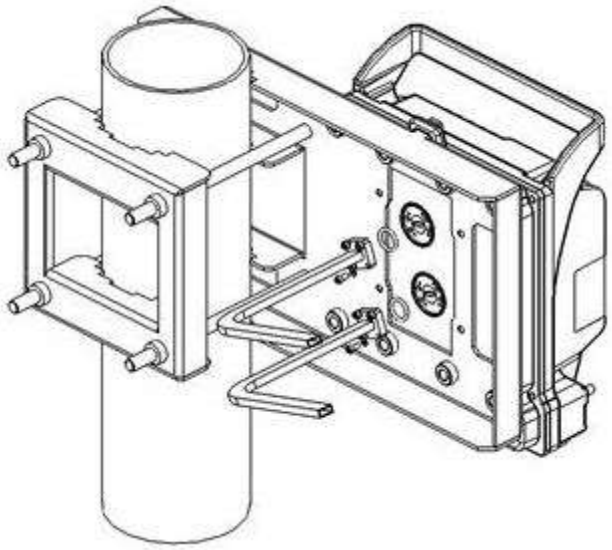


15-38 GHz

1 Mount and tighten the PTP 820C to the PTP 820C DC Pole Mount using the four screws assembled on the PTP 820C.

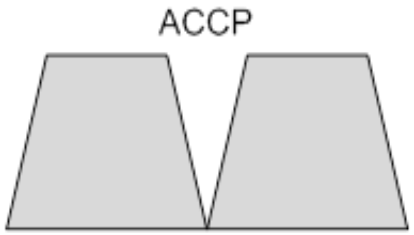


2 Mount and tighten the O-ring and the Flexible WG to PTP 820C radio ports using the four screws supplied with the Flexible WG kit.



MultiCore 2+0 Single Polarization Direct Mount

Figure 18 MultiCore 2+0 Single Polarization Direct Mount



Note
This procedure can also be used for MultiCore 1+0 SP HW ready for MultiCore 2+0 SP configurations.

List of Items

Table 33 Required item for MultiCore 2+0 Single Polarization Direct Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	1	
2	PTP 820C Splitter KIT	1	

Required Tools

- Metric offset hexagon key set
- Phillips #1 and #2 screwdriver

Insertion Loss

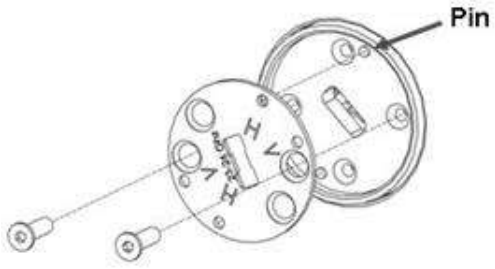
Table 34 Insertion loss for MultiCore 2+0 Single Polarization Direct Mount

Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	1315 GHz	18 GHz	23-26 GHz	28-38 GHz
Splitter	Radio to antenna port	3.5	3.5	3.5	3.7	3.7	4.0

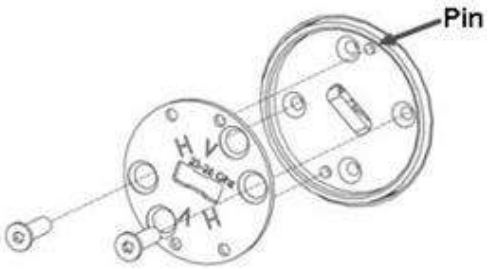
Procedure

1 Adjust the twist on the Splitter Kit. Perform one of the following steps, according to the required polarization (horizontal or vertical).

For horizontal polarization, locate the holes above and below the letter “H” on the pins and fasten the two screws.

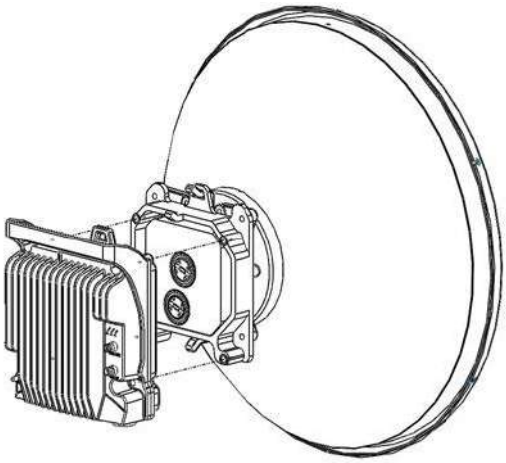


For vertical polarization, locate the holes above and below the letter “V” on the pins and fasten the two screws.



2 Mount and tighten the PTP 820C Splitter Kit on the antenna using the four M8 screws and washers.

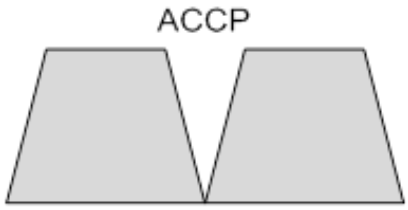
3 Mount and tighten the PTP 820C to the PTP 820C Splitter Kit using the four M8 captive screws and washers supplied.



MultiCore 2+0 Single Polarization Remote Mount

Note
This procedure can also be used for MultiCore 1+0 SP HW ready for MultiCore 2+0 SP configurations.

Figure 22 MultiCore 2+0 Single Polarization Remote Mount



List of Items

Table 35 Required item for MultiCore 2+0 Single Polarization Remote Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	1	
2	RFU-C ADAPTOR REMOTE MOUNT KIT	1	From 6-13 GHz
3	RFU-C POLE MOUNT KIT	1	
4	PTP 820C SPLITTER KIT	1	
5	FLEXIBLE WG KIT	1	

Required Tools

- Metric offset hexagon key wrench set
- Phillips #1, #2 screwdriver
- Metric wrench key set

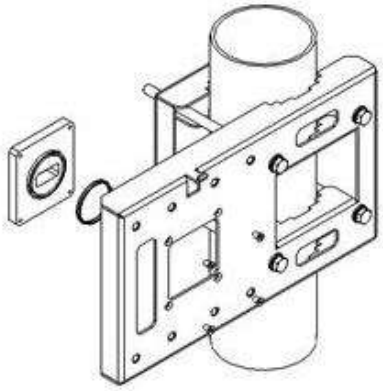
Insertion Loss

Table 36 Insertion loss for MultiCore 2+0 Single Polarization Remote Mount

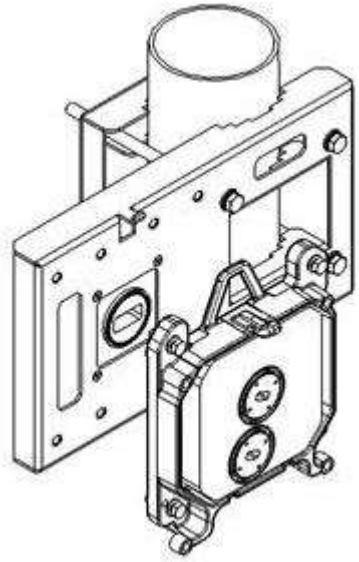
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	1315 GHz	18 GHz	23-26 GHz	28-38 GHz
Splitter and one WG	Radio to antenna port	4.0	4.0	4.7	4.9	5.2	5.5

6-13 GHz

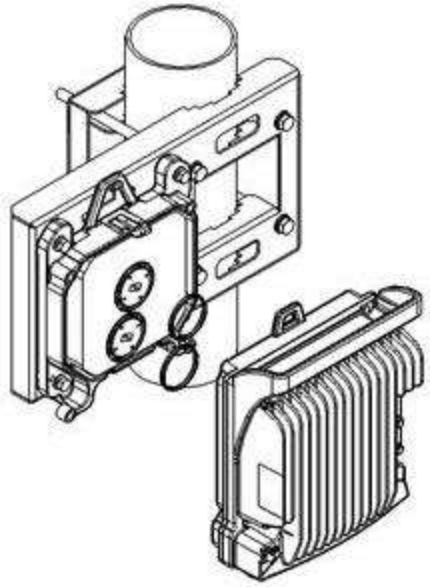
1 Mount and tighten the RFU-C Remote Mount Adaptor plate (supplied in RFU-C Adaptor Remote Mount kit) to the RFU-C Pole Mount using the four flat screws supplied with the RFU-C Adaptor Remote Mount kit.



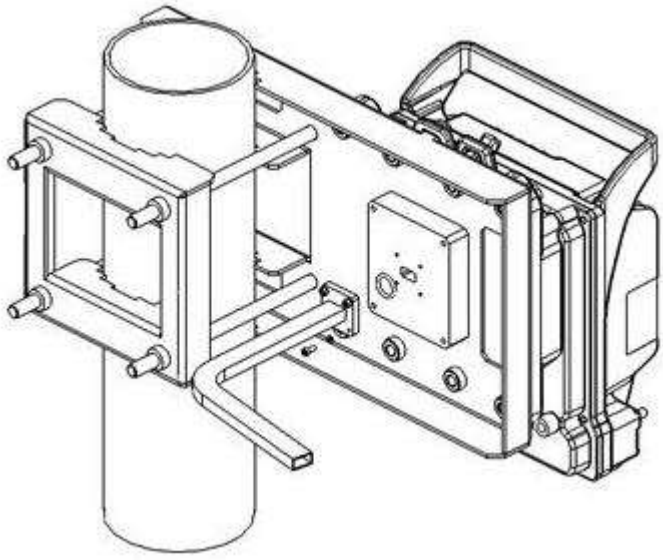
2 Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



3 Mount and tighten the PTP 820C to the PTP 820C Splitter using the four captive screws and washers that are assembled to the PTP 820C radio. Pay attention that the O-rings are mounted on the PTP 820C Splitter kit.

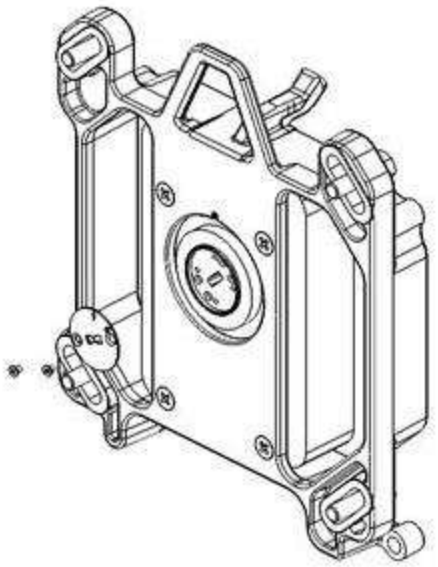


4 Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the Flexible Waveguide Kit.

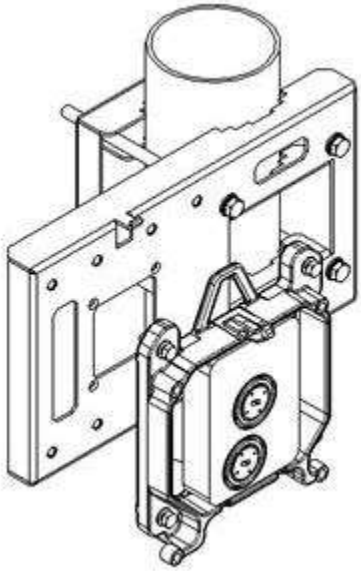


15-38 GHz

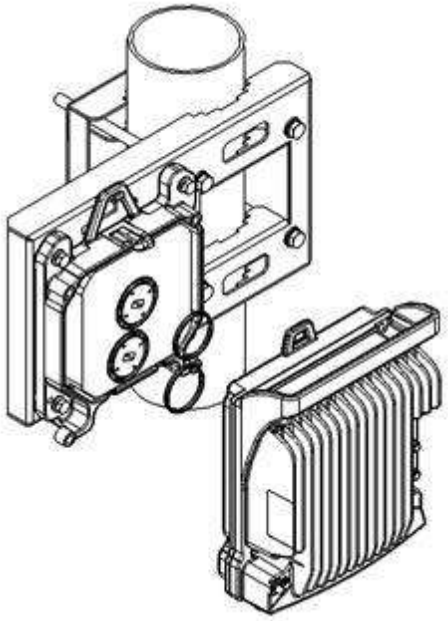
1 Loosen the two screws and remove the twist plate from the PTP 820C Splitter.



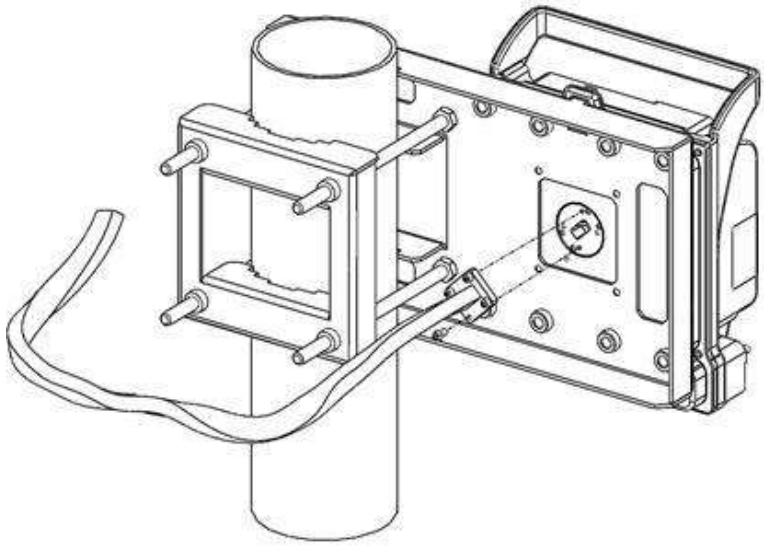
2 Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



3 Mount and tighten the PTP 820C to the PTP 820C Splitter using the four captive screws and washers that are assembled to the PTP 820C. Pay attention that the O-rings are mounted on the PTP 820C Splitter kit.

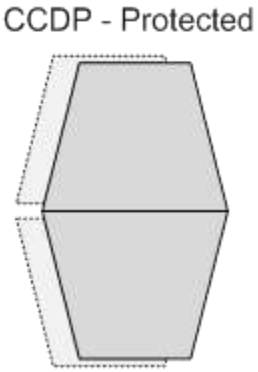


4 Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Kit to the PTP 820C Splitter kit. Tighten the four screws supplied with the Flexible Waveguide kit.



MultiCore 2+2 HSB Double Polarization Direct Mount

Figure 23 MultiCore 2+2 HSB Double Polarization Direct Mount



Note

This procedure can also be used for 2 x MultiCore 1+1 HSB DP HW ready for MultiCore 2+2 HSB DP configurations.

List of Items

Table 37 Required items for MultiCore 2+2 HSB Double Polarization Direct Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	2	
2	PTP 820C OMT KIT	1	
3	PTP 820C DUAL COUPLER KIT	1	
4	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

Insertion Loss

Table 38 Insertion loss for MultiCore 2+2 HSB Double Polarization Direct Mount

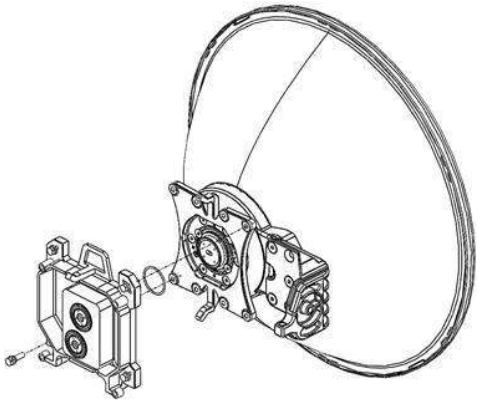
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	1315 GHz	18 GHz	23-26 GHz	28-38 GHz
Splitter and one WG	Main Paths	1.6	1.6	1.6	1.9	1.9	2.5
	Secondary Paths	6.2	6.2	6.2	6.3	6.3	6.5

Procedure

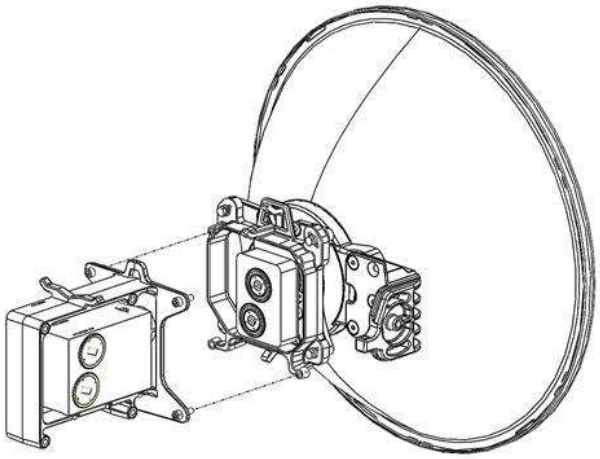
1 Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



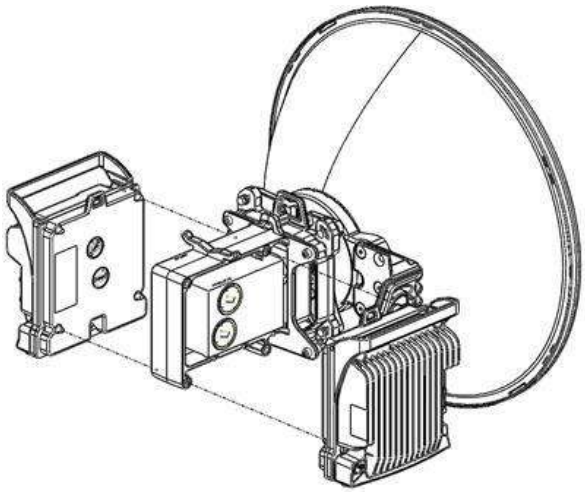
2 Connect the PTP 820C OMT Kit to the antenna and secure it with four screws. Verify existence of the O-ring.



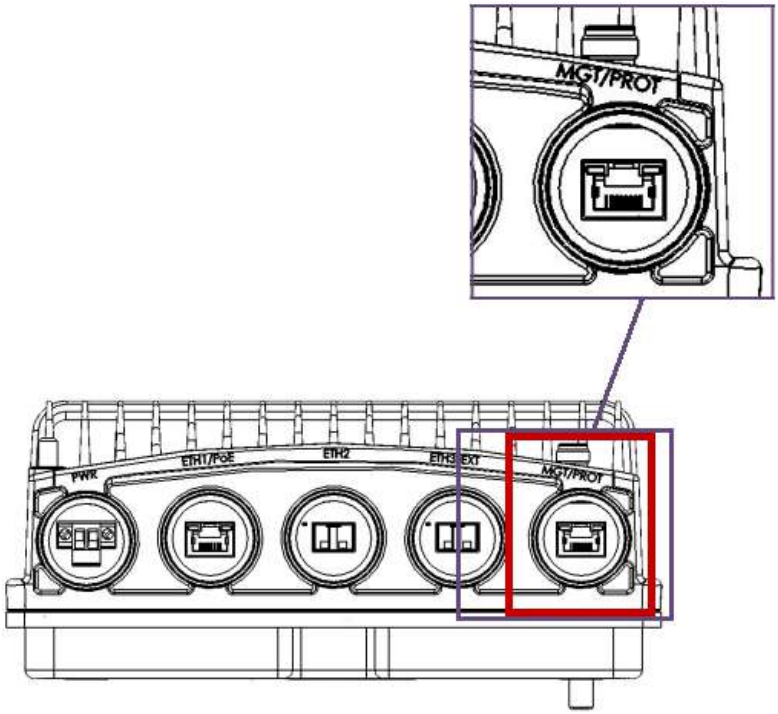
3 Connect the PTP 820C Dual Coupler Kit to the OMT Kit using four M8 screws and washers, and tighten the screws.



4 Mount and tighten the PTP 820C radio unit to both sides of the Dual Coupler Kit using the supplied captive screws and washers. Pay attention that the O-rings are correctly mounted on the radio ports of the PTP 820C Dual Coupler.



5 Connect the MIMO signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable. *(See preparing a MIMO/ protection signaling cable on page 3-35)*

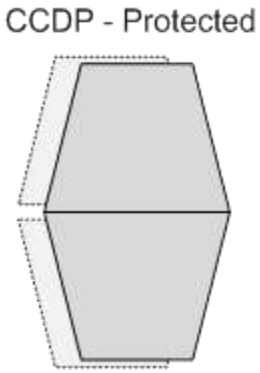


MultiCore 2+2 HSB Double Polarization Remote Mount

Note

This procedure can also be used for 2 x MultiCore 1+1 HSB DP HW ready for MultiCore 2+2 HSB DP configurations.

