Issue 1.9 – 10/15/2012

PTP 800 & PTP 810 ORDERING GUIDE

FROM PTP 800 05-00 and PTP 810 01-10

Cambium Networks™

CONTENTS

1. INTRODUCTION

This Ordering Guide covers our Cambium PTP 800, PTP 800i, PTP 810, and PTP 810i Licensed Microwave solutions. It is intended to provide a structured guide to ordering a link with any accessories and ancillary items for a successful installation. The following steps are involved in planning and ordering your system:

Steps	Activities
1	To begin, we recommend that you complete a site survey. Then you can plan your link using your preferred planning tool or our Cambium PTP LINKPlanner tool which is available at PTP LINKPlanner. PTP LINKPlanner is a customized tool for planning and optimizing PTP 800 and PTP 810 links in any RF band between 6 and 38 GHz. Optional: If the PTP 800 or PTP 810 is part of a Motorola ASTRO® system, review the "PTP for ASTRO System Planner" for guidance on link planning and required options and features.
2	Apply for your license using your preferred licensing method or our FCC Microwave License Coordination Services (in U.S. only). After planning the link, our PTP LINKPlanner tool will provide details to help you complete the licensing application.
3	Receive your license or Prior Coordination Notification (PCN). It is important to note that you should not order your PTP 800 or PTP 810 equipment until you receive your license or PCN indicating the frequency that your license stipulates.
4	Use our PTP LINKPlanner to configure your link and obtain a Bill of Materials (BOM). LINKPlanner's built-in configuration feature generates a complete licensed-microwave Bill-of-Materials (BOM), showing the components and accessories required for link installation. LINKPlanner is focused on planning individual links. When a BOM is created based on your network topology, some manual entry may be required for certain configurations to optimize the BOM and create the final BOM list for the complete network.
5	Order your PTP link. The following table shows you the various components needed to order a link.

As shown below, selecting everything that is required is a five-step process.

Select PTP Modem:	Platform	PTP 800 CMU or PTP 810 MMU
	Capacity Key	10 Mbps to 600 Mbps
	AES Encryption	128/256 bit AES (PTP 800)
	Additional I/O module of MMU	E1/T1
	Modem accessories	SFP module, rack mount kit, AC/DC adapter
Select RF Unit:	Setup	Split Mount or All indoor
	Frequency	6 - 38 GHz for ODU-A 11, 18 or 23 GHz for ODU-B 6, 7, 11 GHz for iRFU
	For ODU-A or B	Define T/R and sub-band
	For IRFU	Define configuration and Tx and Rx Central frequency
Select Antenna & Antenna Accessories:	Frequency	6 - 38 GHz
	Polarization	Single polarization or dual polarization
	ODU Mounting type	Direct mount or remote mount
	Size	1 to 12 ft
	Antenna accessories	Couplers, OMK, etc
	Waveguide	Waveguide, connectors, grounding, etc.
	Dehydrator	All-Indoor only
Select Cable & Cable Accessories:	Length	75m or 500m
	Cable assembly kit	Y/N
	Lightning protection kit	Y/N
	Extra cable grounding kit	Y/N
	Crimp tool	Y/N
Select Warranties, Services, etc.		

2. MODEMS

2.1 PTP 800 COMPACT MODEM UNIT (CMU)

The PTP 800 CMU is frequency independent. Two CMUs are required for a single 1+0 link. Four CMUs are required for a 1+1 hot standby link. Each CMU package includes a wall-mount kit and a DC connector.

P/N	Description
WB3480HH	PTP 800 Modem 1000/100BaseT with Capacity Cap 10 Mbps

2.2 PTP 810 MODULAR MODEM UNIT (MMU)

The PTP 810 MMU uses a modular architecture. Depending on your master I/O module, there are different base models for PTP 810 MMUs:

- Standard – supports 2xFE + 16 E1/T1
- Gig-E – supports 4 x GigE + 1 x GigE SFP slot + 2 E1/T1
- Super PDH – supports 2xFE + 42 E1/T1

2.2.1 PTP 810 MMU - STANDARD CONFIGURATION

The PTP 810 standard configuration supports:

- 1 ~ 100 Mbps scalable Ethernet
- 1 – 16 E1/T1: 2xE1/T1 (RJ-48C) and 14xE1/T1 (Molex 60-pin, high density)

Depending on how many IF/Modem modules the MMU contains, there are two flavors under the PTP 810 MMU standard configuration:

- The PTP 810 MMU Standard, 2xFE + 16xE1/T1, supports a 1+0 unprotected configuration.

- The PTP 810 MMU Standard Dual Modem, 2xFE + 16xE1/T1, supports 1+1, XPIC, 2+0 (East/East) for link aggregation, or 2+0 (East/West) for an unprotected Ribbon or Ring configuration.

P/N	Release	Description
C000081M001A	PTP 810-01-00	PTP 810 MMU Standard, 2xFE + 16xE1/T1
C000081M003A	PTP 810-01-00	PTP 810 MMU Standard Dual Modem, 2xFE + 16xE1/T1

2.2.2 PTP 810 MMU - GIGE CONFIGURATION

The PTP 810 GigE configuration supports:

- Gigabyte-scalable Ethernet (4xGigE + 1xGigE SFP Slot)
- 2 x E1/T1 (RJ-48C)

Depending on how many IF/Modem modules the MMU contains, there are two flavors under a PTP 810 MMU GigE configuration:

- PTP 810 MMU GigE, 4xGigE + 1xGigE SFP + 2xE1/T1, supports a 1+0 unprotected configuration

- PTP 810 MMU GigE Dual Modem, 4xGigE + 1xGigE SFP + 2xE1/T1, supports 1+1, XPIC, 2+0 (East/East) for link aggregation or 2+0 (East/West) for unprotected Ribbon or Ring configuration.