Figure 24 MultiCore 2+2 HSB Double Polarization Remote Mount



List of Items

Table 39 Required items for MultiCore 2+2 HSB Double Polarization Remote Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	2	
2	PTP 820C OMT KIT	1	
3	PTP 820C DUAL COUPLER KIT	1	
4	FLEXIBLE WG KIT	2	
5	PTP 820C DC POLE MOUNT KIT	1	
6	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	From 6-13GHz
7	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor.

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

- Phillips #1 , #2 screwdriver

Insertion Loss

Table 40 Insertion loss for MultiCore 2+2 HSB Double Polarization Remote Mount

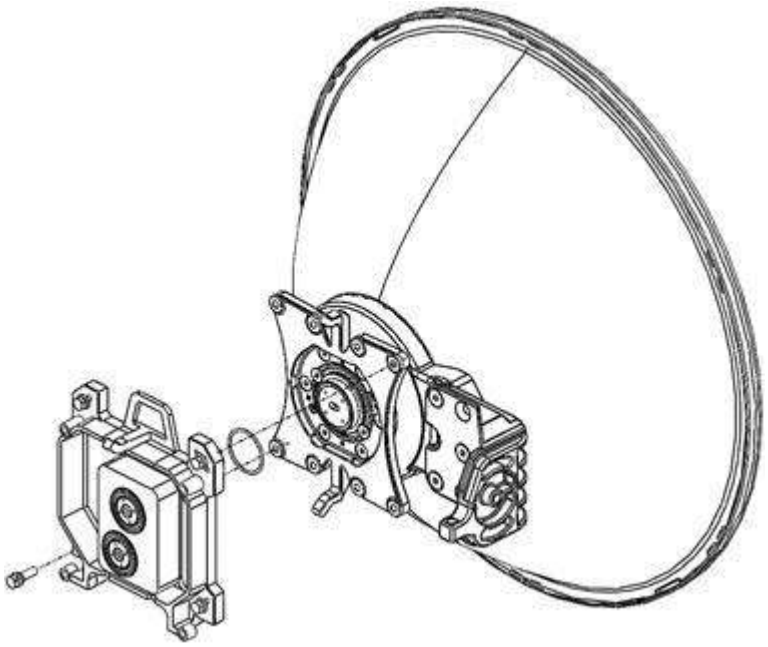
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Coupler, OMT and two WGs	Main Paths	2.1	2.1	2.8	3.1	3.4	4
	Secondary Paths	6.7	6.7	7.4	7.5	7.8	8

Common Installation

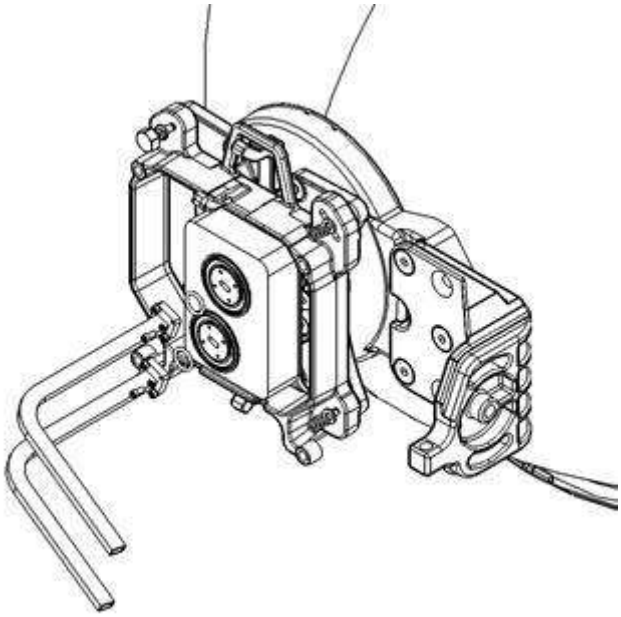
1 Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



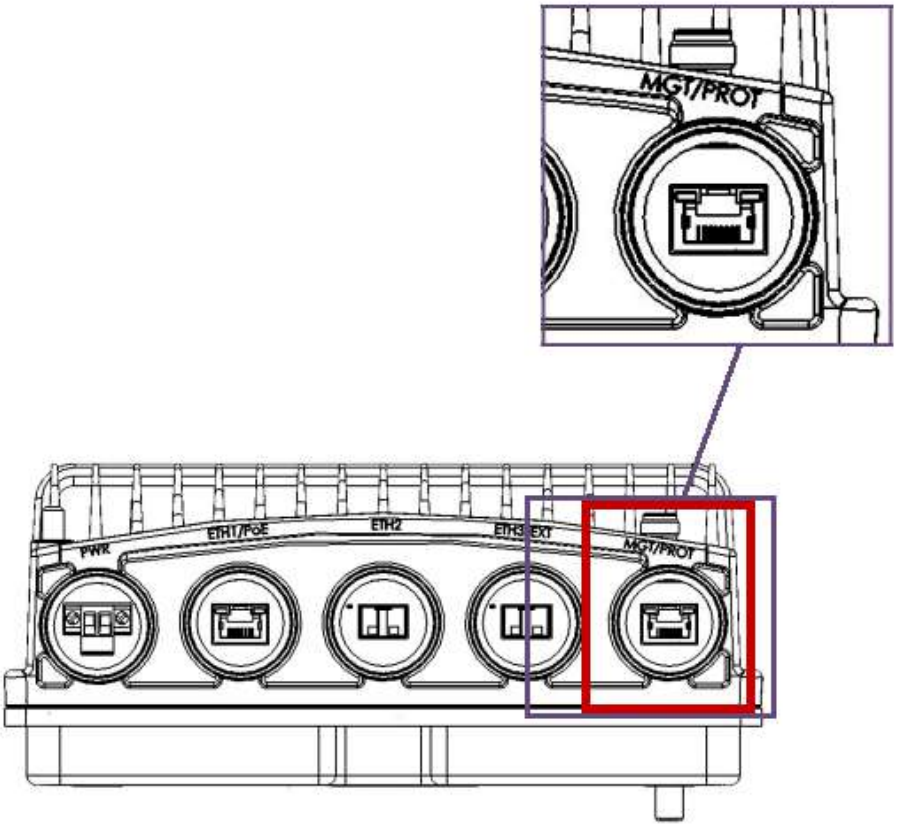
2 Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.



3 Mount and tighten the O-ring and the Flexible WG to PTP 820C OMT ports using the four screws supplied with the Flexible WG kit.

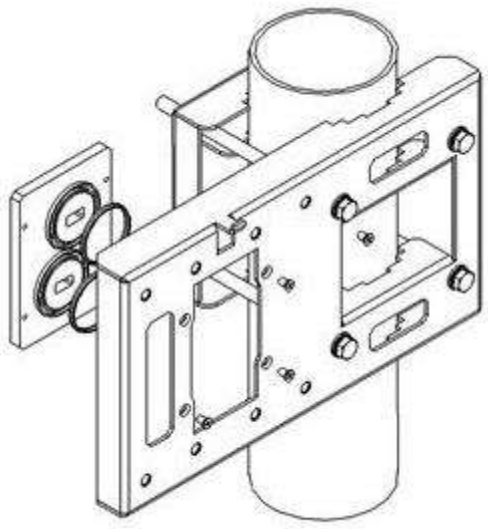


4 Connect the protection signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, *refer to* Preparing a MIMO/ Protection signaling cable *on page 3-35.*

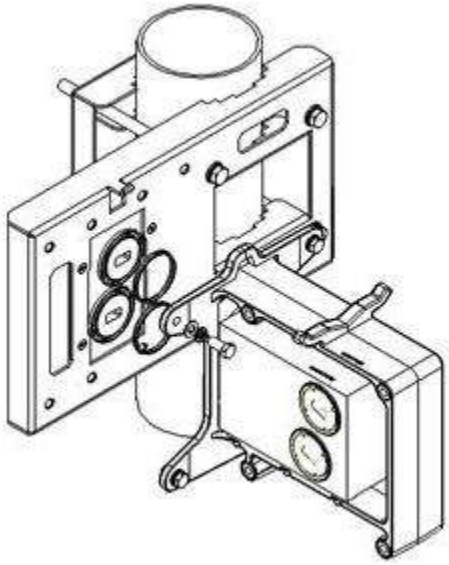


6-13 GHz

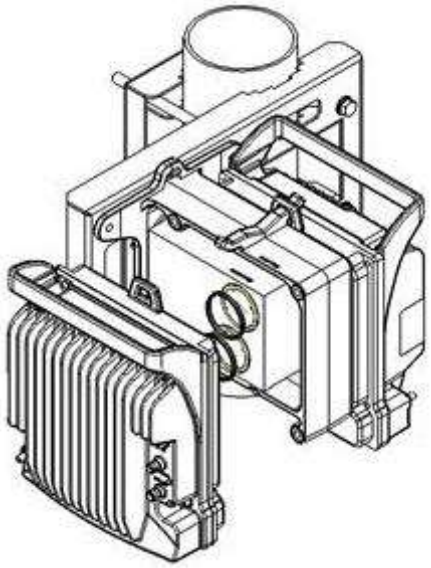
1 Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



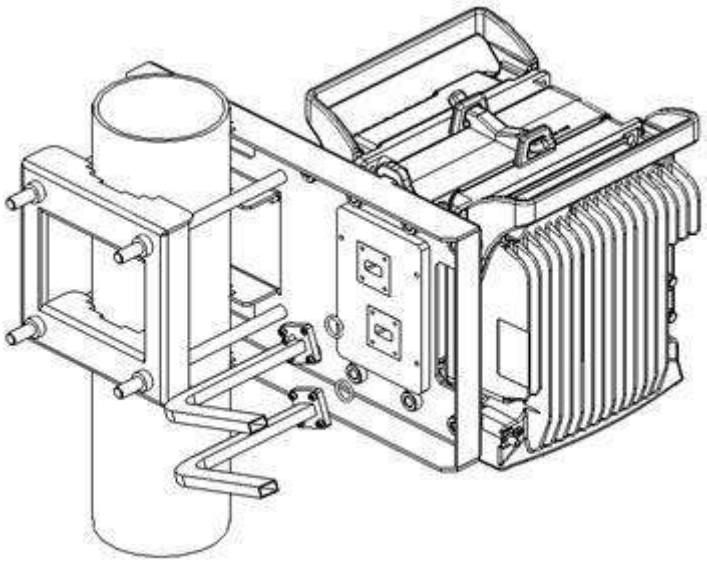
2 Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3 Mount and tighten the PTP 820C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 820C radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual coupler.

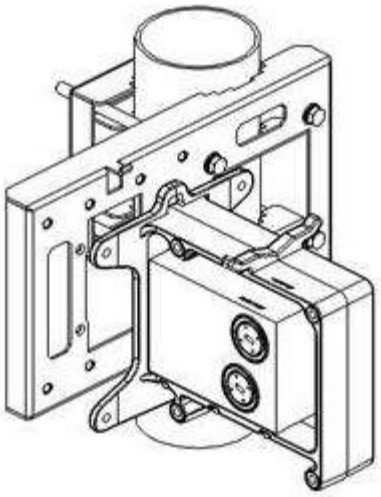


4 Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

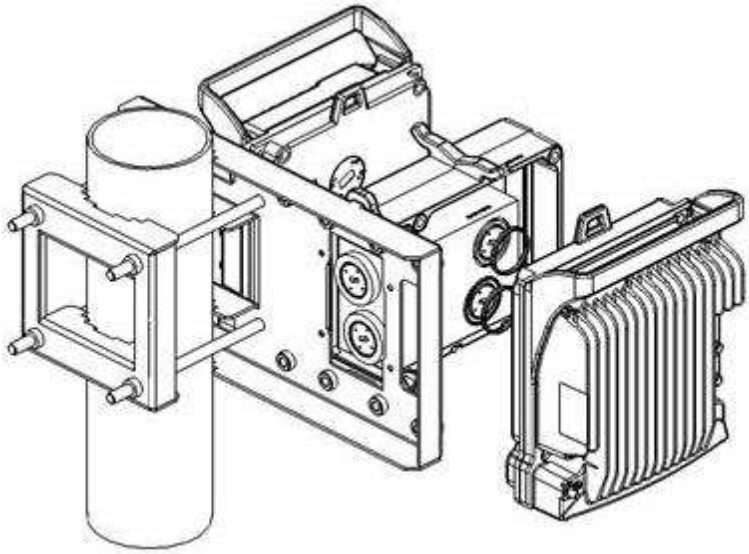


15-38 GHz

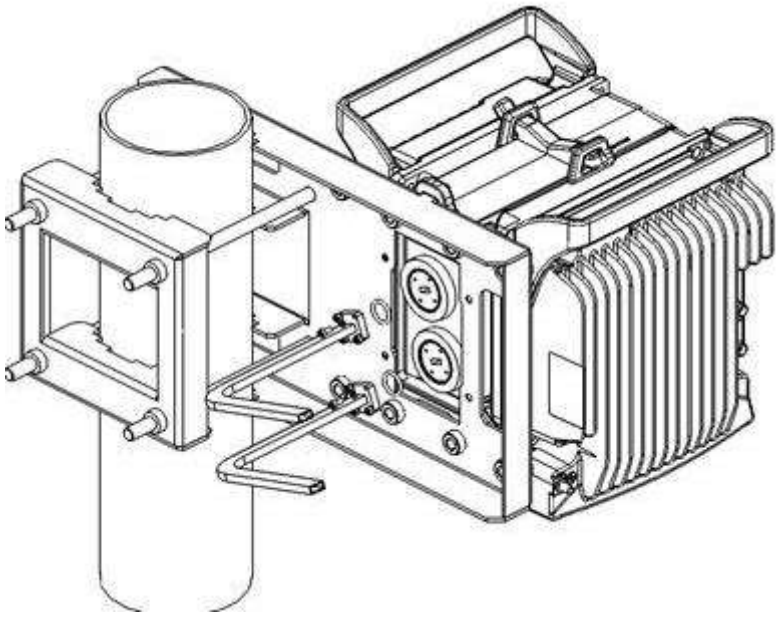
1 Mount and tighten the PTP 820C Dual Coupler to PTP 820C DC Pole Mount using the four screws and washers supplied with PTP 820C Dual Coupler kit.



2 Mount and tighten the PTP 820C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 820c radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual coupler.

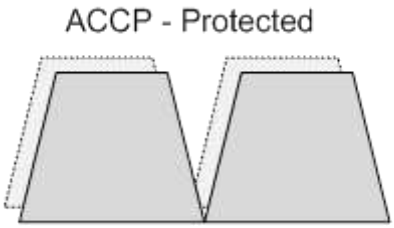


3 Mount the O-ring and the Flexible WG to PTP 820C Dual Coupler ports using the four screws supplied with the Flexible WG kit.



MultiCore 2+2 HSB Single Polarization Direct Mount

Figure 25 MultiCore 2+2 HSB Single Polarization Direct Mount



Note

This procedure can also be used for 2 x MultiCore 1+1 HSB SP HW ready for MultiCore 2+2 HSB SP configurations.

List of Items

Table 41 Required items for MultiCore 2+2 HSB Single Polarization Direct Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	2	
2	PTP 820C SPLITTER KIT	1	
3	DUAL COUPLER KIT	1	

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1 screwdriver

Insertion Loss

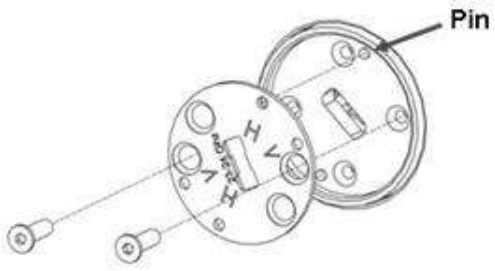
Table 42 Insertion loss for MultiCore 2+2 HSB Single Polarization Direct Mount

Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Coupler and Splitter	Main Paths	4.9	4.9	4.9	5.3	5.3	6
	Secondary Paths	9.5	9.5	9.5	9.7	9.7	10

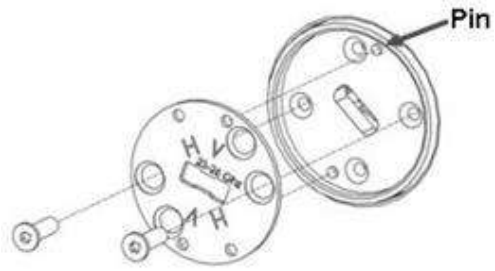
Procedure

1 Adjust the twist on the Splitter Kit. Perform one of the following steps, according to the required polarization (horizontal or vertical).

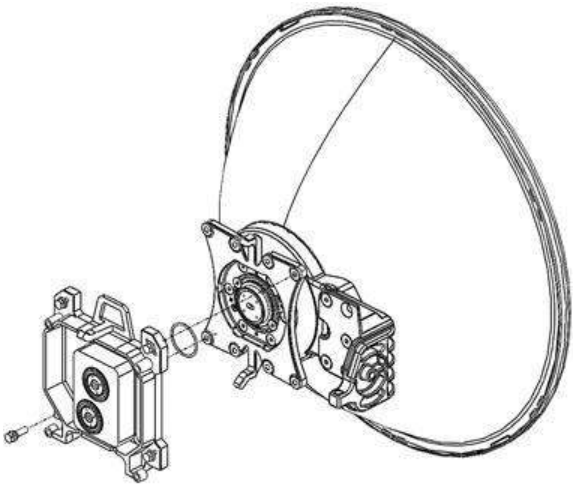
For horizontal polarization, locate the holes above and below the letter “H” on the pins and fasten the two screws.



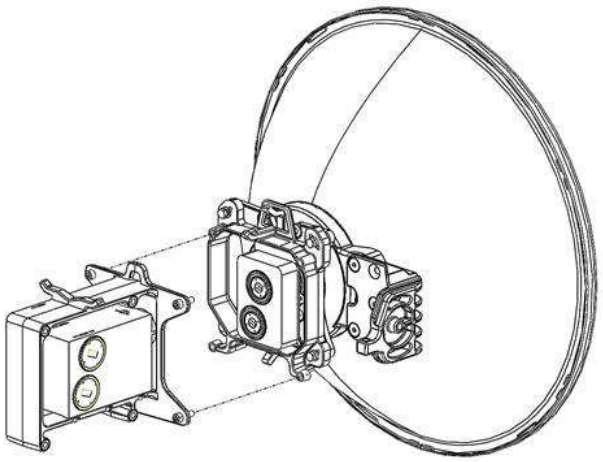
For vertical polarization, locate the holes above and below the letter “V” on the pins and fasten the two screws.



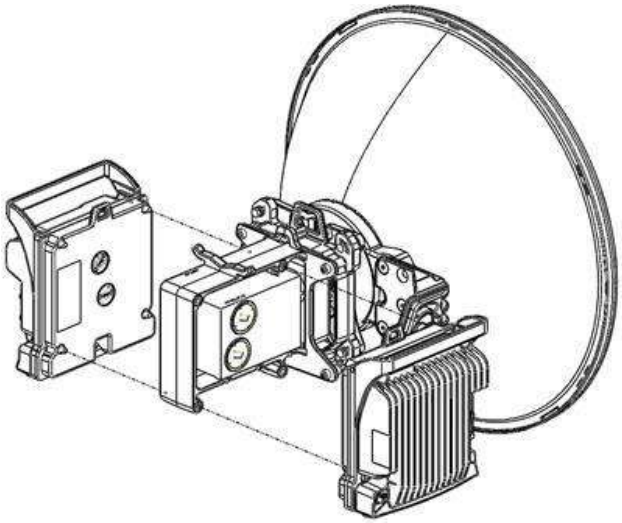
2 Mount the Splitter Kit on the antenna using four M8 screws and washers and tighten the screws.