P/N	Release	Description
C000081M008A	PTP 810-01-00	PTP 810 MMU GigE, 4xGigE + 1xGigE SFP + 2xE1/T1
C000081M005A	PTP 810-01-00	PTP 810 MMU GigE Dual Modem, 4xGigE + 1xGigE SFP + 2xE1/T1

2.2.3 PTP 810 MMU – SUPER PDH CONFIGURATION

The PTP 810 Super PDH configuration supports:

- 1 ~ 100 Mbps scalable Ethernet
- 1 – 42 E1/T1: 3 x 14 E1/T1 (Molex 60-pin, high density)

Depending on how many IF/Modem modules the MMU contains, there are two flavors under a PTP 810 MMU Super PDH configuration:

- PTP 810 MMU Super PDH, 2xFE + 42xE1/T1, supports a 1+0 unprotected configuration

- PTP 810 MMU Super PDH Dual Modem, 2xFE + 42xE1/T1, supports 1+1, XPIC, 2+0 (East/East) for link aggregation or 2+0 (East/West) for unprotected ribbon or ring configuration

P/N	Release	Description
C000081M002A	PTP 810 01-10	PTP810 MMU Super PDH, 2xFE + 42xE1/T1
C000081M010A	PTP 810 01-10	PTP810 MMU Super PDH Dual Modem, 2xFE + 42xE1/T1

2.3 CAPACITY KEYS

All PTP 800 CMUs and PTP810 MMUs are set to a 10-Mbps capacity cap as the default from the factory. You can upgrade the throughput capacity to a greater capacity with a software license key. Capacity upgrades do not require any hardware changes.

Capacity-upgrade license keys are provided on a per-unit basis. While the PTP 800 and PTP 810 share the same capacity key structure, the modems use different methods to implement the capacity key.

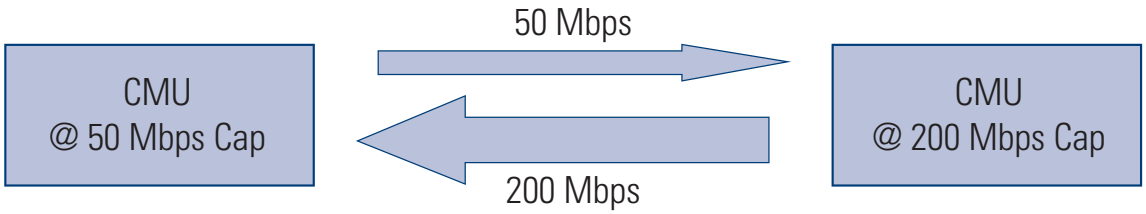
For a PTP 800, the capacity key defines the maximum throughput capacity for all incoming traffic over the CMU's Ethernet user port. This means that you can configure the link's channel size and modulation with no limitation. However, the user throughput threshold on the Ethernet port is governed by the capacity key purchased.

For a PTP 810, the capacity key is mapped to the over-the-air maximum throughput capacity of the various modulation modes (i.e. channel size and modulation). The capacity key will enable a list of channel size and modulation mode combinations. So, you can ONLY configure the link's channel size and modulation mode as permitted by the purchased capacity key.

2.3.1 ASYMMETRIC CAPACITY CONTROL (PTP 800 ONLY)

Each PTP 800 CMU within a link can be set to a different capacity cap to support an asymmetric throughput configuration.

For example, you may want 50 Mbps for the uplink and 200 Mbps for the downlink. If so, you can set one CMU with a 50-Mbps capacity cap while, at the other end of the link, you can set the CMU to 200 Mbps.



2.3.2 CAPACITY UPGRADE OPTIONS

PTP 800 and 810 modems support "single-step" capacity upgrades and flexible "step-by-step" capacity-upgrade options. You can choose either method to upgrade the throughput capacity of a modem. Applications, budget considerations, deployment timing, and future bandwidth requirements can all impact your decision as to which method is best, and the choice is entirely at your discretion.

With a single-step upgrade, you can upgrade the modem to the targeted throughput cap regardless of the modem's current capacity.

SINGLE-STEP CAPACITY UPGRADE	
P/N	**Description**
WB3538	PTP 800 / PTP 810 Modem Capacity CAP - 20 Mbps (per Unit)
WB3539	PTP 800 / PTP 810 Modem Capacity CAP - 30 Mbps (per Unit)
WB3540	PTP 800 / PTP 810 Modem Capacity CAP - 40 Mbps (per Unit)
WB3541	PTP 800 / PTP 810 Modem Capacity CAP - 50 Mbps (per Unit)
WB3542	PTP 800 / PTP 810 Modem Capacity CAP - 100 Mbps (per Unit)
WB3543	PTP 800 / PTP 810 Modem Capacity CAP - 150 Mbps (per Unit)
WB3544	PTP 800 / PTP 810 Modem Capacity CAP - 200 Mbps (per Unit)
WB3545	PTP 800 / PTP 810 Modem Capacity CAP - 300 Mbps (per Unit)
WB3546	PTP 800 / PTP 810 Modem Capacity CAP - 400 Mbps (per Unit)
N000081K001A	PTP 810 Modem Capacity CAP - 600 Mbps (per Unit)

For a step-by-step upgrade, you can upgrade the modem over time from the current capacity to the next capacity level. The modem's current capacity must match the throughput capacity of the license key.

STEP-BY-STEP CAPACITY UPGRADE	
P/N	**Description**
WB3547	PTP 800 / PTP 810 Modem Capacity CAP upgrade from 20 -> 30 Mbps key (per Unit)
WB3548	PTP 800 / PTP 810 Modem Capacity CAP upgrade from 30 -> 40 Mbps key (per Unit)
WB3549	PTP 800 / PTP 810 Modem Capacity CAP upgrade from 40 -> 50 Mbps key (per Unit)
WB3550	PTP 800 / PTP 810 Modem Capacity CAP upgrade from 50 -> 100 Mbps key (per Unit)
WB3551	PTP 800 / PTP 810 Modem Capacity CAP upgrade from 100 -> 150 Mbps key (per Unit)
WB3552	PTP 800 / PTP 810 Modem Capacity CAP upgrade from 150 -> 200 Mbps key (per Unit)
WB3553	PTP 800 / PTP 810 Modem Capacity CAP upgrade from 200 -> 300 Mbps key (per Unit)
WB3554	PTP 800 / PTP 810 Modem Capacity CAP upgrade from 300 -> 400 Mbps Key (per Unit)
N000081K003	PTP 810 Modem Capacity CAP upgrade from 400 -> 600 Mbps Key (per Unit)

2.3.3 PTP 810 CAPACITY KEYS

The PTP 810 MMU capacity keys are issued in three different types:

- 1+x (1+0 or 1+1):
  - The "1+x" capacity key is used to allow operation of 1+0 and 1+1 link configurations of the PTP 810 MMU.
- 2+0:
  - The "2+0" capacity key is used to allow operation of 2+0 East/East (true 2+0 with link aggregation) and 2+0 East/West (1+0 Ring or 1+0 Ribbon) link configurations of the PTP 810 MMU.
- XPIC:
  - The "XPIC" capacity code type is used to allow operation of 2+0 XPIC link configurations of the PTP 810 MMU. For customers who want to deploy XPIC, a separate XPIC authorization key also needs to be purchased, which can be found at Section 2.3.4.