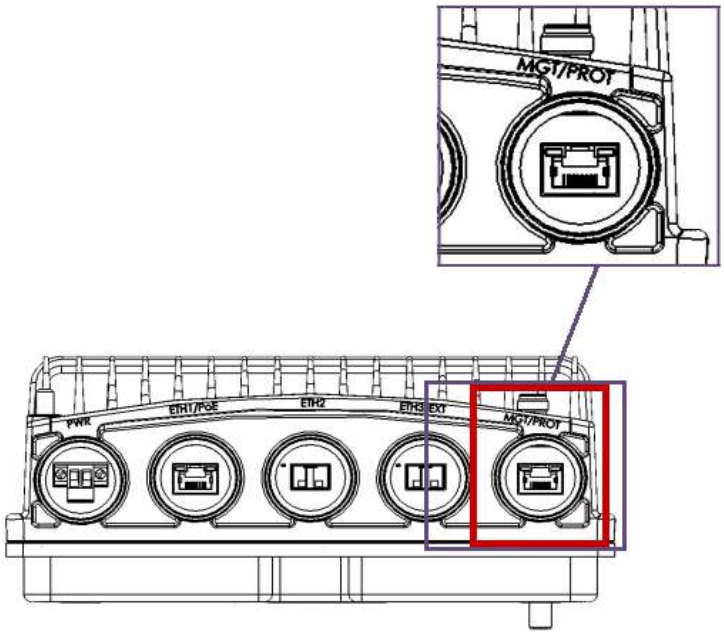
3 Connect the PTP 820C Dual Coupler Kit to the PTP 820C Splitter Kit using four M8 screws and washers and tighten the screws.



4 Connect the PTP 820C radio unit to both sides of the Dual Coupler Kit using the supplied captive screws and washers and tighten the screws.



5 Connect the protection signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, *see* Preparing a MIMO/ Protection signaling cable *on page 3-35*.

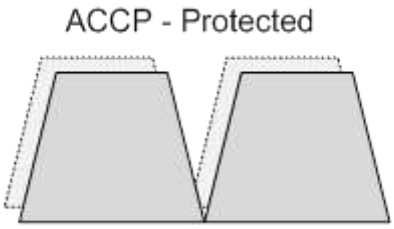


MultiCore 2+2 HSB Single Polarization Remote Mount

Note

This procedure can also be used for 2 x MultiCore 1+1 HSB SP HW ready for 2+2 HSB SP configuration.

Figure 26 MultiCore 2+2 HSB Single Polarization Remote Mount



List of Items

Table 43 Required items for MultiCore 2+2 HSB Single Polarization Remote Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	2	
2	PTP 820C SPLITTER KIT	1	
3	PTP 820C DUAL COUPLER KIT	1	
4	FLEXIBLE WG KIT	2	
5	RFU-C POLE MOUNT KIT	1	
6	RFU-C REMOTE MOUNT ADAPTOR	1	From 6-13 GHz.

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

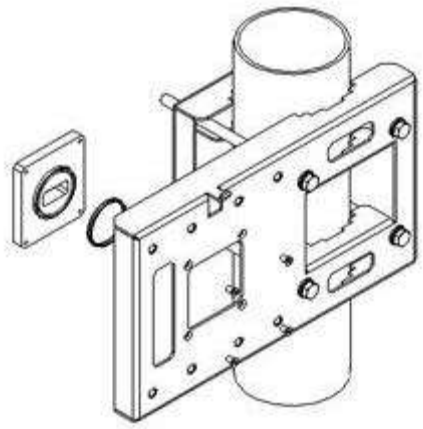
Insertion Loss

Table 44 Insertion loss for MultiCore 2+2 HSB Single Polarization Remote Mount

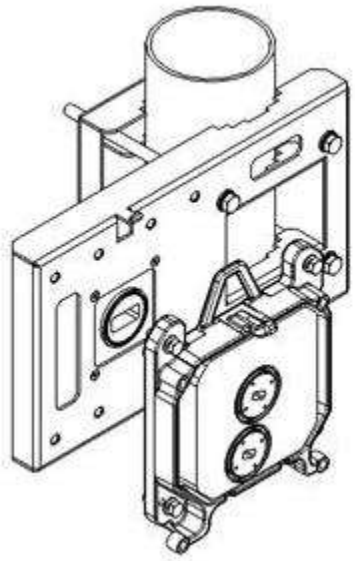
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	1315 GHz	18 GHz	23-26 GHz	28-38 GHz
Splitter and one WG	Main Paths	5.4	5.4	6.1	6.5	6.8	7.5
	Secondary Paths	10	10	10.7	10.9	11.2	11.5

6-13 GHz

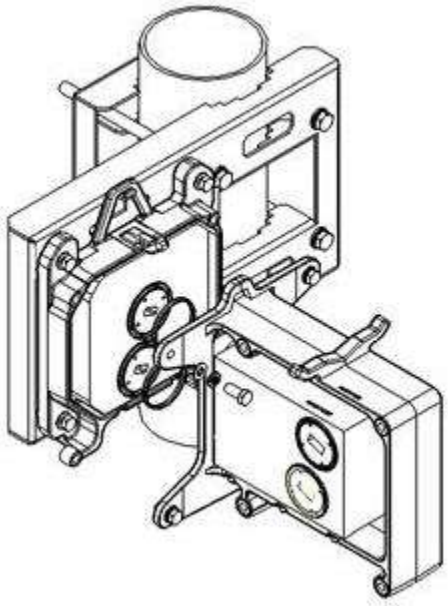
1 Mount and tighten the RFU-C Remote Mount Adaptor plate (supplied in RFU-C Adaptor Remote Mount kit) to the RFU-C Pole Mount using the four flat screws supplied with the RFU-C Adaptor Remote Mount kit.



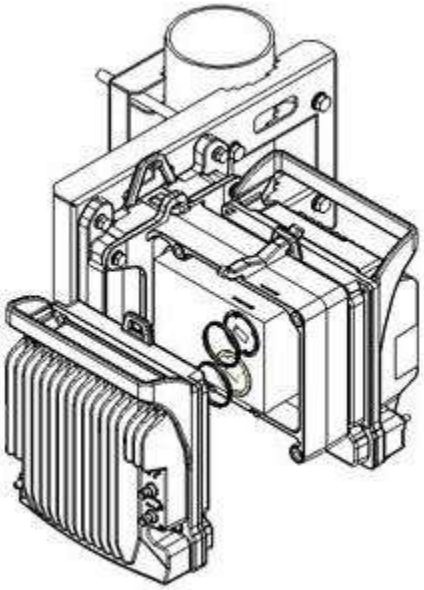
2 Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



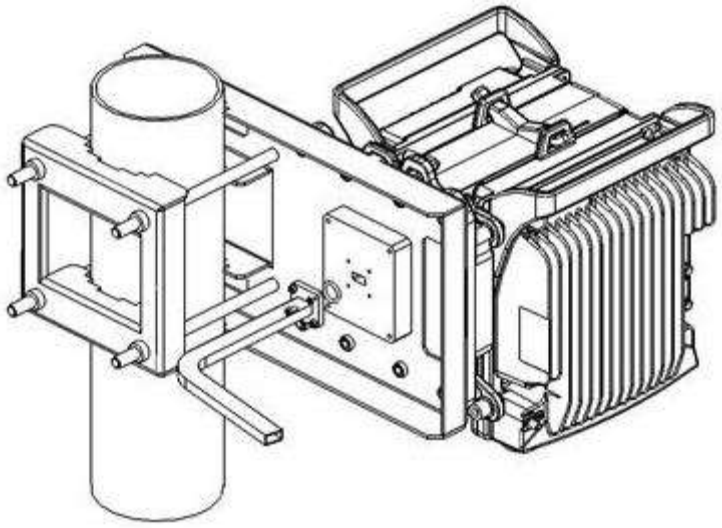
3 Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Splitter using the four captive screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Splitter.



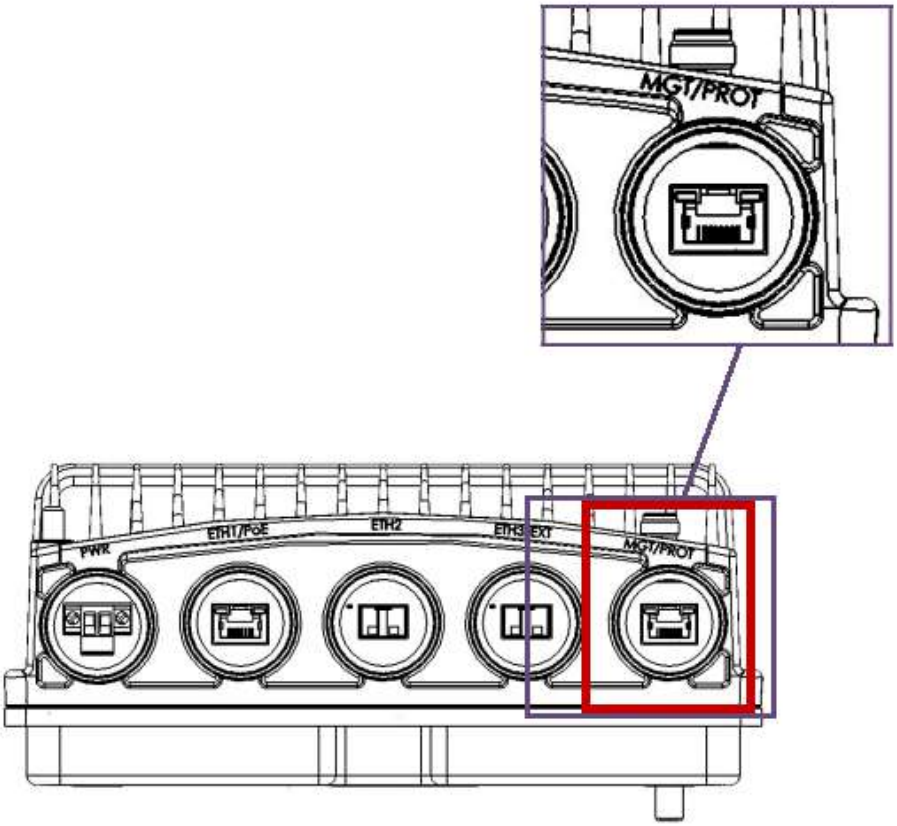
4 Mount and tighten the PTP 820C Radio to the PTP 820C Dual Coupler using the four screws and washers that are assembled to the PTP 820C Radio. Pay attention that the O-rings are mounted on the PTP 820C Dual Coupler.



5 Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the Flexible Waveguide Kit.

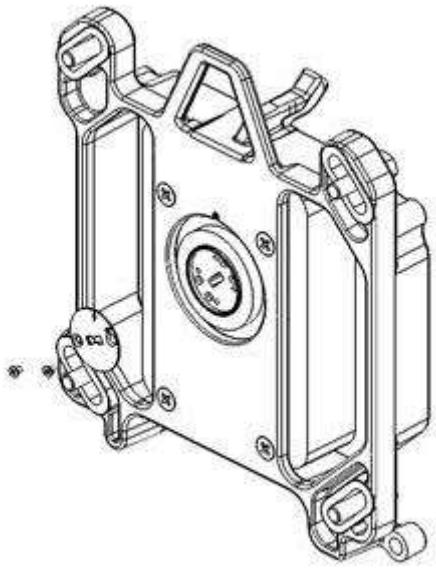


6 Connect the protection signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, *refer to preparing a MIMO protection signalling cable on page 3-35.*

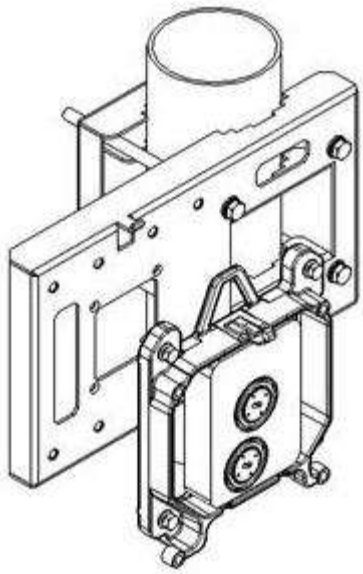


15-38 GHz

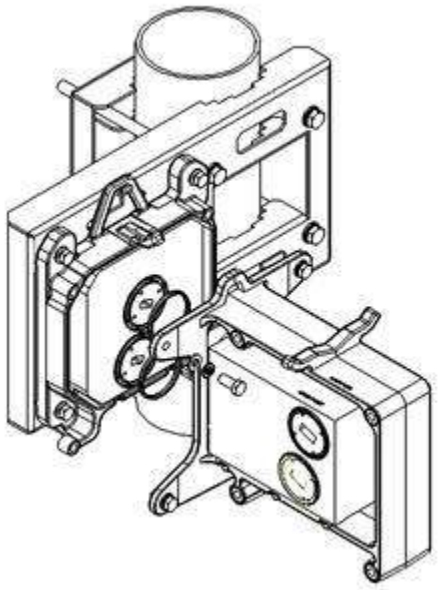
1 Loosen the two screws, and remove the twist plate from the PTP 820C Splitter.



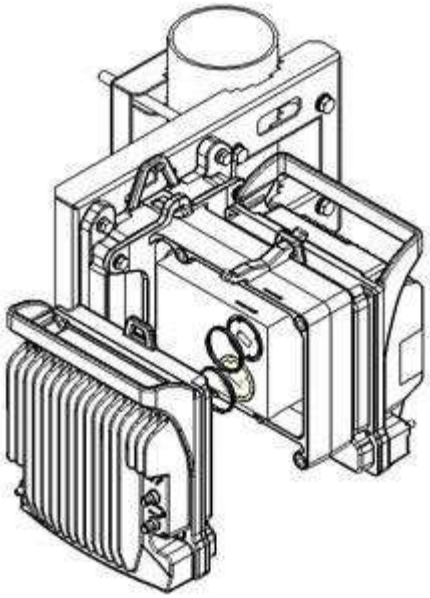
2 Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



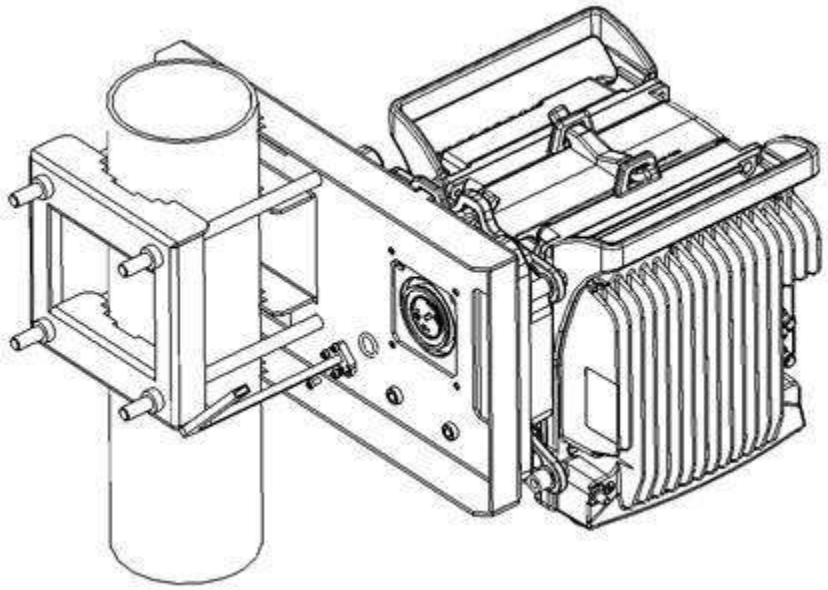
3 Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Splitter using the four captive screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Splitter.



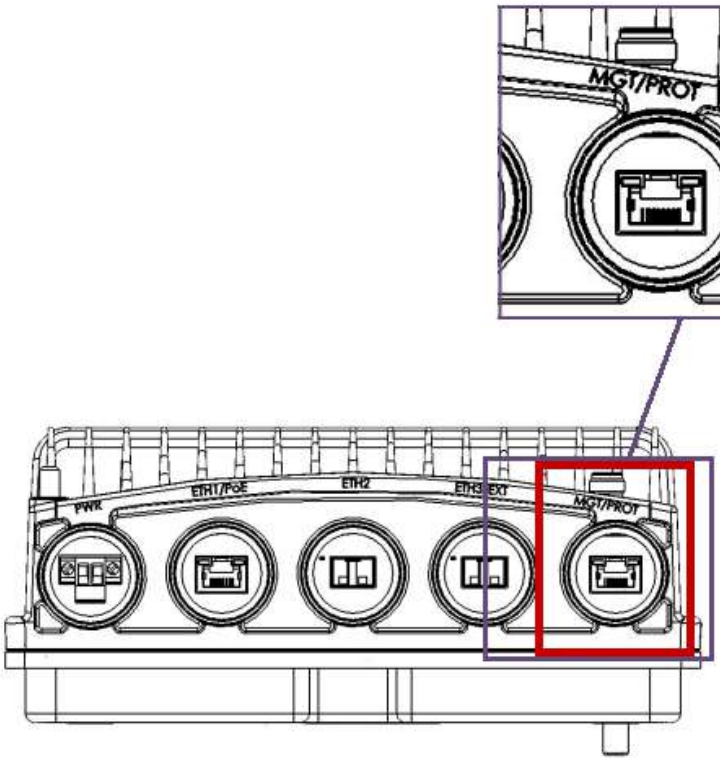
4 Mount and tighten the PTP 820C Radio to the PTP 820C Dual Coupler using the four screws and washers that are assembled to the PTP 820C radio. Pay attention that the O-rings are mounted on the PTP 820C Dual Coupler.



5 Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna port. Tighten the four screws supplied with the Flexible Waveguide kit.

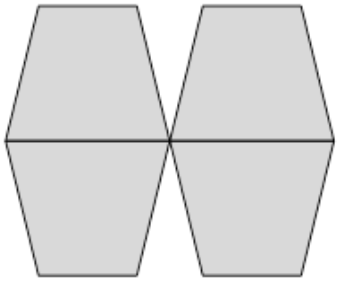


6 Connect the protection signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, refer to *Preparing a MIMO/ Protection signaling cable on page* 3-35



2 x MultiCore 2+0 Dual Polarization Direct Mount

Figure 27 2 x MultiCore 2+0 Dual Polarization Direct Mount



Note
This procedure can also be used for MultiCore 2+0 DP HW ready for 2 x MultiCore 2+0 DP configurations.

List of Items

Table 45 Required items for 2 x MultiCore 2+0 Dual Polarization Direct Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	2	
2	PTP 820C OMT KIT	1	
3	PTP 820C DUAL COUPLER or SPLITTER KIT	1	
4	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

Insertion Loss

Table 46 Insertion loss for 2 x MultiCore 2+0 Dual Polarization Direct Mount

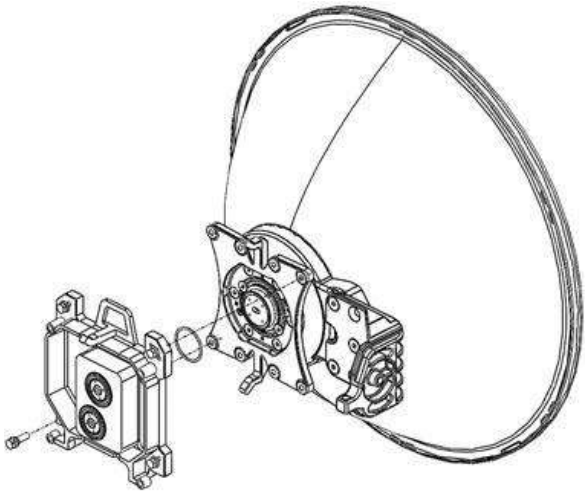
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Splitter and OMT	Radio to antenna port	3.8	3.8	3.8	4	4.2	4.5

Procedure

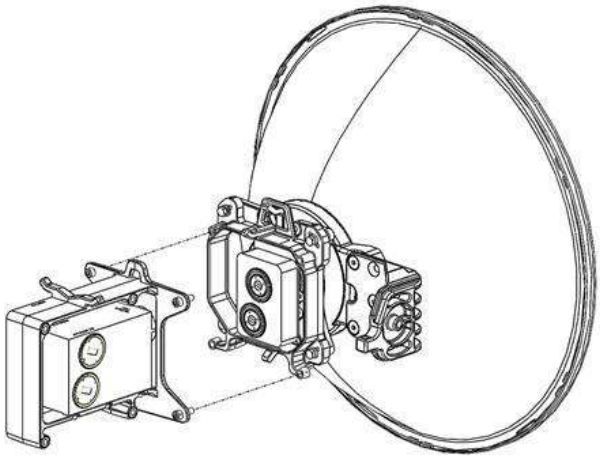
1 Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



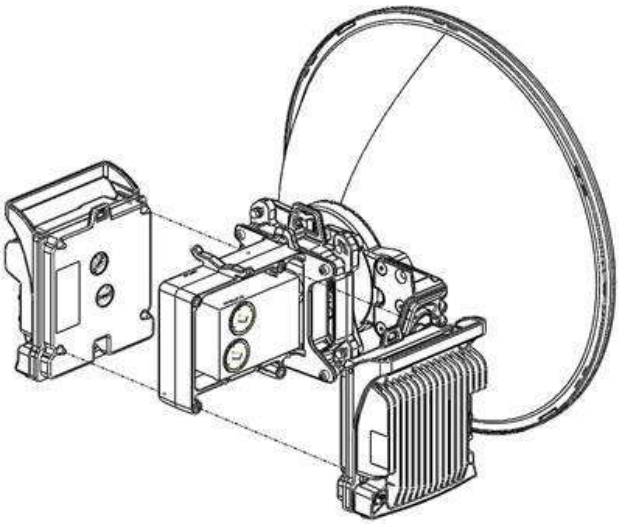
2 Connect the PTP 820C OMT Kit to the antenna and secure it with four screws. Verify existence of the O-ring.