The following tables provide the minimum "1+x" capacity key required for a PTP 810 MMU:

USER DATA THROUGHPUT FOR 1+x CONFIGURATION – ETSI					
Channel Size (ETSI)	**Modulation**	**Minimum Required Capacity Key**	**Maximum Link Throughput[1] (Mbps) (Eth + E1)**	**Maximum Ethernet Throughput (Mbps)**	**Maximum Number of E1s Supported**
7 MHz	QPSK	10 Mbps	10.0	9.0	4
	16 QAM	20 Mbps	20.0	19.0	9
	32 QAM	20 Mbps	24.6	23.0	11
	64 QAM	30 Mbps	30.0	28.0	14
	128 QAM	40 Mbps	35.5	34.0	16
13.75 / 14 MHz	QPSK	20 Mbps	20.0	19.0	9
	16 QAM	40 Mbps	40.2	38.0	18
	32 QAM	50 Mbps	49.8	48.0	23
	64 QAM	50 Mbps	60.9	59.0	29
	128 QAM	50 Mbps	71.9	70.0	34
27.5 / 28 / 29.65 / 30 MHz	QPSK	40 Mbps	40.5	39.0	19
	16 QAM	100 Mbps	81.3	79.0	39
	32 QAM	100 Mbps	104.5	100.0	50
	64 QAM	100 Mbps	123.5	120.0	59
	128 QAM	150 Mbps	145.9	136.0	70
	256 QAM	150 Mbps	168.3	160.0	81
40 MHz	QPSK	50 Mbps	55.4	53.0	26
	16 QAM	100 Mbps	110.7	104.0	53
	32 QAM	150 Mbps	142.3	136.0	68
	64 QAM	150 Mbps	169.0	160.0	81
	128 QAM	200 Mbps	199.7	192.0	96
	256 QAM	200 Mbps	230.4	224.0	110
55 / 56 / 60 MHz	QPSK	100 Mbps	81.3	79.0	39
	16 QAM	150 Mbps	155.2	152.0	75
	32 QAM	200 Mbps	208.3	200.0	101
	64 QAM	300 Mbps	255.4	248.0	123
	128 QAM	300 Mbps	294.2	288.0	126
	256 QAM	300 Mbps	339.5	328.0	126

[1] Throughput includes NMS and 64 Kbps auxiliary data.

USER DATA THROUGHPUT FOR 1+x CONFIGURATION – FCC					
Channel Size (FCC)	**Modulation**	**Minimum Required Capacity Key**	**Maximum Link Throughput (Mbps) (Eth + T1)**	**Maximum Ethernet Throughput (Mbps)**	**Maximum Number of T1s Supported**
10 MHz	QPSK	10 Mbps	13.8	13.0	8
	16 QAM	30 Mbps	27.8	27.0	17
	32 QAM	30 Mbps	33.9	33.0	21
	64 QAM	40 Mbps	41.4	40.0	26
	128 QAM	50 Mbps	49.2	47.0	31
20 MHz	QPSK	30 Mbps	27.8	27.0	17
	16 QAM	50 Mbps	55.7	54.0	35
	32 QAM	50 Mbps	68.8	67.0	43
	64 QAM	100 Mbps	84.0	82.0	53
	128 QAM	100 Mbps	99.3	96.0	63
	256 QAM	100 Mbps	114.5	104.0	73
25 MHz	QPSK	40 Mbps	34.7	33.0	21
	16 QAM	100 Mbps	69.6	67.0	44
	32 QAM	100 Mbps	89.5	87.0	57
	64 QAM	100 Mbps	105.7	100.0	67
	128 QAM	150 Mbps	124.9	120.0	80
	256 QAM	150 Mbps	144.1	136.0	92
30 MHz	QPSK	40 Mbps	41.6	40.0	26
	16 QAM	100 Mbps	83.5	81.0	53
	32 QAM	100 Mbps	107.4	104.0	68
	64 QAM	150 Mbps	134.4	128.0	86
	128 QAM	150 Mbps	149.9	144.0	96
	256 QAM	150 Mbps	173.0	168.0	110
40 MHz	QPSK	50 Mbps	55.7	54.0	35
	16 QAM	100 Mbps	111.4	104.0	71
	32 QAM	150 Mbps	143.2	136.0	91
	64 QAM	150 Mbps	170.0	160.0	109
	128 QAM	200 Mbps	200.8	192.0	126
	256 QAM	200 Mbps	231.7	224.0	126
50 MHz	QPSK	50 Mbps	69.6	67.0	44
	16 QAM	150 Mbps	139.2	136.0	89
	32 QAM	200 Mbps	178.9	168.0	114
	64 QAM	200 Mbps	218.7	208.0	126
	128 QAM	300 Mbps	252.0	240.0	126
	256 QAM	300 Mbps	290.7	280.0	126
80 MHz	QPSK	100 Mbps	81.3	79.0	51
	16 QAM	150 Mbps	162.5	152.0	104
	32 QAM	200 Mbps	208.9	200.0	125
	64 QAM	300 Mbps	255.4	248.0	126
	128 QAM	300 Mbps	294.2	288.0	126
	256 QAM	300 Mbps	339.5	328.0	126

The following tables provide the minimum "2+0" capacity key required for PTP810 MMU:

USER DATA THROUGHPUT FOR 2+0 CONFIGURATION – ETSI					
Channel Size (ETSI)	**Modulation**	**Minimum Required Capacity Key**	**Maximum Link Throughput[2] (Mbps) (Eth + E1)**	**Maximum Ethernet Throughput (Mbps)**	**Maximum Number of E1s Supported**
7 MHz	QPSK	20 Mbps	19.9	18.0	8
	16 QAM	40 Mbps	40.1	38.0	18
	32 QAM	50 Mbps	49.1	46.0	22
	64 QAM	50 Mbps	60.0	56.0	28
	128 QAM	50 Mbps	70.9	68.0	32
13.75 / 14 MHz	QPSK	40 Mbps	40.1	38.0	18
	16 QAM	100 Mbps	80.4	76.0	36
	32 QAM	100 Mbps	99.6	96.0	46
	64 QAM	100 Mbps	121.7	118.0	58
	128 QAM	150 Mbps	143.8	140.0	68
27.5 / 28 / 29.65 / 30 MHz	QPSK	100 Mbps	81.0	78.0	38
	16 QAM	150 Mbps	162.6	158.0	78
	32 QAM	200 Mbps	209.0	200.0	100
	64 QAM	200 Mbps	246.9	240.0	118
	128 QAM	300 Mbps	291.8	272.0	140
	256 QAM	300 Mbps	336.7	320.0	162
40 MHz	QPSK	100 Mbps	110.8	106.0	52
	16 QAM	200 Mbps	221.4	208.0	106
	32 QAM	300 Mbps	284.7	272.0	136
	64 QAM	300 Mbps	338.0	320.0	162
	128 QAM	400 Mbps	399.4	384.0	192
	256 QAM	400 Mbps	460.8	448.0	205
55 / 56 / 60 MHz	QPSK	150 Mbps	162.6	158.0	78
	16 QAM	300 Mbps	310.3	304.0	150
	32 QAM	400 Mbps	417.9	400.0	202
	64 QAM	600 Mbps	510.7	496.0	205
	128 QAM	600 Mbps	588.5	576.0	205
	256 QAM	600 Mbps	679.0	656.0	205

[2] Throughput includes NMS and 64 Kbps auxiliary data.

USER DATA THROUGHPUT FOR 2+0 CONFIGURATION – FCC					
Channel Size (FCC)	**Modulation**	**Minimum Required Capacity Key**	**Maximum Link Throughput (Mbps) (Eth + T1)**	**Maximum Ethernet Throughput (Mbps)**	**Maximum Number of T1s Supported**
10 MHz	QPSK	30 Mbps	27.6	24.0	16
	16 QAM	50 Mbps	55.5	52.0	34
	32 QAM	50 Mbps	67.8	64.0	42
	64 QAM	100 Mbps	82.8	80.0	52
	128 QAM	100 Mbps	98.3	94.0	62
20 MHz	QPSK	50 Mbps	55.5	52.0	34
	16 QAM	100 Mbps	111.4	108.0	70
	32 QAM	150 Mbps	137.5	134.0	86
	64 QAM	150 Mbps	168.0	162.0	106
	128 QAM	200 Mbps	198.5	192.0	126
	256 QAM	200 Mbps	229.1	208.0	146
25 MHz	QPSK	50 Mbps	69.4	66.0	42
	16 QAM	150 Mbps	139.2	135.0	88
	32 QAM	200 Mbps	179.0	174.0	114
	64 QAM	200 Mbps	211.4	200.0	134
	128 QAM	300 Mbps	249.9	240.0	160
	256 QAM	300 Mbps	288.3	272.0	184
30 MHz	QPSK	100 Mbps	83.2	80.0	52
	16 QAM	150 Mbps	167.1	162.0	106
	32 QAM	200 Mbps	214.8	208.0	136
	64 QAM	300 Mbps	268.8	256.0	172
	128 QAM	300 Mbps	299.8	288.0	192
	256 QAM	300 Mbps	345.9	336.0	205
40 MHz	QPSK	100 Mbps	111.4	108.0	70
	16 QAM	200 Mbps	222.7	208.0	142
	32 QAM	300 Mbps	286.3	272.0	182
	64 QAM	300 Mbps	339.9	320.0	205
	128 QAM	400 Mbps	401.7	384.0	205
	256 QAM	400 Mbps	463.5	448.0	205
50 MHz	QPSK	150 Mbps	139.2	134.0	88
	16 QAM	300 Mbps	278.4	272.0	178
	32 QAM	400 Mbps	357.9	336.0	205
	64 QAM	400 Mbps	437.3	416.0	205
	128 QAM	600 Mbps	503.9	480.0	205
	256 QAM	600 Mbps	581.4	560.0	205
80 MHz	QPSK	150 Mbps	162.6	158.0	102
	16 QAM	300 Mbps	325.0	304.0	205
	32 QAM	400 Mbps	417.9	400.0	205
	64 QAM	600 Mbps	510.7	496.0	205
	128 QAM	600 Mbps	588.5	576.0	205
	256 QAM	600 Mbps	679.0	656.0	205

The following provides the minimum "XPIC" capacity key required for a PTP 810:

USER DATA THROUGHPUT FOR XPIC CONFIGURATION – ETSI					
Channel Size (ETSI)	**Modulation**	**Minimum Required Capacity Key**	**Maximum Link Throughput (Mbps) (Eth + E1)**	**Maximum Ethernet Throughput (Mbps)**	**Maximum Number of E1s Supported**
27.5 / 28 / 29.65 / 30 MHz	64 QAM	300 Mbps	255.4	240.0	120
	128 QAM	300 Mbps	301.8	288.0	146
	256 QAM	300 Mbps	348.3	336.0	168
40 MHz	64 QAM	300 Mbps	347.9	336.0	168
	128 QAM	400 Mbps	411.1	400.0	198
	256 QAM	400 Mbps	474.4	464.0	205
55 / 56 / 60 MHz	64 QAM	600 Mbps	510.7	496.0	205
	128 QAM	600 Mbps	603.6	576.0	205
	256 QAM	600 Mbps	696.4	672.0	205

USER DATA THROUGHPUT FOR XPIC CONFIGURATION – FCC					
Channel Size (FCC)	**Modulation**	**Minimum Required Capacity Key**	**Maximum Link Throughput (Mbps) (Eth + T1)**	**Maximum Ethernet Throughput (Mbps)**	**Maximum Number of T1s Supported**
30 MHz	64 QAM	300 Mbps	273.7	256.0	174
	128 QAM	300 Mbps	310.2	288.0	198
	256 QAM	400 Mbps	357.9	336.0	205
40 MHz	64 QAM	300 Mbps	349.9	336.0	205
	128 QAM	400 Mbps	413.5	400.0	205
	256 QAM	400 Mbps	477.4	464.0	205
50 MHz	64 QAM	400 Mbps	437.1	416.0	205
	128 QAM	600 Mbps	516.8	496.0	205
	256 QAM	600 Mbps	596.3	576.0	205
80 MHz	64 QAM	600 Mbps	510.7	496.0	205
	128 QAM	600 Mbps	603.6	576.0	205
	256 QAM	600 Mbps	696.4	672.0	205

2.3.4 PTP 810 XPIC

For an XPIC link, the PTP 810 MMU configuration will require a dual modem. In addition to the "XPIC" capacity key, one XPIC authorization key is required to enable the XPIC features on each PTP 810 MMU. In other words, two XPIC keys are required per XPIC link, one key per MMU.

One XPIC cable is required to inter-connect two modem modules.

P/N	Description
N000081K005A	PTP 810 MMU XPIC Authorization Key (per Unit)
N000081L004A	PTP 810 XPIC cable

To generate to an XPIC authorization key, you will need to use the activation code, the Serial Number (SN) of the MMU chassis, and the SN of the two modem modules in the MMU.

2.4 ENCRYPTION FOR PTP 800

PTP 800 systems support 128-bit and 256-bit AES encryption as security options. The encryption is enabled via a license key which unlocks the functionality in the CMU. The AES license key is provided on a per-unit basis. AES is used for link encryption, but also for SNMPv3 Privacy (SNMP encryption) and HTTPS (secure management web-page access).

For Motorola ASTRO® implementations using Unified Event Manager (UEM) to manage PTP 800 radios, HTTPS is mandatory and SNMPv3 Privacy is optional. For ASTRO implementations using UEM, AES is required for secure SNMPv3 operation (as opposed to "Clear" operation).

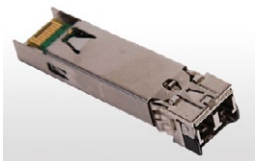
P/N	Description
WB3555	PTP 800 Series AES License Key 128bit - End only
WB3556	PTP 800 Series AES License Key 256bit - End only

2.5 PTP 800 CMU ACCESSORIES

2.5.1 OPTICAL INTERFACE

You can choose SFP plug-in modules to enable fiber Gig-E interfaces on a PTP 800 CMU. No license key is required to enable the fiber port. Two different SFP modules are available:

P/N	Description
01010430001	SFP SX Gig-E Optical Pluggable Module - 850 nm
01010431001	SFP LX Gig-E Optical Pluggable Module - 1310 nm



2.5.2 PTP 800 CMU RACK MOUNT KIT

Two CMUs can be mounted on a 19-inch rack using a single CMU rack mount kit.

P/N	Description
WB3486H	PTP 800 CMU/PTP-SYNC 19-inch Rack Mount Installation Kit

2.5.3 PTP 800 AC/DC CONVERTER AND MAINS LEAD

The PTP 800 CMU uses -48 VDC input. If you have AC only, the AC/DC converter supports AC to DC conversion. The input power range is 90 ~ 264 Vac. In addition, you need to order one mains lead cable separately.

P/N	Description
WB3622A	AC-DC Power Supply Converter (no lead cable included)
WB3618A	Mains Lead - US 3pin to C5 (PTP 800 AC-DC PSU)
WB3619A	Mains Lead - UK 3pin to C5 (PTP 800 AC-DC PSU)
WB3620A	Mains Lead – EU with dual earth to C5 (PTP 800 AC-DC PSU)
WB3621A	Mains Lead – AUS 3pin to C5 (PTP 800 AC-DC PSU)

2.5.4 PTP 800 1+1 HOT STANDBY KITS

You may need to purchase a 1+1 Protection Kit for certain configurations. Two different Protection Kits are supported for the PTP 800:

- **1+1 Protection Kit – Optical-Y:** For 1+1 Optical-Y configurations, one kit is required per end. The kit includes two 850 nm multi-mode Gig-E SFP modules and two, two-meter Fiber Gig-E Y-cables (one cable for the Tx split and one cable for the Rx split).
- **1+1 Protection Kit – Out-of-Band Management (OOBM):** For 1+1 OOBM configurations, one kit is required per end. The kit includes one 4 RJ-45 port box which is used to split the OOBM from the CMU management port.

1+1 Optical-Y Splitter Kit

1+1 Out-of-Band Splitter

P/N	Description
WB3806H	1+1 Optical-Y Splitter Kit (per end, includes SFP modules – 850 nm)
WB3807H	1+1 Out-of-Band Splitter Kit (per end)

2.6 PTP 810 MMU ACCESSORIES

2.6.1 PTP 810 MMU SPARE MODULE CARDS

The PTP 810 has a modular achitecture. In the case of hardware failure, there is no need to exchange the complete MMU, only the defected module or chassis would need to be replaced.

The following provides the PNs for the spare cards and chassis.

P/N	Description
N000081H005A	PTP 810 MMU Control Module
C000081H002A	PTP 810 MMU Modem Module
N000081H015A	PTP 810 MMU Power Supply Module
N000081H004A	PTP 810 MMU Chassis
N000081H016A	PTP 810 MMU Standard Master I/O module
N000081H012A	PTP 810 MMU GigE Master I/O module

PTP 810 MMU
Control Module

PTP 810 MMU
Modem Module

PTP 810 MMU
Power Supply Module

PTP 810 MMU
Chassis

PTP 810 MMU Standard Master I/O Module

PTP 810 MMU GigE Master I/O Module

PTP 810 MMU GigE Master
I/O Module (Top View)

PTP 810 MMU Super PDH Master I/O Module

2.6.2 PTP 810 MMU EXPANSION I/O MODULE

PTP 810 systems have a modular achitecture. By adding an addtional I/O module, the PTP 810 MMU can provide you with additional T1/E1 ports.