3 Connect the PTP 820C Dual Coupler Kit to the OMT Kit using four M8 screws and washers, and tighten the screws.



4 Mount and tighten the PTP 820C DC radio unit to both sides of the PTP 820C Dual Coupler using the supplied captive screws and washers. Pay attention that the O-rings are correctly mounted on the radio ports of the PTP 820C Dual Coupler.

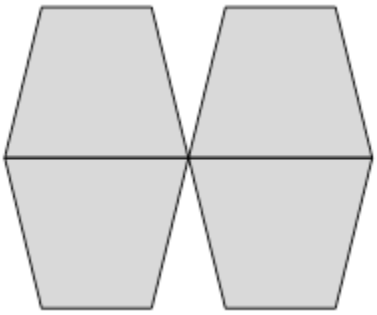


2 x MultiCore 2+0 Dual Polarization Remote Mount

Note

This procedure can also be used for 2 x MultiCore 1+0 DP HW ready for 2 x MultiCore 2+0 DP configurations.

Figure 28 2 x MultiCore 2+0 Dual Polarization Remote Mount



List of Items

Table 47 Required items for MultiCore 2+0 HSB Dual Polarization Remote Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	2	
2	PTP 820C OMT KIT	1	
3	PTP 820C DUAL COUPLER OR DUAL SPLITTER KIT	1	
4	FLEXIBLE WG KIT	2	
5	PTP 820C DC POLE MOUNT KIT	1	
6	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	From 6-13GHz
7	CIRC./CIRC. ADAPTOR	1	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1 , #2 screwdriver

Insertion Loss

Table 48 Insertion loss for MultiCore 2+0 Dual Polarization Remote Mount

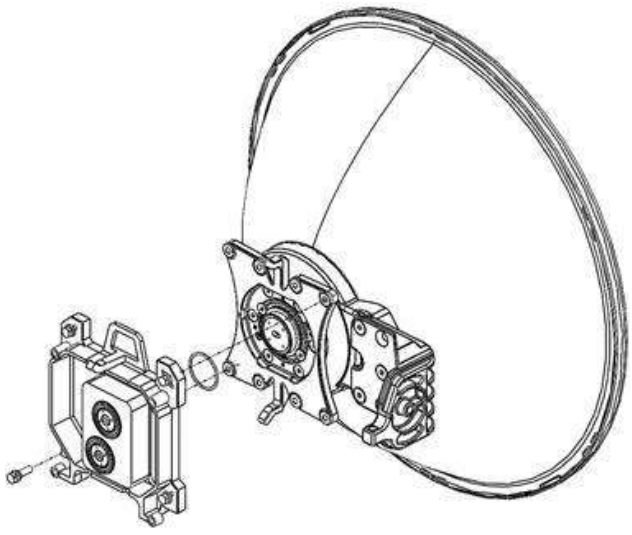
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Splitter, OMT and two WGs	Radio to antenna port	4.3	4.3	5	5.2	5.7	6

Common Installation Procedure

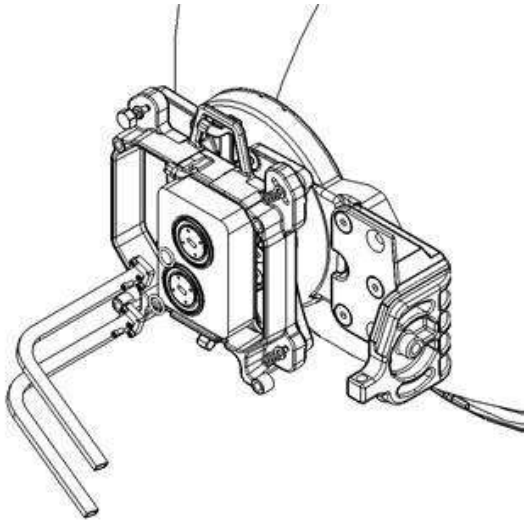
1 Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)



2 Connect the OMT Kit to the antenna and secure it with four screws. Verify the existence of the O-ring.

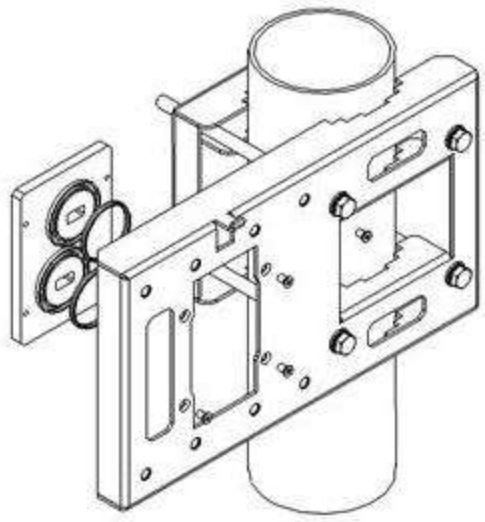


3 Mount and tighten the O-ring and the Flexible WG to PTP 820C OMT ports using the four screws supplied with the Flexible WG kit.

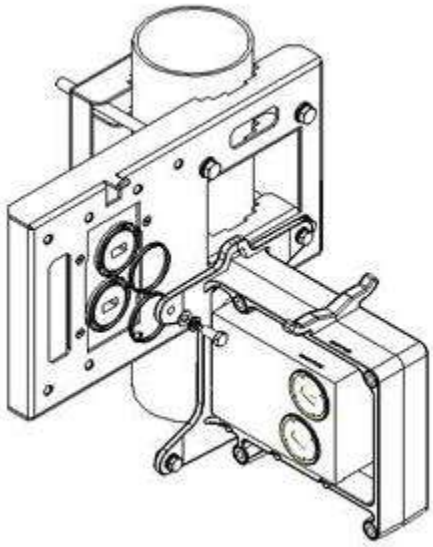


6-13 GHz

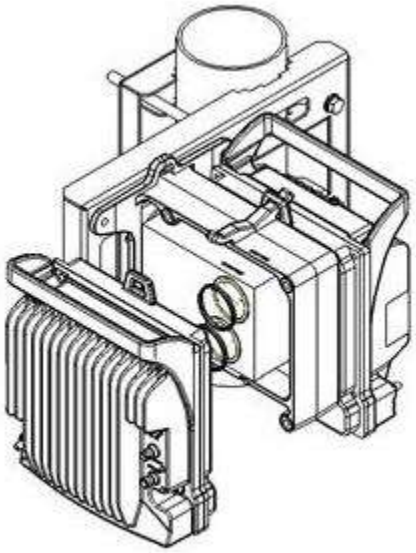
1 Mount and tighten the PTP 820-C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



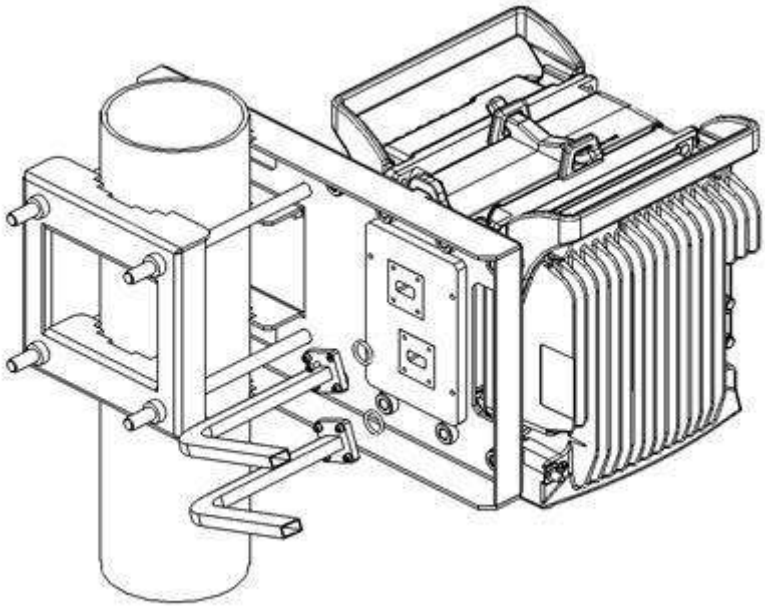
2 Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3 Mount and tighten the PTP 820C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 820C radio. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.

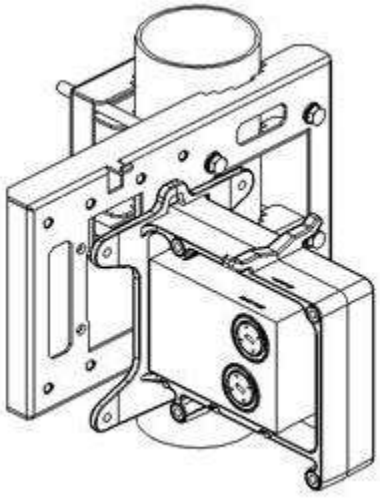


4 Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

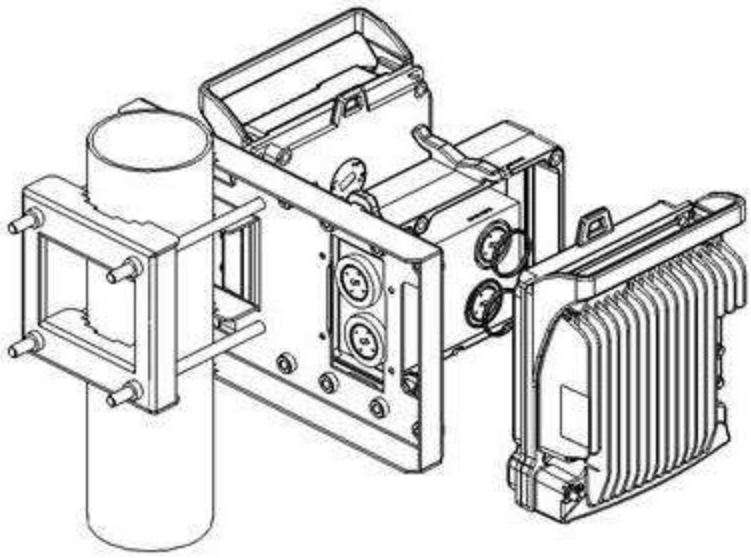


15-38 GHz

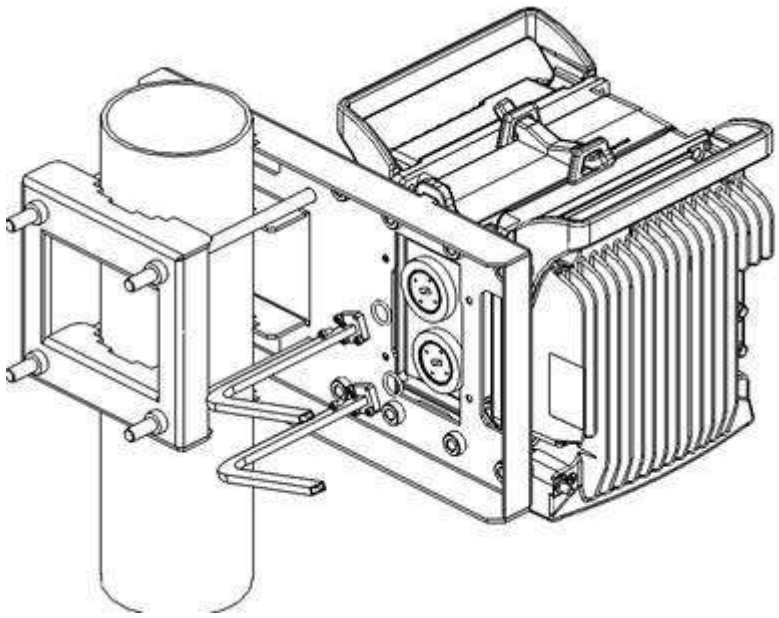
1 Mount and tighten the PTP 820C Dual Coupler to PTP 820C DC Pole Mount using the four screws and washers supplied with PTP 820C Dual Coupler kit.



2 Mount and tighten the PTP 820C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 820C radio. Pay attention that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.

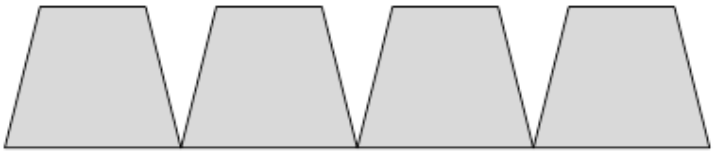


3 Mount the O-ring and the Flexible WG to PTP 820C Dual Coupler ports using the four screws supplied with the Flexible WG kit.



2 x MultiCore 2+0 Single Polarization Direct Mount

Figure 29 2 x MultiCore 2+0 Single Polarization Direct Mount



Note

This procedure can also be used for 2 x MultiCore 1+0 SP HW ready for 2 x MultiCore 2+0 SP configurations.

List of Items

Table 49 Required items for 2 x MultiCore 2+0 Single Polarization Direct Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	2	
2	PTP 820C Splitter Kit	1	
3	PTP 820C Dual Splitter Kit	1	

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1 screwdriver

Insertion Loss

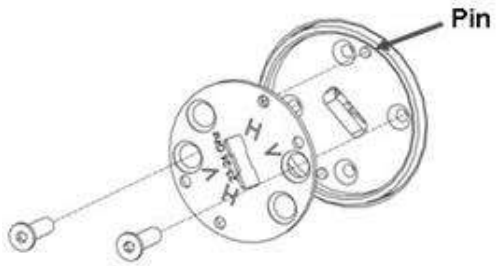
Table 50 Insertion loss for 2 x MultiCore 2+0 Single Polarization Direct Mount

Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Double Splitter and splitter	Radio to antenna port	7	7	7	7.4	7.4	8

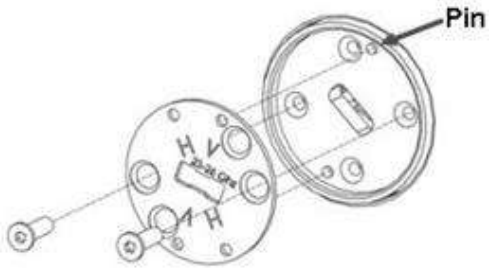
Procedure

1 Adjust the twist on the PTP 820C Splitter Kit. Perform one of the procedures below according to the required polarization:

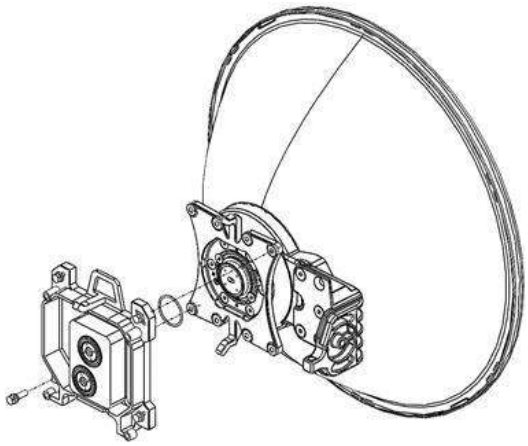
Horizontal polarization, locate the holes above and below the letter “H” on the pins and fasten the two screws.



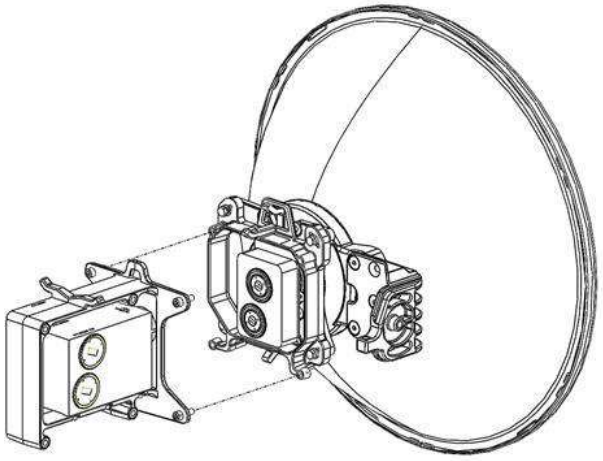
Vertical polarization, locate the holes above and below the letter “V” on the pins and fasten the two screws.



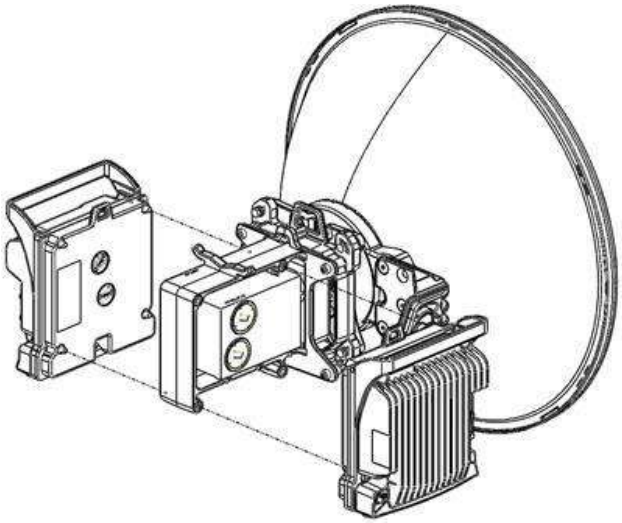
2 Mount the Splitter Kit on the antenna using four M8 screws and washers and tighten the screws.



3 Connect the PTP 820C Dual Coupler Kit to the PTP 820C Splitter Kit using four M8 screws and washers and tighten the screws.

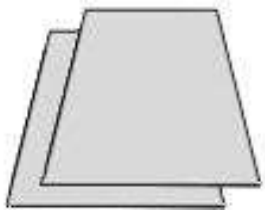


4 Connect the PTP 820C radio unit to both sides of the Dual Coupler Kit using the supplied captive screws and washers and tighten the screws.



2x2 LoS MIMO Direct Mount

Figure 30 2x2 LoS MIMO Direct Mount



Note
This procedure can also be used for 1+0 SD configurations.

List of Items

Table 51 Required items for 2x2 LoS MIMO Direct Mount

Item	Description	Quantity	Remarks
1	PTP 820C Radio	1	
2	PTP 820C Dual Core Kit	1	
3	Flexible WG Kit	1	Optional
4	Coax to WG Kit	1	Optional

Required Tools

- Metric offset hexagon key set
- Phillips #1 and #2 screwdriver

Insertion Loss

Table 52 Insertion loss for 2x2 LoS MIMO Direct Mount

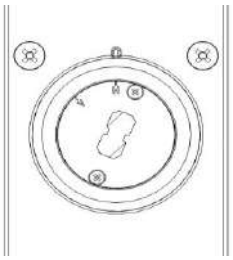
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Dual Core Mediation Device and WG	Radio to antenna (upper path)	0.2	0.2	0.2	0.3	0.3	0.5
	WG port to second antenna	Frequency band and WG length (antenna separation) dependent					

Procedure

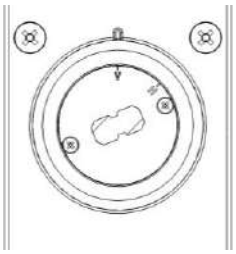
1 Adjust the twist on the dual core kit according to the required polarization.

Note
Ensure the polarization mounting direction of the twist to the dual core is according to the antenna polarization.

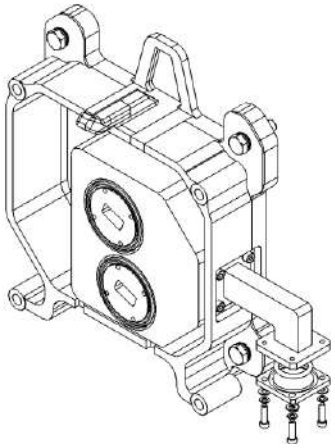
For horizontal polarization, locate the holes above and below the letter “H” on the pins and fasten the two screws.



For vertical polarization, locate the holes above and below the letter “V” on the pins and fasten the two screws.

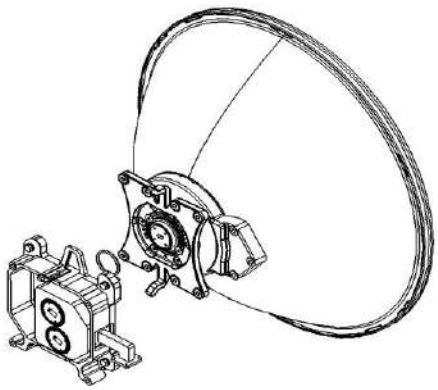


2 If not required, remove the plate assembled to the bended part of the dual core kit.



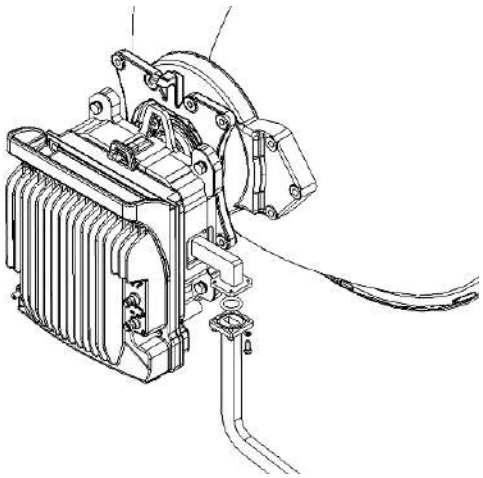
3 Mount and tighten the PTP 820C dual core kit on the antenna using the four M8 screws and washers.

Note
Verify that the O-ring is properly mounted between the antenna transition and the dual core.



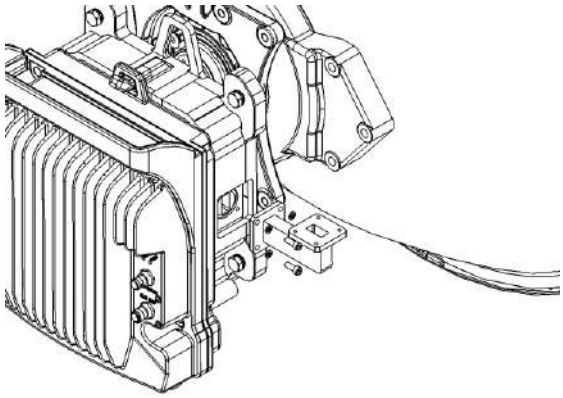
4 Connect the PTP 820C radio to the PTP 820C dual core kit using four M8 screws and washers and tighten the screws.

Note
Verify that the O-rings are properly mounted between the dual core and the radio.



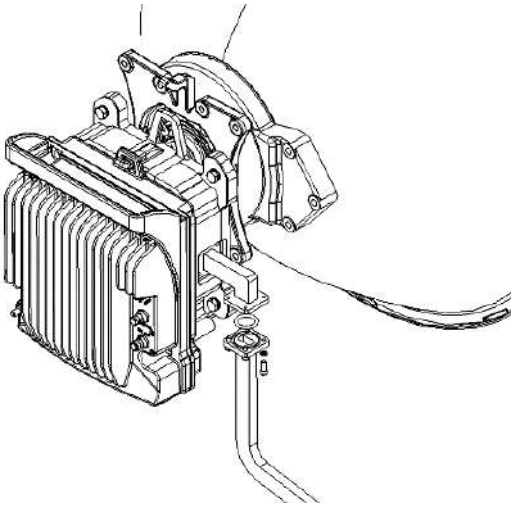
5 You can switch the orientation of the dual core flange connection by removing screws and rotating the bended part. Place back O-ring and tighten back screws.

Note
Verify that the O-rings are properly mounted between the dual core and the Coax to WG flange.



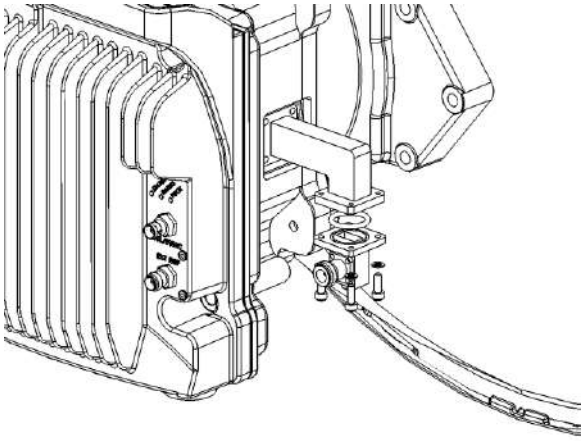
6 Connect the flexible waveguide to the PTP 820C dual core kit using O-ring, screws and washers supplied with flexible waveguide kit and tighten the screws.

Note
Verify that the O-rings are properly mounted between the dual core and the flexible waveguide flange.



7 You can also connect the dual core flange to coax to WG adapter supplied separately. Place O-ring and tighten screws and washers supplied with Coax to WG adapter kit.

Note
Verify that the O-rings are properly mounted between the dual core and the Coax to WG flange.

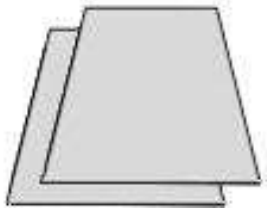


2x2 LoS MIMO Remote Mount

Note

This procedure can also be used for 1+0 SD configurations.

Figure 31 2x2 LoS MIMO Remote Mount



List of Items

Table 53 Required items for 2x2 LoS MIMO Remote Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	1	
2	PTP 820C REMOTE MOUNT ADAPTOR KIT	1	From 6-13GHz

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

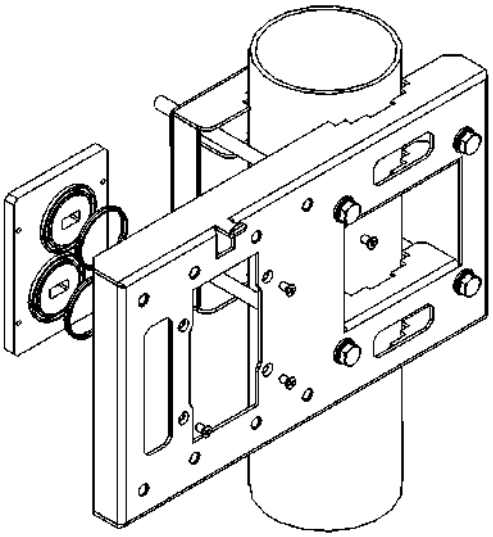
Insertion Loss

Table 54 Insertion loss for 2x2 LoS MIMO Remote Mount

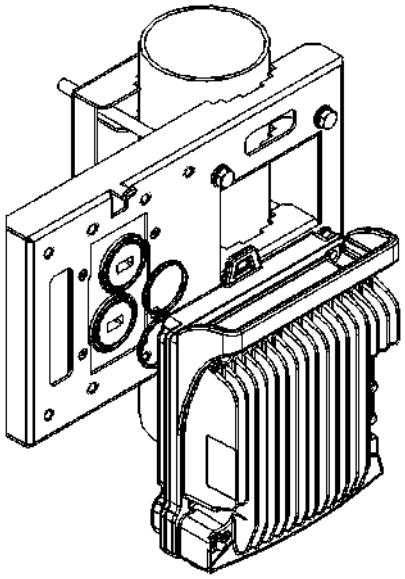
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
WGs	PTP 820C antenna port to antenna port	Frequency band and WG length (antenna separation) dependent					

6-13 GHz

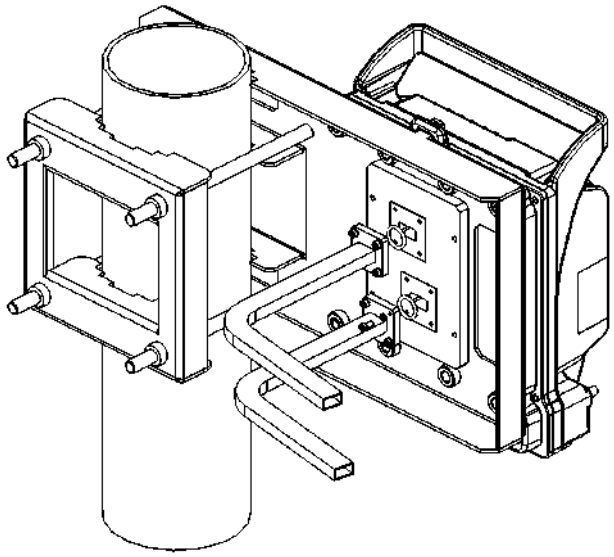
1 Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



2 Mount and tighten the PTP 820C Radio to the PTP 820C Pole Mount using the four captive screws and washers that are supplied with the PTP 820C Radio. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.

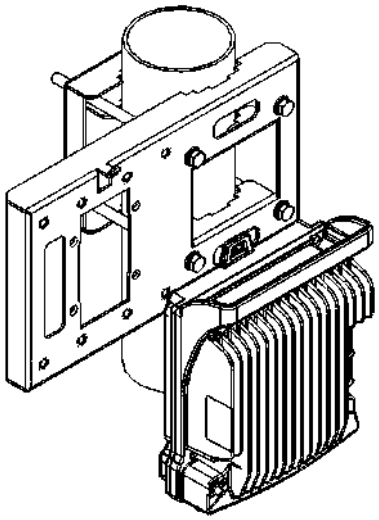


3 Mount and tighten both Flexible WGs with their O-ring to the PTP 820C Remote Mount Adaptor ports using the four screws supplied with each Flexible WG kit.

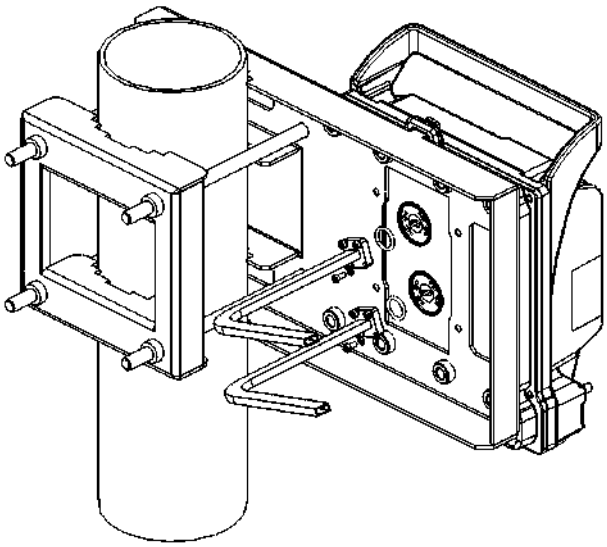


15-38 GHz

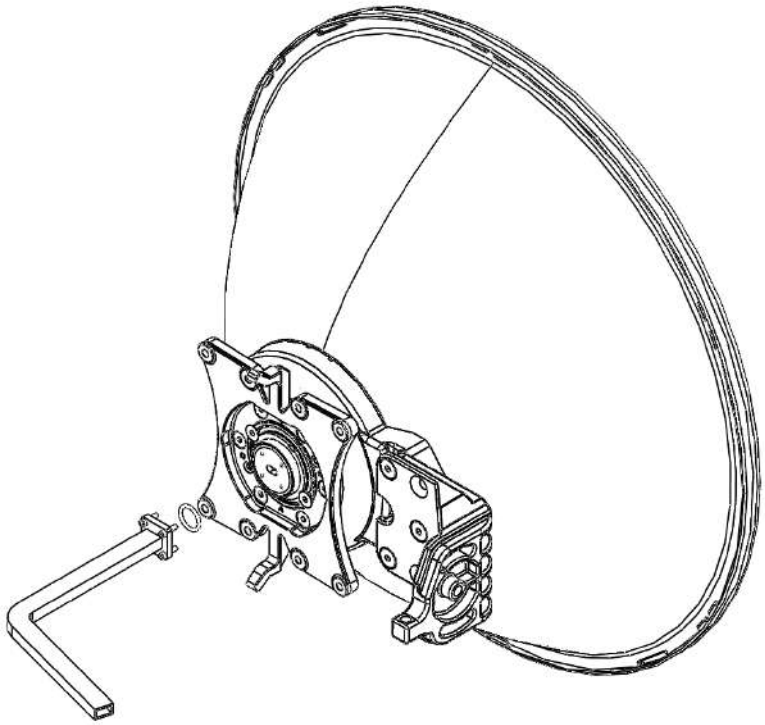
1 Mount and tighten the PTP 820C radio to the PTP 820C DC Pole Mount using the four screws assembled on the PTP 820C radio.



2 Mount and tighten the O-ring and the Flexible WG to PTP 820C radio ports using the four screws supplied with the Flexible WG kit.



3 Mount and tighten the O-ring and flexible WG to both antenna ports using the four screws supplied with the flexible WG kit.

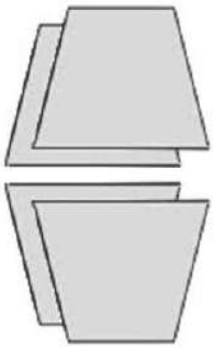


4x4 LoS MIMO Direct Mount

This procedure can also be used for:

- MultiCore 2+0 SP HW ready for 2 x MultiCore 2+0 SP
- 2+2 SD
- Advanced Space Diversity (ASD) configurations (Site 1 – Two Units).

Figure 32 4x4 Los MIMO Direct Mount



List of Items

Table 55 Required items for 4x4 LoS MIMO Direct Mount

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	2	
2	PTP 820C OMT KIT	2	
3	MIMO DATA CABLE	1	
4	SOURCE SHARING CABLE	1	
5	CAT5E MIMO SIGNALING CABLE	1	
6	CIRC./CIRC. ADAPTOR	2	Per Antenna Vendor

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

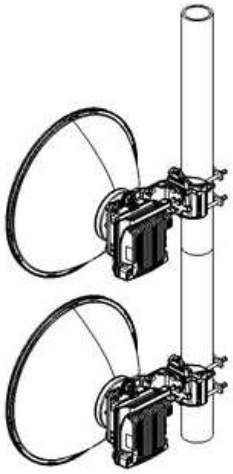
Insertion Loss

Table 56 Insertion loss for 4x4 LoS MIMO Direct Mount

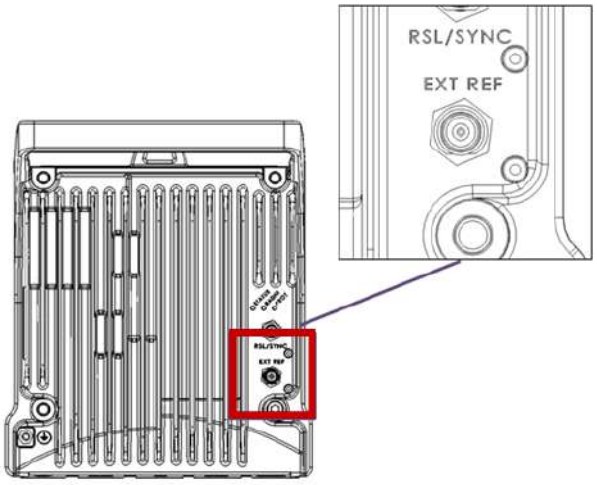
Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
OMT for each PTP 820C	Each PTP 820C antenna port to Mediation device antenna port	0.3	0.3	0.3	0.3	0.5	0.5

Procedure

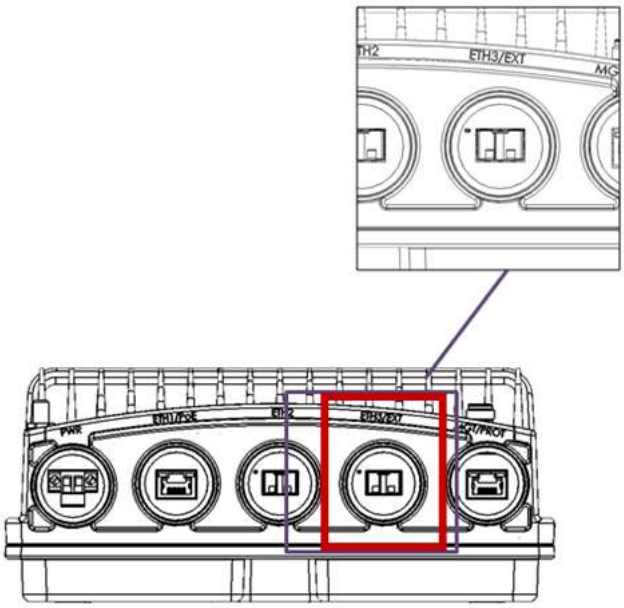
1 For instructions on installation of the PTP 820C OMT and radios, *see* *MultiCore 2+0 Dual Polarization Direct Mount on page 6-2*.



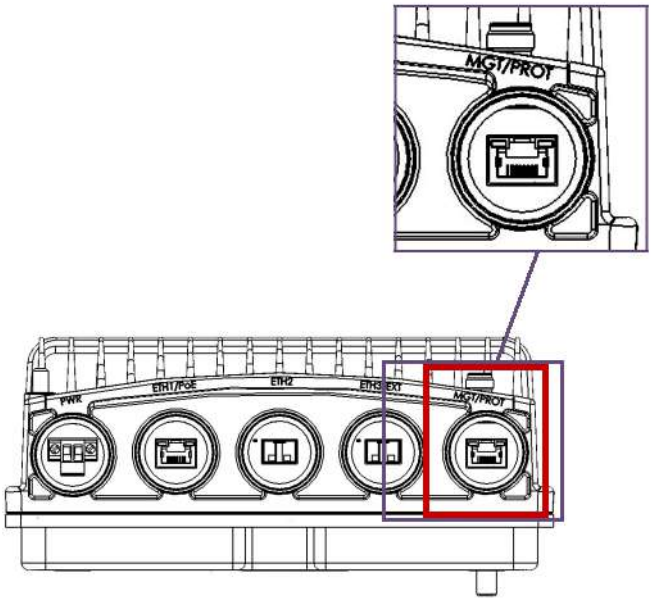
2 Connect the source sharing cable between both EXT REF PTP 820C radio connectors.



3 Connect the MIMO data sharing cable between both ETH3/EXT PTP 820C radio connectors.



4 Connect the MIMO signaling cable between the management ports of both units. For additional instructions on preparing and connecting this cable, see *Preparing a MIMO/ Protection signaling cable* on page 3-35.



4+0 Dual Polarization, 2+2HSB Single/Dual Polarization Direct Mount

List of Items

Table 57 Required items for 4+0 Dual Polarization, 2+2 HSB Single/Dual Polarization Direct Mount

Item	Description	Quantity	Remarks
1	PTP 820C Dual Coupler/Splitter/Circulator	1	
2	PTP 820C OMT/Splitter Kit	1	
3	PTP 820C Radios	2	

Required Tools

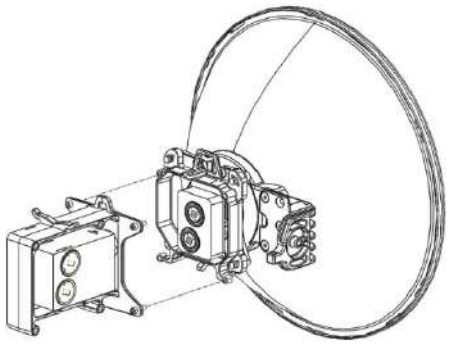
- Metric offset hexagon key set
- Metric wrench key set

Procedure

1 Once the OMT/Splitter is mounted to the antenna, connect the PTP 820C Dual Coupler/Splitter kit to the OMT kit using four M8 screws and washers, and tighten the screws.

Caution

Verify that the O-ring is properly mounted between the OMT/Splitter ports and the Dual Coupler/Splitter.