P/N	Description
N000081H006A	PTP 810 MMU Expansion I/O: 16xE1/T1
N000081H011A	PTP 810 MMU Expansion I/O: 21xE1/T1

2.6.3 PTP 810 MMU UPGRADE KIT

The control module and master I/O module can be shared within a PTP 810 MMU. With a PTP 810 MMU upgrade kit, a PTP 810 can be upgraded from a single modem setup to a dual modem setup. The dual modem setup provides redundancy on the power supply and supports a 1+1 or 2+0 configuration. The upgrade kit contains two modules – a power supply module and the modem module.

P/N	Description
C000081H001A	PTP 810 MMU Dual Modem upgrade kit, Power Supply Module + Modem Module

2.6.4 PTP 810 AC/DC CONVERTER AND MAINS LEAD

The PTP 810 MMU uses -48 VDC input. If you have AC only, the AC/DC converter supports AC to DC conversion. The input power range is 90 ~ 264 Vac.

The AC/DC power adapter comes with the U.S. mains power lead. There is no need to order it separately.

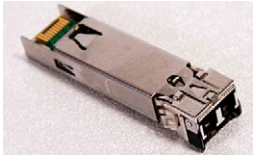
For other regions with different mains power lead requirements, you need to order the mains lead cable separately.

P/N	Description
N000081L002A	PTP 810 AC to DC power adaptor
C000025L003A	3-pin IEC Mains Power Lead (UK), Spare
C000025L004A	3-pin IEC Mains Power Lead (EU), Spare
C000025L005A	3-pin IEC Mains Power Lead (AUS), Spare

2.6.5 OPTICAL INTERFACE

A PTP 810 MMU shares the same SFP plug-in modules as the PTP 800 to enable fiber Gig-E interfaces on PTP 810 Gig-E I/O modules. No license key is required to enable the fiber port. Two different SFP modules are available:

P/N	Description
01010430001	SFP SX Gig-E Optical Pluggable Module - 850 nm
01010431001	SFP LX Gig-E Optical Pluggable Module - 1310 nm



3. RADIO FREQUENCY (RF) UNITS

The PTP 800 and PTP 810 support the same RF Units (ODU-A, ODU-B and IRFU), with various frequency and configurations for different network requirements.

Configuration	Components
Split-Mount Installation	Supported by both PTP800 CMU and PTP810 MMU: • ODU-A (6-38 GHz, ETSI & FCC/IC) • ODU-B (11/18/23 GHz, FCC/IC only)
	PTP800 CMU to ODU Connection: Coaxial Cable, N-type (CMU) to N-type (ODU) connectors
	PTP 810 MMU to ODU Connection: Coaxial Cable, TNC-type (MMU) to N-type (ODU) connectors
All-Indoor Installation	Supported by both PTP 800 CMU and PTP 810 MMU: • IRFU (FCC/IC 6 and 11 GHz, FCC 7 GHz)
	PTP 800 CMU to IRFU Connection: Coaxial Cable, N-type (CMU) to SMA (IRFU) connectors
	PTP 810 MMU to IRFU Connection: Coaxial Cable, TNC-type (MMU) to SMA (IRFU) connectors

ODU-A **IRFU** **ODU-B**

3.1 ODU-A AND ODU-B ORDERING GUIDANCE

ODU-A and ODU-B are designed for split-mount installation with the ODU installed outdoors. The ODU can be directly attached to the antenna or remote mounted using a short flexible waveguide that is connected to the antenna.

If you want to deploy the 6 and 11 GHz ODU-A in an all-indoor installation with an elliptical waveguide, please consult your Cambium Regional Technical Manager for detailed guidance.

ODU-A all indoor installation is only supported by PTP800 CMU. We do not recommend using the ODU-B for any all-indoor installation.

To order the correct ODU SKUs, you must choose the correct T/R spacing that complies with local regulatory rules and the correct sub-band that covers the channel frequency you have licensed. For a complete link, the ODUs must be ordered in pairs, with one end on Tx-Hi and one end on Tx-Lo, such as:

SAMPLE ODU PAIRING
ODU-A 18GHz, TR1560, Lo, B3 (17700.0 - 18140.0 MHz), Rectangular WG, Neg Pol
ODU-A 18GHz, TR1560, Hi, B3 (19260.0 - 19700.0 MHz), Rectangular WG, Neg Pol

ODU-A and ODU-B share the same antenna interface with the same mechanical size of mounting clips. When compared with ODU-A, ODU-B offers higher transmit power, lower power consumption and less weight.

- ODU-B shares the same antenna interface as ODU-A and can be direct mounted with all Mot-interface antennas.
- ODU-B supports FCC/IC 11, 18 and 23 GHz.
- ODU-B supports the same channel plan, bandwidth and modulation as ODU-A on 11, 18 and 23 GHz bands,
- The FCC-regulation 18 GHz ODU-B supports the 80 MHz channel from QPSK up to 256 QAM.
- ODU-B has higher transmit power than ODU-A:
  - For FCC/IC 11 GHz, the maximum transmit power is increased by 1 dB @ 64/128/256 QAM.
  - For FCC/IC 18 and 23 GHz, the maximum transmit power is increased by 2 dB @ 64/128/256 QAM.
- ODU-B is "greener and lighter" than ODU-A:
  - As much as 29% less power consumption
  - As much as 15% less weight

The following tables provide ODU-A and ODU-B ordering information.