2 Connect the PTP 820C DC radios using the four M8 captive screws and washers supplied, and tighten the screws.

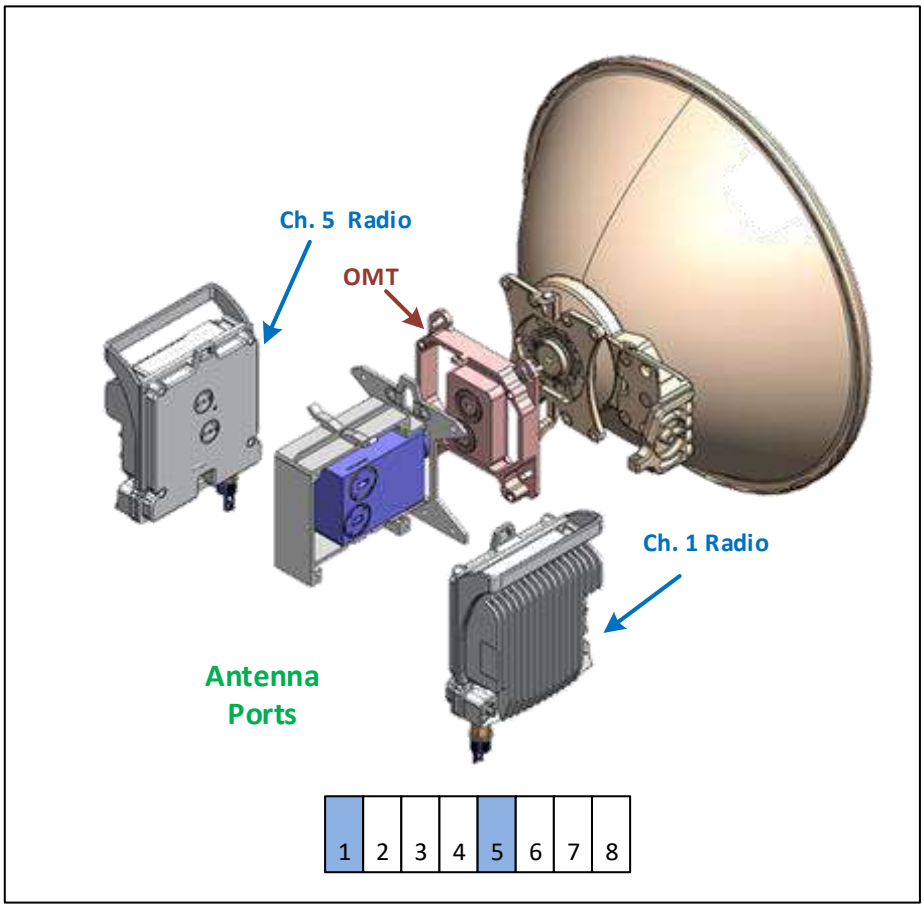
Caution

Verify that the O-rings are properly mounted between the Dual Coupler/Splitter ports and the radio.

4+0 with Dual Circulator (6-11GHz) Direct Mount

The following example illustrates a typical configuration, assuming that:

- The regulation specifies a channelization of 8 consecutive 28/38MHz channels (1-8 ch).
- The actual channels in use are channels 1,5.



4+0 Dual Polarization, 2+2HSB Dual Polarization Remote Mount

List of Items

Table 58 Required items for 4+0 Dual Polarization, 2+2HSB Dual Polarization Remote Mount

Item	Description	Quantity	Remarks
1	PTP 820C OMT Kit	1	
2	Flexible Waveguide Kit	2	
3	PTP 820C Dual Coupler/Splitter	1	

Required Tools

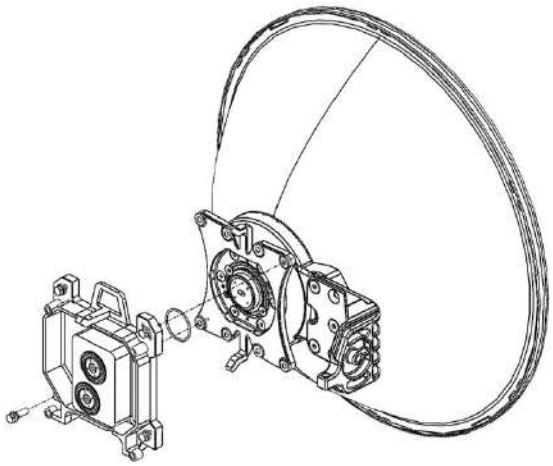
- Metric offset hexagon key set
- Metric wrench key set

Common Installation

1 Connect the OMT kit to the antenna and secure it with four screws.

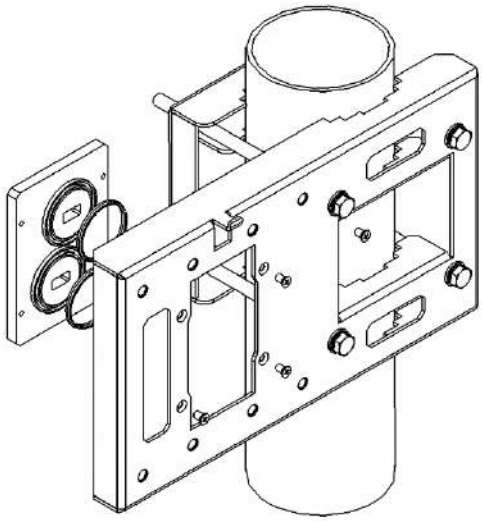
Caution

Verify that the O-ring is properly mounted between the antenna transition and the OMT.

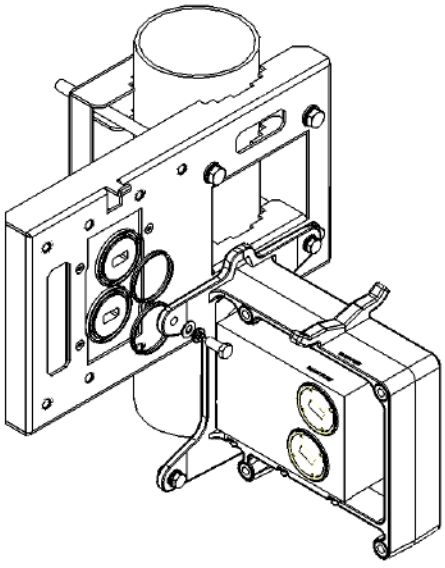


6-13GHz

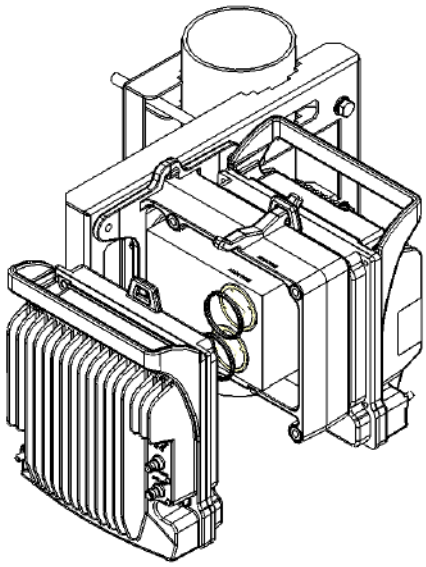
1 Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



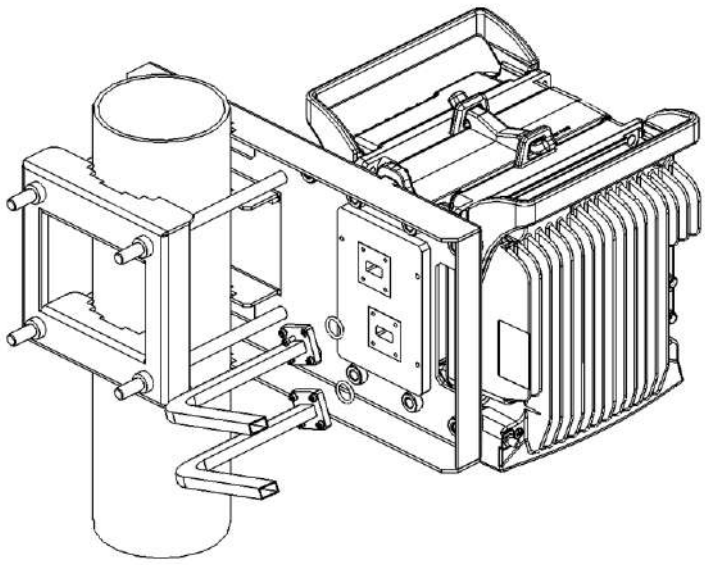
2 Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3 Mount and tighten the PTP 820C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 820C radio. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C dual coupler.

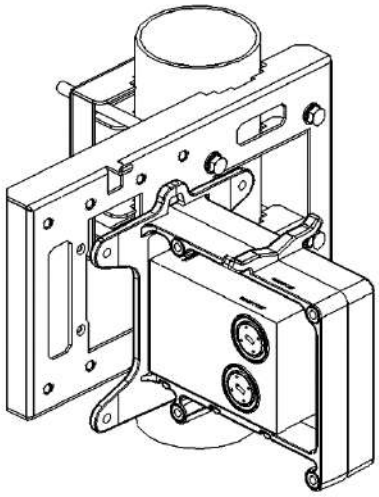


4 Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

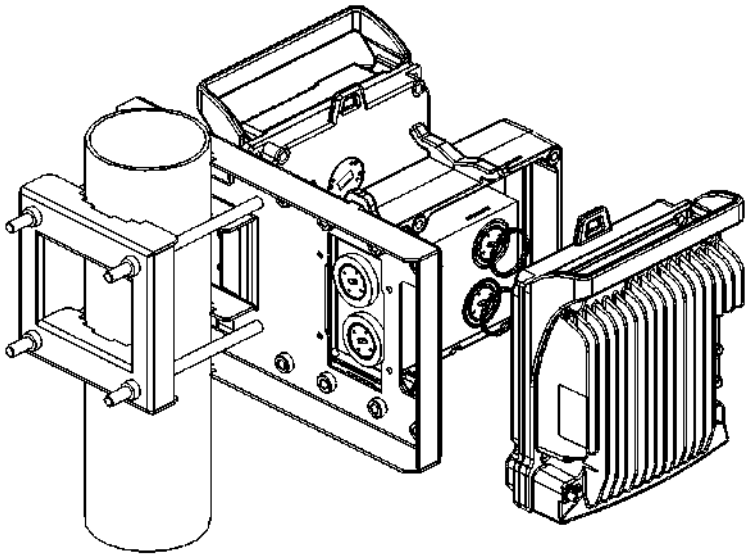


15-38 GHz

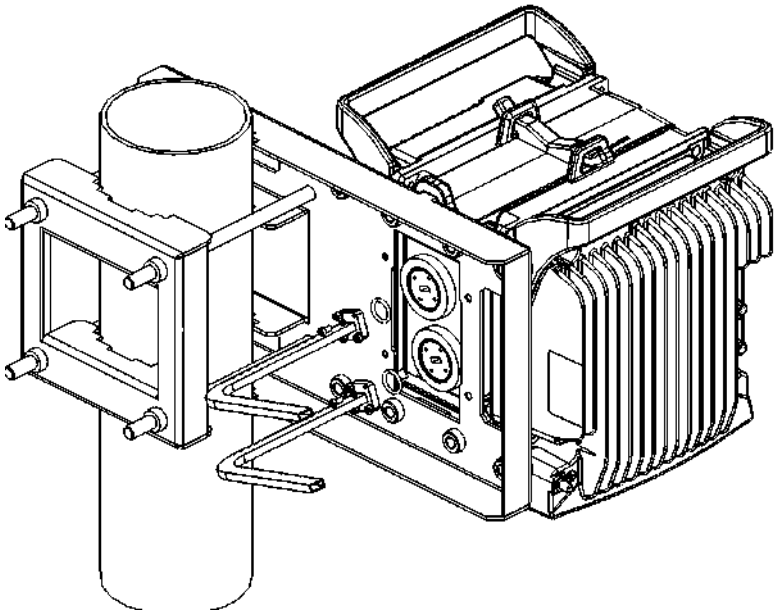
1 Mount and tighten the PTP 820C Dual Coupler to the PTP 820C DC Pole Mount using the four screws and washers supplied with the PTP 820C Dual Coupler kit.



2 Mount and tighten the PTP 820C radios on each side of the PTP 820C Dual Coupler using the screws assembled on the PTP 820C unit. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.



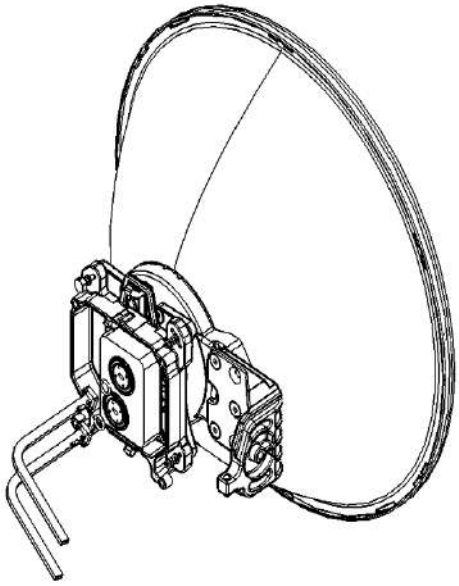
3 Mount the O-ring and the Flexible Waveguides to the PTP 820C Dual Coupler ports using the four screws supplied with the Flexible Waveguide kits.



4 Mount and tighten the O-ring and the Flexible Waveguides to the PTP 820C OMT ports using the four screws supplied with the Flexible Waveguide kits.

Caution

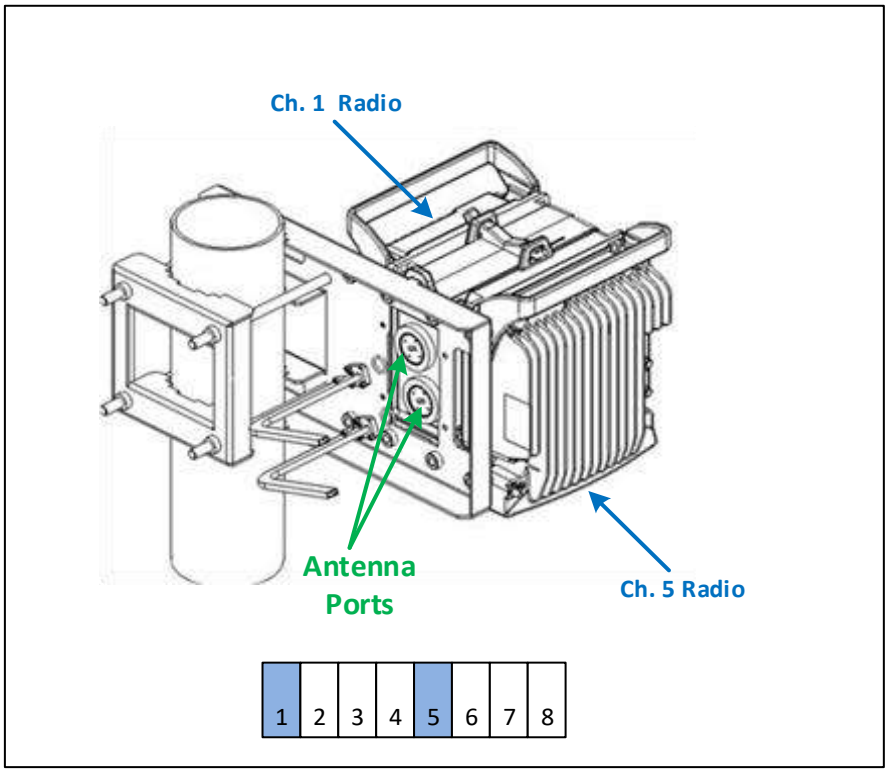
Verify that the O-rings are correctly mounted between the OMT ports and each Flexible Waveguide.



4+0 with Dual Circulator (6-11GHz) Remote Mount

The following example illustrates a typical configuration, assuming that:

- The regulation specifies a channelization of 8 consecutive 28/38MHz channels (1-8 ch).
- The actual channels in use are channels 1,5.

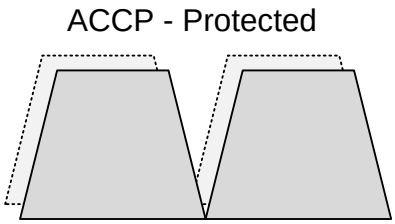


2+2 HSB Single Polarization Remote Mount

Note

This procedure can also be used for 1+1HSB SP HW ready for 2+2HSB SP configurations.

Figure 33 2+2 HSB Single Polarization Remote Mount



List of Items

Table 59 Required items for 2+2 HSB Single Polarization Remote Mount

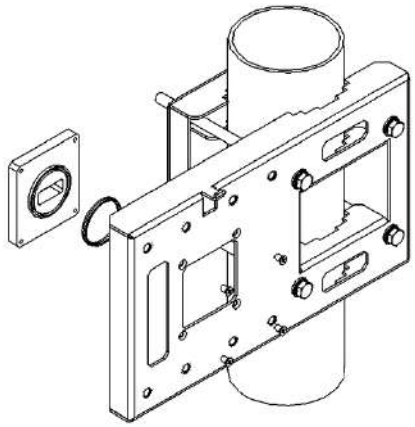
Item	Description	Quantity	Remarks
1	PTP 820C RADIO	2	
2	PTP 820C SPLITTER KIT	1	
3	PTP 820C DUAL COUPLER KIT	1	
4	FLEXIBLE WG KIT	2	
5	RFU-C POLE MOUNT KIT	2	

Required Tools

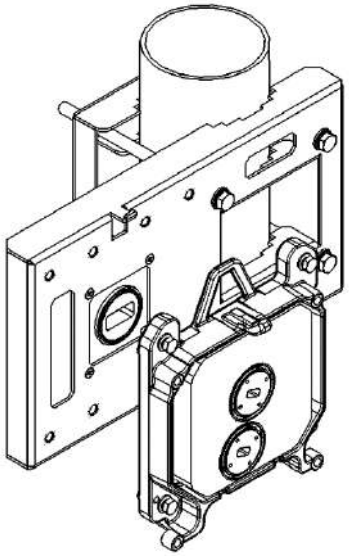
- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

6-13GHz

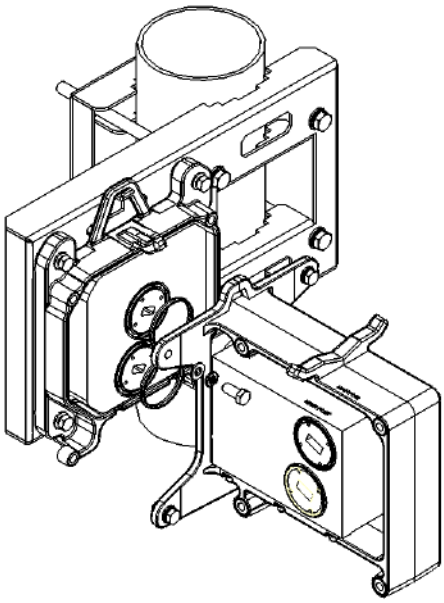
1 Mount and tighten the RFU-C Remote Mount Adaptor plate (supplied in the RFU-C Adaptor Remote Mount kit) to the RFU-C Pole Mount using the four flat screws supplied with the RFU-C Adaptor Remote Mount kit.



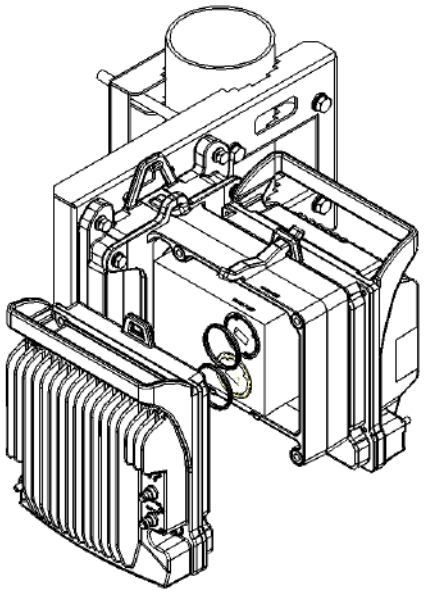
2 Mount and tighten the PTP 820C Splitter to the RFU-C Pole Mount using the four captive screws and washers that are assembled to the PTP 820C Splitter kit.



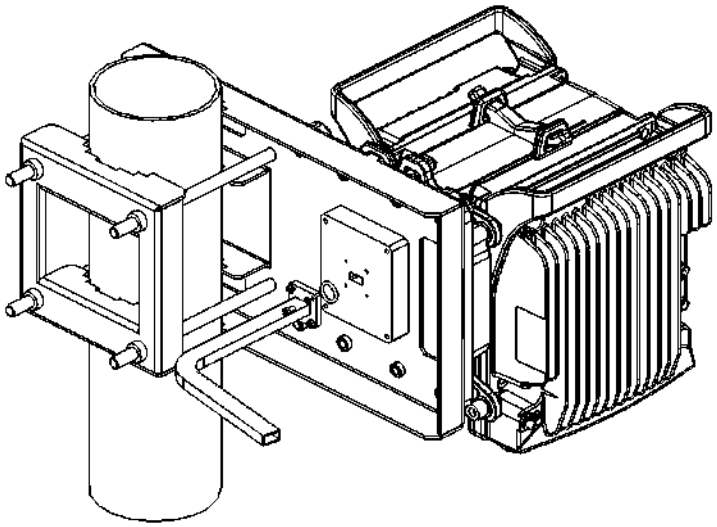
3 Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Splitter using the four captive screws and washers that are supplied with the PTP 820C Dual Coupler kit. Make sure that the O-rings are mounted on the PTP 820C Splitter.