Standard	ODU-A P/N	ODU-A Description	Main Frequency	T/R Spacing	Sub-Band
ETSI & FCC	01010411007	ODU-A 6GHz,TR252, Lo, B1 (5925.0 - 6025.0 MHz), Rectangular WG, Neg Pol	L6 ODU-A	252.04 MHz	B1-Lo
	01010411008	ODU-A 6GHz,TR252, Hi, B1 (6175.0- 6275.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	01010411009	ODU-A 6GHz,TR252, Lo, B2 (6000.0 - 6100.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	01010411010	ODU-A 6GHz,TR252, Hi, B2 (6250.0 - 6350.0 MHz), Rectangular WG, Neg Pol			B2-Hi
	01010411011	ODU-A 6GHz,TR252, Lo, B3 (6075.0 - 6175.0 MHz), Rectangular WG, Neg Pol			B3-Lo
	01010411012	ODU-A 6GHz,TR252, Hi, B3 (6325.0 - 6425.0 MHz), Rectangular WG, Neg Pol			B3-Hi
FCC	01010411024	ODU-A GHz, TR160, Lo, B1 (6580.0 – 6640.0 MHz), Rectangular WB, Neg Pol	U6 ODU-A	160 MHz	B1-Lo
	01010411022	ODU-A GHz, TR160, Hi, B1 (6740.0 – 6800.0 MHz), Rectangular WB, Neg Pol			B1-Hi
	01010411025	ODU-A GHz, TR160, Lo, B2 (6640.0 – 6710.0 MHz), Rectangular WB, Neg Pol			B2-Lo
	01010411023	ODU-A GHz, TR160, Hi, B2 (6800.0 – 6870.0 MHz), Rectangular WB, Neg Pol			B2-Hi
FCC	01010411027	ODU-A GHz, TR170, Lo, B1 (6530.0 – 6580.0 MHz), Rectangular WB, Neg Pol	U6 ODU-A	170 MHz	B1-Lo
	01010411026	ODU-A GHz, TR170, Hi, B1 (6700.0 – 6750.0 MHz), Rectangular WB, Neg Pol			B1-Hi
ETSI	01010411013	ODU-A 6GHz, TR340, Lo, B1 (6430.0 - 6540.0 MHz), Rectangular WG, Neg Pol	U6 ODU-A	340 MHz	B1-Lo
	01010411014	ODU-A 6GHz, TR340, Hi, B1 (6770.0 - 6880.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	01010411015	ODU-A 6GHz, TR340, Lo, B2 (6520.0 - 6630.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	01010411016	ODU-A 6GHz, TR340, Hi, B2 (6860.0 - 6970.0 MHz), Rectangular WG, Neg Pol			B2-Hi
	01010411017	ODU-A 6GHz, TR340, Lo, B3 (6600.0 - 6710.0 MHz), Rectangular WG, Neg Pol			B3-Lo
	01010411018	ODU-A 6GHz, TR340, Hi, B3 (6940.0 - 7050.0 MHz), Rectangular WG, Neg Pol			B3-Hi
	01010411019	ODU-A 6GHz, TR340, Lo, B4 (6670.0 - 6780.0 MHz), Rectangular WG, Neg Pol			B4-Lo
	01010411020	ODU-A 6GHz, TR340, Hi, B4 (7010.0 - 7120.0 MHz), Rectangular WG, Neg Pol			B4-Hi

Standard	ODU-A P/N	ODU-A Description	Main Frequency	T/R Spacing	Sub-Band
ETSI	01010610001	ODU-A 7GHz, TR154, Lo, B1 (7428.0 - 7484.0 MHz), Circular WG, Neg Pol	7 GHz ODU-A	154 MHz	B1-Lo
	01010610002	ODU-A 7GHz, TR154, Hi, B1 (7582.0 - 7638.0 MHz), Circular WG, Neg Pol			B1-Hi
	01010610003	ODU-A 7GHz, TR154, Lo, B2 (7470.0 - 7526.0 MHz), Circular WG, Neg Pol			B2-Lo
	01010610004	ODU-A 7GHz, TR154, Hi, B2 (7624.0 - 7680.0 MHz), Circular WG, Neg Pol			B2-Hi
	01010610005	ODU-A 7GHz, TR154, Lo, B3 (7512.0 - 7568.0 MHz), Circular WG, Neg Pol			B3-Lo
	01010610006	ODU-A 7GHz, TR154, Hi, B3 (7666.0 - 7722.0 MHz), Circular WG, Neg Pol			B3-Hi
ETSI	01010610013	ODU-A 7GHz, TR161, Lo, B1 (7114.0 - 7177.0 MHz), Circular WG, Neg Pol	7 GHz ODU-A	161 MHz	B1-Lo
	01010610014	ODU-A 7GHz, TR161, Hi, B1 (7275.0 - 7338.0 MHz), Circular WG, Neg Pol			B1-Hi
	01010610015	ODU-A 7GHz, TR161, Lo, B2 (7149.0 - 7212.0 MHz), Circular WG, Neg Pol			B2-Lo
	01010610016	ODU-A 7GHz, TR161, Hi, B2 (7310.0 - 7373.0 MHz), Circular WG, Neg Pol			B2-Hi
	01010610017	ODU-A 7GHz, TR161, Lo, B3 (7184.0 - 7247.0 MHz), Circular WG, Neg Pol			B3-Lo
	01010610018	ODU-A 7GHz, TR161, Hi, B3 (7345.0 - 7408.0 MHz), Circular WG, Neg Pol			B3-Hi
	01010610019	ODU-A 7GHz, TR161, Lo, B4 (7219.0 - 7282.0 MHz), Circular WG, Neg Pol			B4-Lo
	01010610020	ODU-A 7GHz, TR161, Hi, B4 (7380.0 - 7443.0 MHz), Circular WG, Neg Pol			B4-Hi
	01010610021	ODU-A 7GHz, TR161, Lo, B5 (7239.0 - 7302.0 MHz), Circular WG, Neg Pol			B5-Lo
	01010610022	ODU-A 7GHz, TR161, Hi, B5 (7400.0 - 7463.0 MHz), Circular WG, Neg Pol			B5-Hi
	01010610023	ODU-A 7GHz, TR161, Lo, B6 (7274.0 - 7337.0 MHz), Circular WG, Neg Pol			B6-Lo
	01010610024	ODU-A 7GHz, TR161, Hi, B6 (7435.0 - 7498.0 MHz), Circular WG, Neg Pol			B6-Hi
	01010610025	ODU-A 7GHz, TR161, Lo, B7 (7309.0 - 7372.0 MHz), Circular WG, Neg Pol			B7-Lo
	01010610026	ODU-A 7GHz, TR161, Hi, B7 (7470.0 - 7533.0 MHz), Circular WG, Neg Pol			B7-Hi
	01010610027	ODU-A 7GHz, TR161, Lo, B8 (7344.0 - 7407.0 MHz), Circular WG, Neg Pol			B8-Lo
	01010610028	ODU-A 7GHz, TR161, Hi, B8 (7505.0 - 7568.0 MHz), Circular WG, Neg Pol			B8-Hi
	01010610029	ODU-A 7GHz, TR161, Lo, B9 (7414.0 - 7477.0 MHz), Circular WG, Neg Pol			B9-Lo
	01010610030	ODU-A 7GHz, TR161, Hi, B9 (7575.0 - 7638.0 MHz), Circular WG, Neg Pol			B9-Hi
	01010610031	ODU-A 7GHz, TR161, Lo, B10 (7449.0 - 7512.0 MHz), Circular WG, Neg Pol			B10-Lo
	01010610032	ODU-A 7GHz, TR161, Hi, B10 (7610.0 - 7673.0 MHz), Circular WG, Neg Pol			B10-Hi
	01010610033	ODU-A 7GHz, TR161, Lo, B21 (7484.0 - 7547.0 MHz), Circular WG, Neg Pol			B21-Lo
	01010610034	ODU-A 7GHz, TR161, Hi, B21 (7645.0 - 7708.0 MHz), Circular WG, Neg Pol			B21-Hi