4 Mount and tighten the PTP 820C unit to the PTP 820C Dual Coupler using the four screws and washers that are assembled to the PTP 820C unit. Make sure that the O-rings are mounted on the PTP 820C Dual Coupler.



5 Connect the Flexible Waveguide and Sealing Gasket supplied with the Flexible Waveguide kit to the RFU-C Adaptor plate. Tighten the four screws supplied with the Flexible Waveguide kit.



1+1 HSB-SD

List of Items

Table 60 Required items for 1+1 HSB-SD

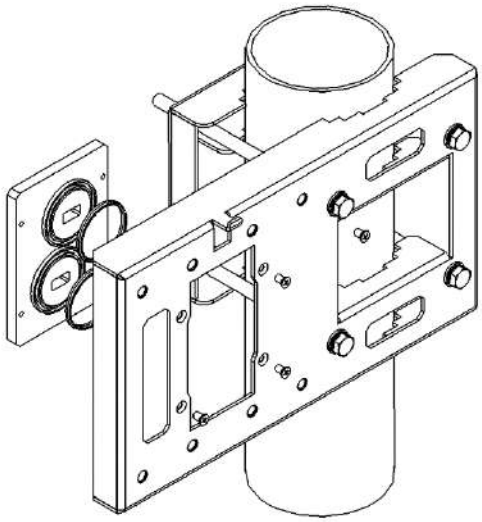
Item	Description	Quantity	Remarks
1	Flexible Waveguide Kit	2	
2	PTP 820C Dual Coupler/Splitter	1	

Required Tools

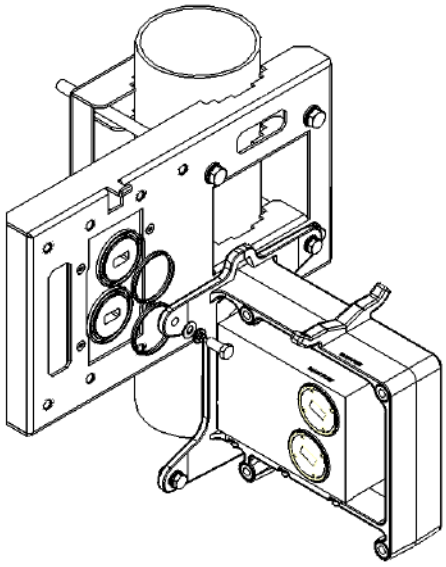
- Metric offset hexagon key set
- Metric wrench key set

6-13GHz

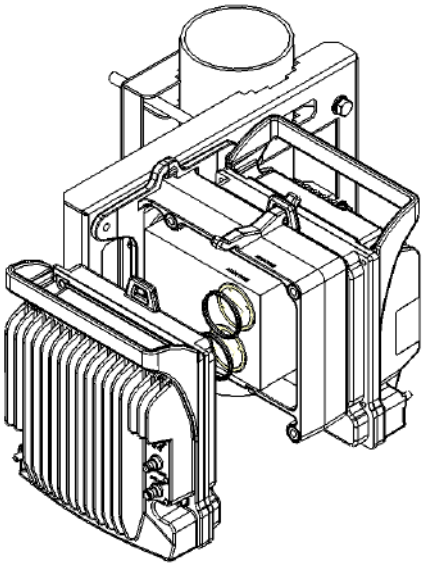
1 Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



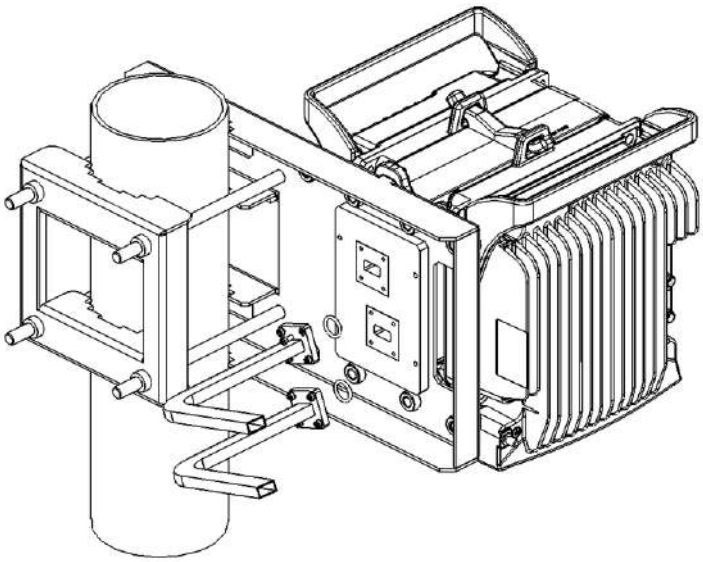
2 Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers that are supplied with the PTP 820C Dual Coupler kit. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.



3 Mount and tighten the PTP 820C radios on each side of the PTP 820C Dual Coupler using the screws assembled on PTP 820C radio. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C dual coupler.

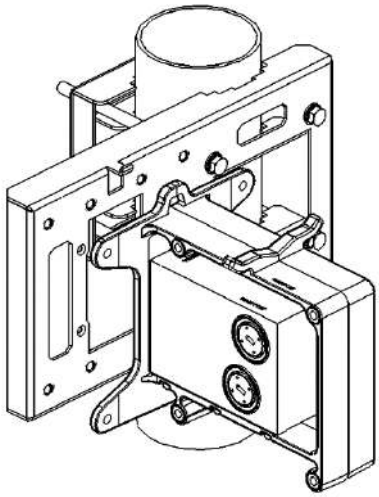


4 Connect both Flexible Waveguides and Sealing Gaskets supplied with each Flexible Waveguide Kit to the PTP 820C Dual Coupler antenna ports. Tighten the screws and washers supplied with the Flexible Waveguide Kit.

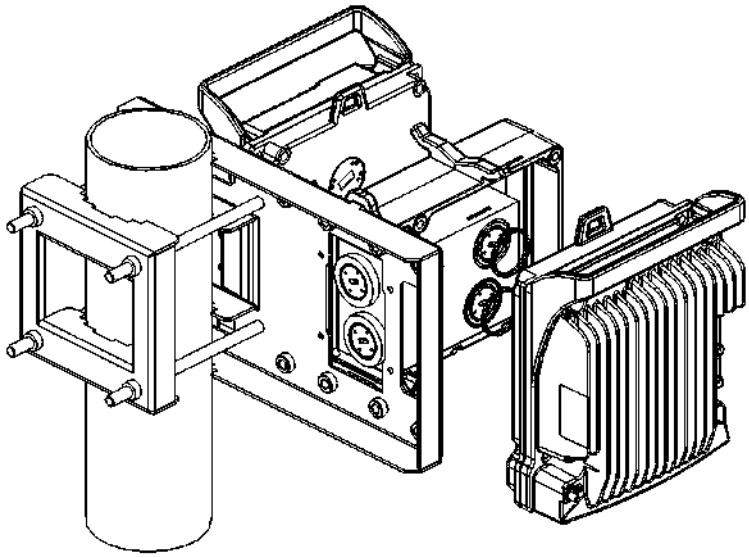


15-42GHz

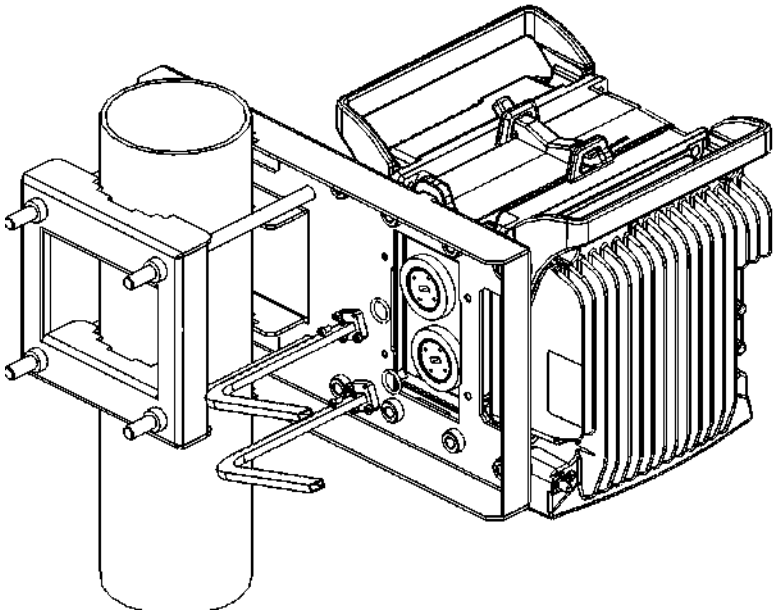
1 Mount and tighten the PTP 820C Dual Coupler to the PTP 820C Pole Mount using the four screws and washers supplied with the PTP 820C Dual Coupler kit.



2 Mount and tighten the PTP 820C radios on each side of the PTP 820C Dual Coupler using the screws assembled on the PTP 820C unit. Make sure that the O-rings are correctly assembled on the radio port of the PTP 820C Dual Coupler.



3 Mount the O-ring and the Flexible Waveguides to the PTP 820C Dual Coupler ports using the four screws supplied with the Flexible Waveguide kits.



4 Mount and tighten the O-ring and the Flexible Waveguides to the antenna ports on the primary and diversity antennas using the four screws supplied with the Flexible Waveguide kits.

Note
Verify that the O-rings are correctly mounted between the OMT ports and each Flexible Waveguide.

Dual Circulator Multi-Carrier Kit Installation

List of Items

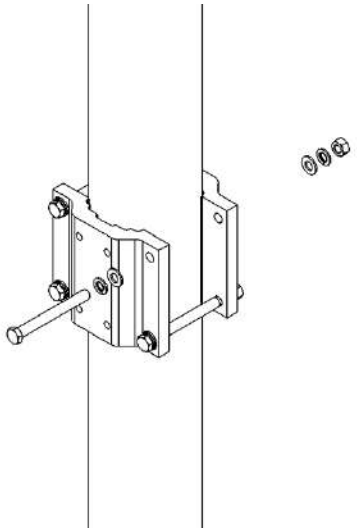
Item	Description	Quantity	Remarks
1	PTP 820C RADIO	4	
2	PTP 820C_DUAL_CIRC_kit_xxG	2	
3	PTP 820C_MC_DUAL_CIRC_kit_xxG	1	

Required Tools

- Metric offset hexagon key set
- Metric wrench key set

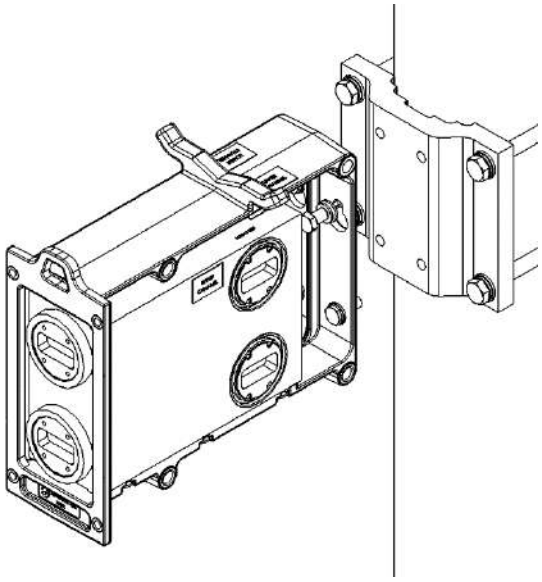
Procedure

1. Mount and tighten the pillar adapter brackets to pole (supplied in PTP820C Adaptor Remote Mount kit). Tighten the four M10 Hex screws and washers supplied within the kit.



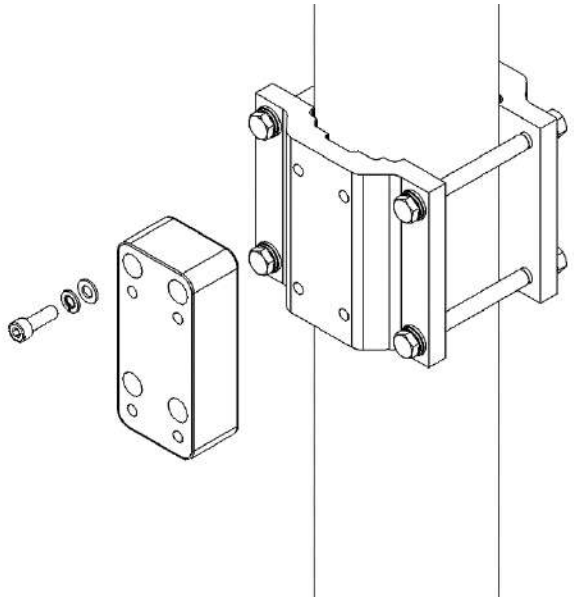
6-8 GHz

1 Mount and tighten the PTP820C MC Dual Cir to the PTP820C pillar adapter bracket using the four M8 Hex screws and washers supplied within the kit.

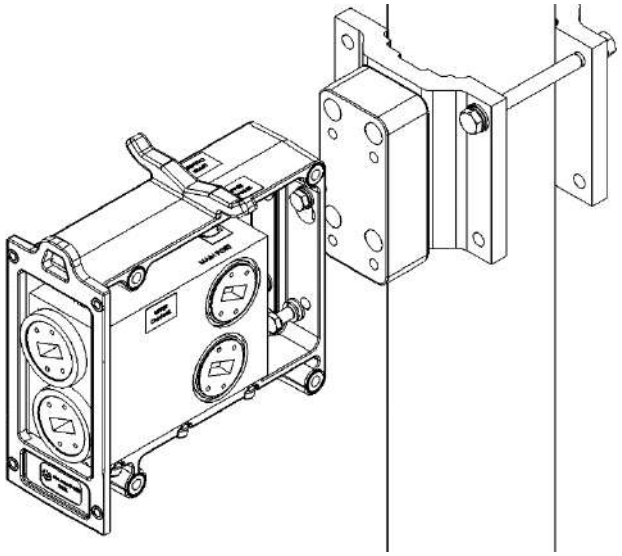


11 GHz only

1 Mount and tighten the PTP820C MC extender to the PTP820C pillar adapter bracket using the four M8 Hex screws and washers supplied within the kit.

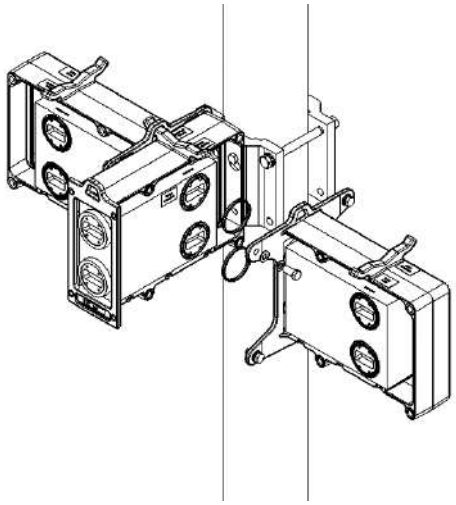


2 Mount and tighten the PTP820C MC Dual Cir to the PTP820C MC Extender using the four M8 Hex screws and washers supplied within the kit.

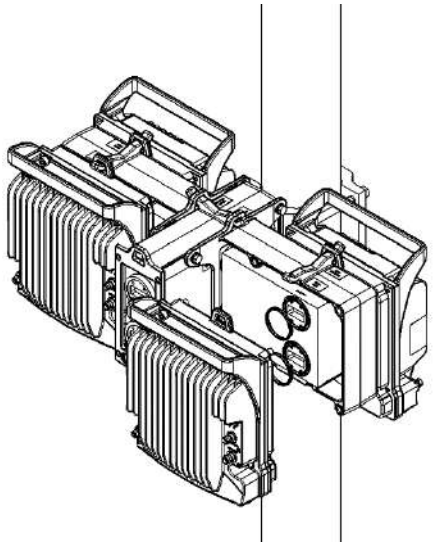


6-11GHz

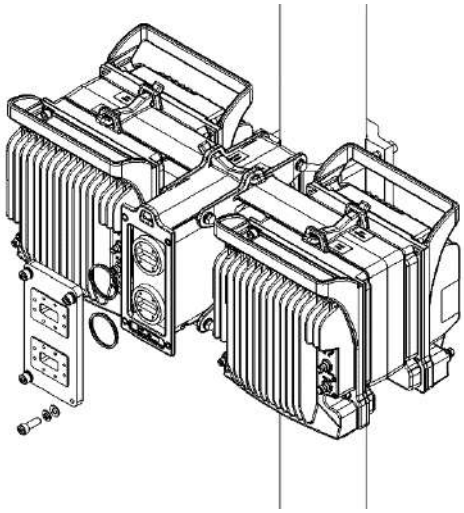
1 Mount and tighten the PTP820C Dual Cir to each side of the PTP820 MC Dual Circ using the four M8 Hex screws and washers supplied in the PTP820 Dual Circ kit. Pay attention that the O-rings on the PTP820C MC Dual Circ are well in place during the mounting.



2 Mount and tighten the PTP820C radios to each PTP820C Dual Circ radio port using the four screws assembled on the PTP820C radio. Pay attention that the O-rings on the PTP820C Dual Circ are well in place during the mounting.

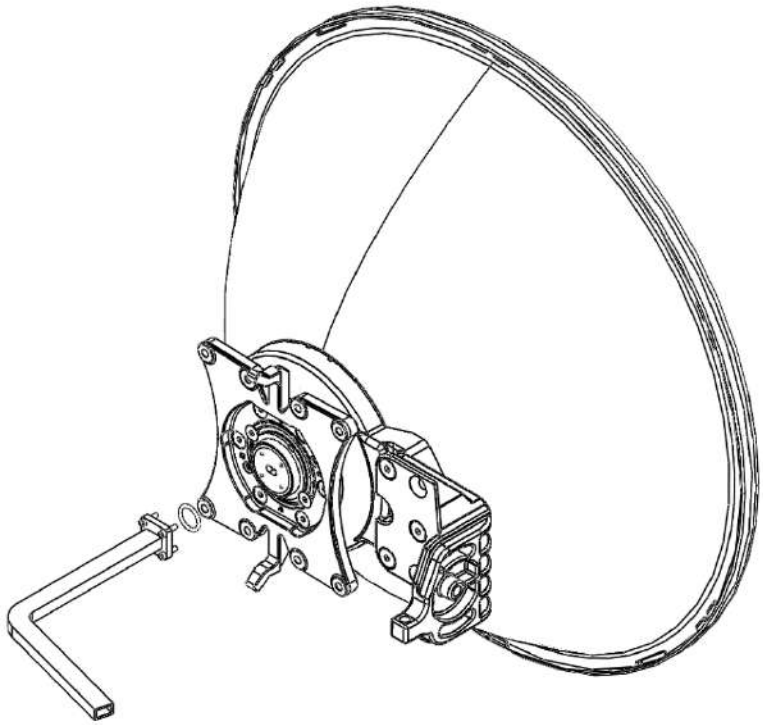


3 Mount and tighten the PTP820C MC Remote mount adapter to thePTP820C MC Dual Circ antenna ports using the four screws assembled on the PTP820C radio. Pay attention that the O-rings on the PTP820C MC Remote mount adapter are well in place during the mounting.



4 Mount and tighten the O-ring and the Flexible WG to the PTP820C MC Remote mount adapter ports using the four screws supplied with the Flexible WG kit.

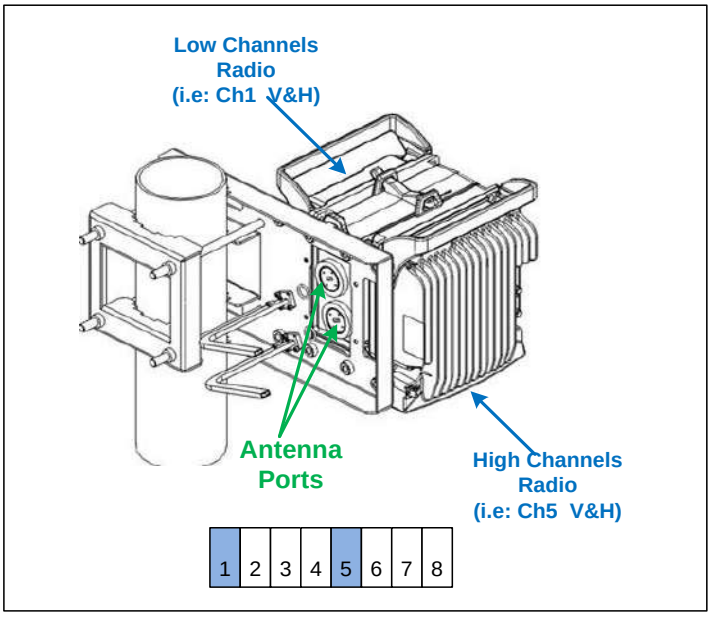
5 Mount and tighten the O-ring and flexible WG to both antenna ports using the four screws supplied with the flexible WG kit.

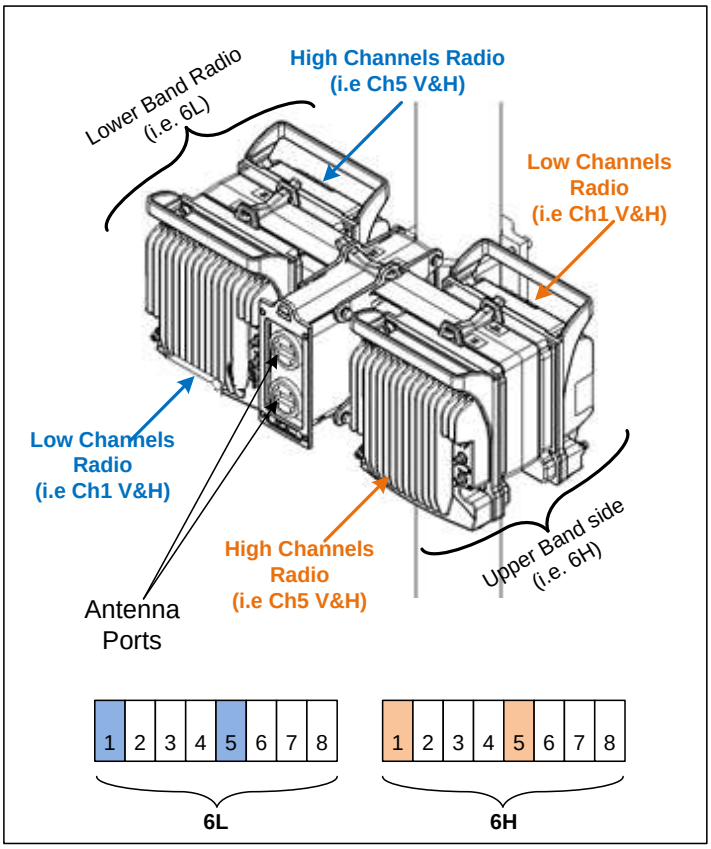


The following example illustrates a typical configuration, assuming:

- The regulation specifies a channelization of 8 consecutive 28/30 MHz channels (1-8ch).
- The actual channels in use are channels 1, 5.

4+0 Configuration




Lower Band Radio
(i.e. 6L)
High Channels Radio
(i.e Ch5 V&H)
Low Channels
Radio
(i.e Ch1 V&H)
Low Channels
Radio
(i.e Ch1 V&H)
High Channels
Radio
(i.e Ch5 V&H)
Upper Band side
(i.e. 6H)
Antenna
Ports
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
6L
6H

AFR 1+0 Hub Site

In an AFR 1+0 configuration, a Multicore PTP 820C unit is deployed at the hub site and two PTP 820C or PTP 820S units are deployed in two tail sites.

The hub site utilizes a single PTP 820C unit with two radio carriers. Each carrier is in a link, via its own directional antenna, with a tail site that consists of a PTP 820C or PTP 820S unit.



Note

The links should be located so as to ensure that the two radio paths do not cross.

The tail site unit is installed as a simple 1+0 configuration.

The hub site unit is installed as a remote mount configuration in which two flexible waveguides are used to connect the two Remote Mount Adaptor ports to an antenna. This chapter describes a hub site installation.

For standard interface antennas (six feet and larger), no OMT and no Circ./Circ. Adaptor are used, and the flexible waveguides are connected directly to the antenna flanges. For instructions how to connect the waveguides to the antenna flanges, refer to the antenna vendor's documentation.

List of Items

Table 61 Required items 1+0 Hub Site

Item	Description	Quantity	Remarks
1	PTP 820C RADIO	1	
3	FLEXIBLE WG KIT	2	
4	PTP 820C DC POLE MOUNT KIT	1	
5	PTP 820C DC REMOTE MOUNT ADAPTOR KIT	1	From 6-13GHz
6	Circ./Circ. Adaptor	1	Per Antenna Vendor. Not used for standard interface antennas (six feet and larger).

Required Tools

- Metric offset hexagon key set
- Metric wrench key set
- Phillips #1, #2 screwdriver

Insertion Loss

Table 62 Insertion Loss for AFR 1+0 Hub Site

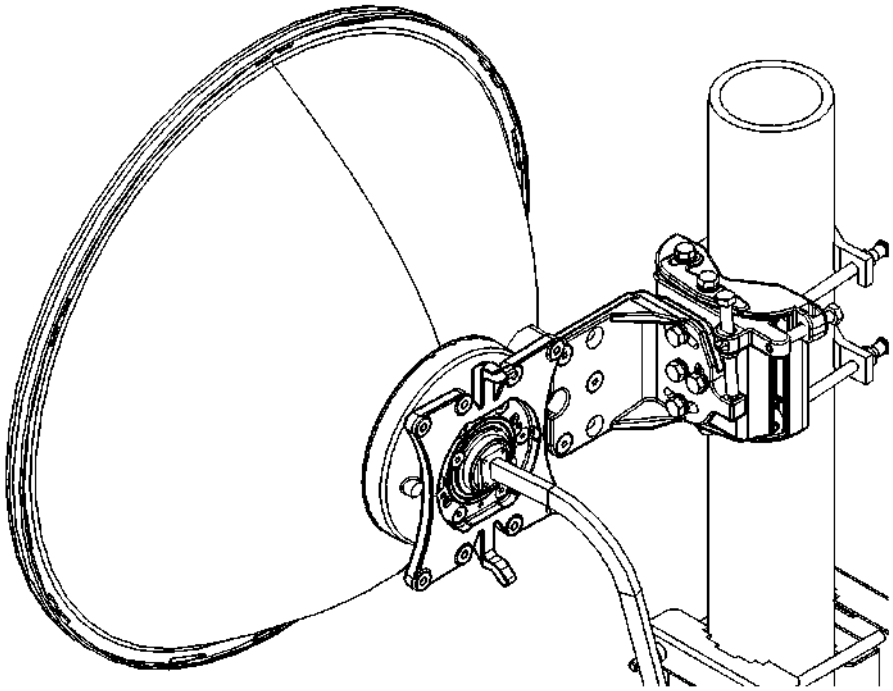
Mediation Devices	Signal Path / Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-42 GHz
Flex WG (1m)	Each PTP 820C port to antenna port	0.4	0.5	1.0	1.8	2.7	3.3

Common Installation

1 Prior to the installation, follow the antenna manufacturer's instructions to use the circular adaptor. (Remove the existing rectangular transition, swap the O-ring, and install the circular transition instead.)

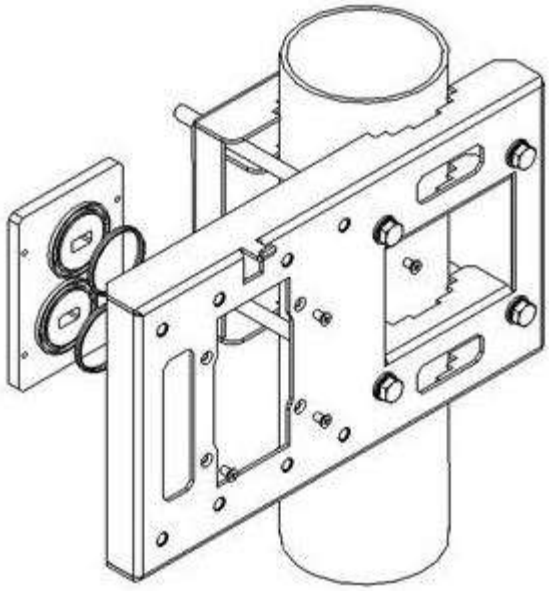


2 Mount and tighten the Flexible WG to the antenna port using the four screws supplied with the Flexible WG kit.

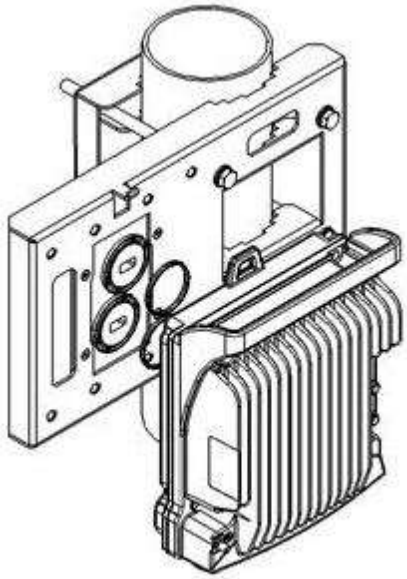


6-13 GHz

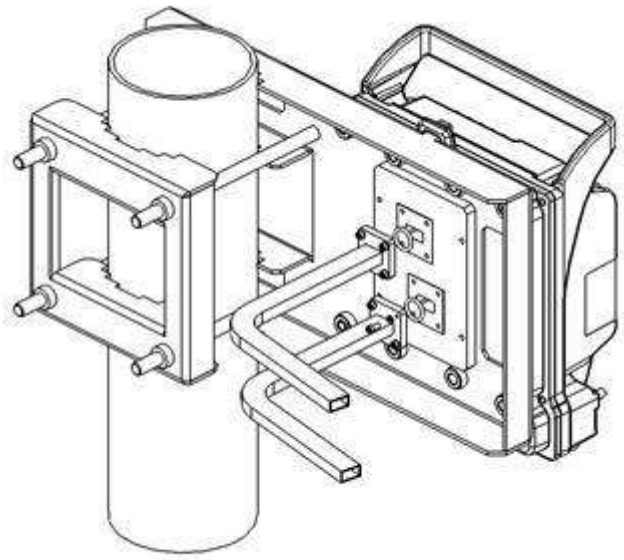
1 Mount and tighten the PTP 820C Remote Mount Adaptor plate (supplied in PTP 820C Adaptor Remote Mount kit) to the PTP 820C Pole Mount using the four flat screws supplied with the PTP 820C Adaptor Remote Mount kit.



2 Mount and tighten the PTP 820C to the PTP 820C Pole Mount using the four captive screws and washers that are supplied with the PTP 820C. Pay attention that the O-rings are mounted on the PTP 820C Remote Mount Adaptor.

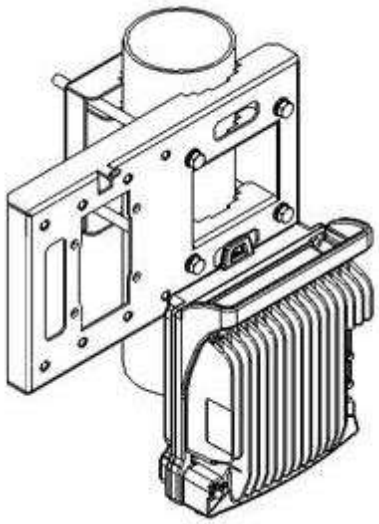


3 Mount and tighten both Flexible WGs with their O-ring to the PTP 820C Remote Mount Adaptor ports using the four screws supplied with each Flexible WG kit.

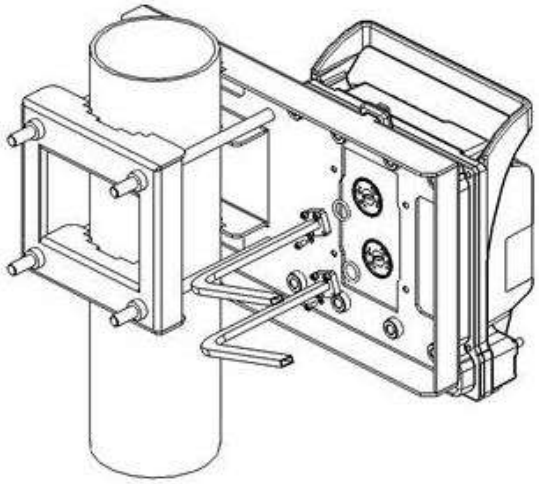


15-38 GHz

1 Mount and tighten the PTP 820C to the PTP 820C DC Pole Mount using the four screws assembled on the PTP 820C.

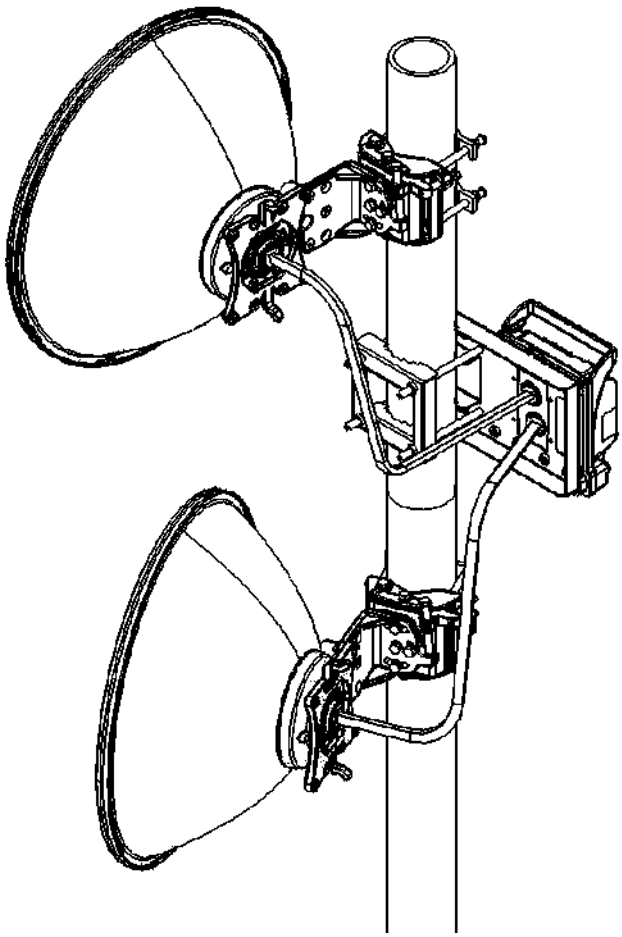


2 Mount and tighten the O-ring and the Flexible WG to PTP 820C radio ports using the four screws supplied with the Flexible WG kit.



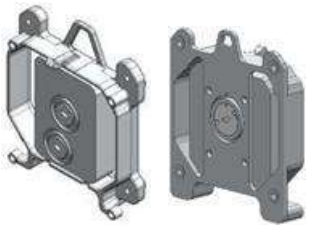
The following figure shows the complete installation

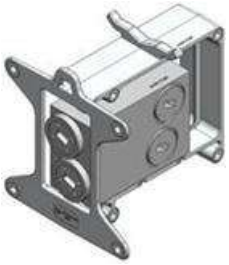
Note
This figure shows an installation with horizontal polarization. Vertical polarization can also be used. The same polarization must be used for both links.



Chapter 7: Mediation Device Losses

Table 63 Mediation device losses

Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
Flex WG	3ft / 1.2m	0.5	0.5	1.2	1.2	1.5	1.5
Dual Core Mediation Device 	Radio to antenna (upper path)	0.2	0.2	0.2	0.3	0.3	0.5
OMT  	Radio to antenna ports (V or H)	0.3	0.3	0.3	0.3	0.5	0.5
Splitter 	Radio to antenna port	3.5	3.5	3.5	3.7	3.7	4
Double Coupler	Main Paths	1.4	1.4	1.4	1.6	1.6	2

Mediation Devices	Signal Path/Remarks	Insertion Loss [dB]					
		6-8 GHz	11 GHz	13-15 GHz	18 GHz	23-26 GHz	28-38 GHz
	Secondary Paths	6	6	6	6	6	6
Double Splitter 	Radio to antenna port	3.5	3.5	3.5	3.7	3.7	4

Chapter 8: Acceptance & Commissioning Procedures

This chapter provides Cambium Networks' recommended Acceptance and Commissioning Procedure for PTP 820. 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 Networks' 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
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

SITE ACCEPTANCE CHECKLIST (continued)

4. OUTDOOR UNIT	
Type of ODU mount:	(Direct or Remote mount)
ODU is securely mounted to the antenna or pole	OK
ODU is grounded as per installation instructions	OK
ODU's polarization is as per link requirements	OK
ODU 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. CAT5/Fiber Optic CABLE	
Overall cable length:	
Cable type:	
CAT5 connectors assembled properly on the cable	OK
Cable connected securely to ODU and IDU	OK
Cable connector is covered by gland and secure by cable tie at the ODU	OK
At the ODU, cable has a service/drip loop to prevent moisture from entering the connector	OK
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 is as per site specifications	OK
Cable point-of-entry to building/shelter is weather-proof	OK
Cable ends are properly labeled	OK

SITE ACCEPTANCE CHECKLIST (continued)	
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	OK
8. DC POWER SUPPLY - Two Inputs	
Measured DC voltage input to the IDU:	(-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
9. RACK INSTALLATION	
Rack is mounted to the shelter floor with four screws	OK
Rack is mounted to the shelter wall with two screws	OK

SITE ACCEPTANCE CHECKLIST (continued)	
10. REMARKS/NOTES	
11. GENERAL INFORMATION	
Site accepted by:	Name:
	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. **ODU (Outdoor Unit)**
   - The ODU is grounded as per installation instructions. See the third point in the Antenna Mounting section above.
   - The ODU polarization is as per link requirements and matches the polarization of the antenna.
   - 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
- ODU labels - for link identity, frequency, and polarization
- Cat5/Fiber cable labels - for link identity, close to the ODU, switch, and either end of any joint

- Switch labels - for link identity

Radio Link Commissioning Procedure

Scope

This section describes the recommended commissioning tests for PTP 820 radio link in a 1+0 configuration.

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

Commissioning Test

The following tests should be performed on each installed link.

Link Verification

- Received Signal Level (RSL) is up to +/- 4 dB from the expected (calculated) level at both ends of the link.[1]
- Radio Bit Error Rate (BER) is 10E-11 orlower.
- If working with ATPC, ATPC is operating as expected (RSL = reference level).

Ethernet Line Interfaces Test

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

Interoperability Verification

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

[1] The voltage at the BNC port is 1.XX where XX is the RSL level. For example: 1.59V means an RSL of -59 dBm. Note that the voltage measured at the BNC port is not accurate and should be used only as an aid).

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 820 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 Networks' support center at https://support.cambiumnetworks.com.

PTP 820 LINK COMMISSIONING LOG		
1. GENERAL INFORMATION		
Customer:		
Radio model:		
Configuration:		
Radio link code:		
Site 1 name & add:		
Site 2 name & add:		
2. ODU/RFU	**Site 1**	**Site 2**
ODU model:		
ODU p/n:		
ODU s/n:		
ODU SW:		
Tx frequency (MHz):		
Rx frequency (MHz):		
Link ID:		
Tx power (dBm):		
ATPC on/off:		
ATPC ref level:		
ODU Polarization:		
3. ANTENNA AND ODU MOUNT	**Site 1**	**Site 2**
Antenna vendor and model:		
Antenna size:		
Mounting type:		

Mounting losses:		
4. LINK PARAMETERS	**Site 1**	**Site 2**
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	**Site 1**	**Site 2**
Line loopback:	Pass	Pass
ODU loopback:	Pass	Pass
Radio BER:	Pass	Pass
FE test:	Pass	Pass
GbE test:	Pass	Pass
6. MANAGEMENT CONFIGURATION	**Site 1**	**Site 2**
Eth IP Address:		
Eth IP mask:		
Default router:		
In-band VLAN		
7. REMARKS/NOTES		
8. INSTALLATION INFORMATION		
Installed by:	Name:	
	Company:	
	Date:	
	Signature:	
Commissioned by:	Name:	
	Company:	
	Date:	
	Signature:	