Standard	ODU-A P/N	ODU-A Description	Main Frequency	T/R Spacing	Sub-Band
ETSI	01010610035	ODU-A 7GHz, TR161, Lo, B22 (7519.0 - 7582.0 MHz), Circular WG, Neg Pol	7 GHz ODU-A	161 MHz	B22-Lo
	01010610036	ODU-A 7GHz, TR161, Hi, B22 (7680.0 - 7743.0 MHz), Circular WG, Neg Pol			B22-Hi
	01010610037	ODU-A 7GHz, TR161, Lo, B23 (7539.0 - 7602.0 MHz), Circular WG, Neg Pol			B23-Lo
	01010610038	ODU-A 7GHz, TR161, Hi, B23 (7700.0 - 7763.0 MHz), Circular WG, Neg Pol			B23-Hi
	01010610039	ODU-A 7GHz, TR161, Lo, B24 (7574.0 - 7637.0 MHz), Circular WG, Neg Pol			B24-Lo
	01010610040	ODU-A 7GHz, TR161, Hi, B24 (7735.0 - 7798.0 MHz), Circular WG, Neg Pol			B24-Hi
	01010610041	ODU-A 7GHz, TR161, Lo, B25 (7609.0 - 7672.0 MHz), Circular WG, Neg Pol			B25-Lo
	01010610042	ODU-A 7GHz, TR161, Hi, B25 (7770.0 - 7833.0 MHz), Circular WG, Neg Pol			B25-Hi
	01010610043	ODU-A 7GHz, TR161, Lo, B26 (7644.0 - 7707.0 MHz), Circular WG, Neg Pol			B26-Lo
	01010610044	ODU-A 7GHz, TR161, Hi, B26 (7805.0 - 7868.0 MHz), Circular WG, Neg Pol			B26-Hi
ETSI	01010610062	ODU-A 7GHz, TR168, Lo, B1 (7443.0 - 7499.0 MHz), Circular WG, Neg Pol	7 GHz ODU-A	168 MHz	B1-Lo
	01010610063	ODU-A 7GHz, TR168, Hi, B1 (7611.0 - 7667.0 MHz), Circular WG, Neg Pol			B1-Hi
	01010610064	ODU-A 7GHz, TR168, Lo, B2 (7485.0 - 7541.0 MHz), Circular WG, Neg Pol			B2-Lo
	01010610065	ODU-A 7GHz, TR168, Hi, B2 (7653.0 - 7709.0 MHz), Circular WG, Neg Pol			B2-Hi
	01010610066	ODU-A 7GHz, TR168, Lo, B3 (7527.0 - 7583.0 MHz), Circular WG, Neg Pol			B3-Lo
	01010610067	ODU-A 7GHz, TR168, Hi, B3 (7695.0 - 7751.0 MHz), Circular WG, Neg Pol			B3-Hi
ETSI	01010610045	ODU-A 7GHz, TR196, Lo, B1 (7093.0 - 7149.0 MHz), Circular WG, Neg Pol	7 GHz ODU-A	196 MHz	B1-Lo
	01010610046	ODU-A 7GHz, TR196, Hi, B1 (7289.0 - 7345.0 MHz), Circular WG, Neg Pol			B1-Hi
	01010610047	ODU-A 7GHz, TR196, Lo, B2 (7121.0 - 7177.0 MHz), Circular WG, Neg Pol			B2-Lo
	01010610048	ODU-A 7GHz, TR196, Hi, B2 (7317.0 - 7373.0 MHz), Circular WG, Neg Pol			B2-Hi
	01010610049	ODU-A 7GHz, TR196, Lo, B3 (7149.0 - 7205.0 MHz), Circular WG, Neg Pol			B3-Lo
	01010610050	ODU-A 7GHz, TR196, Hi, B3 (7345.0 - 7401.0 MHz), Circular WG, Neg Pol			B3-Hi
	01010610051	ODU-A 7GHz, TR196, Lo, B4 (7177.0 - 7233.0 MHz), Circular WG, Neg Pol			B4-Lo
	01010610052	ODU-A 7GHz, TR196, Hi, B4 (7373.0 - 7429.0 MHz), Circular WG, Neg Pol			B4-Hi
	01010610053	ODU-A 7GHz, TR196, Lo, B5 (7205.0 - 7261.0 MHz), Circular WG, Neg Pol			B5-Lo
	01010610054	ODU-A 7GHz, TR196, Hi, B5 (7401.0 - 7457.0 MHz), Circular WG, Neg Pol			B5-Hi
ETSI	01010610055	ODU-A 7GHz, TR245, Lo, B1 (7400.0 - 7484.0 MHz), Circular WG, Neg Pol	7 GHz ODU-A	245 MHz	B1-Lo
	01010610056	ODU-A 7GHz, TR245, Hi, B1 (7645.0 - 7729.0 MHz), Circular WG, Neg Pol			B1-Hi

Standard	ODU-A P/N	ODU-A Description	Main Frequency	T/R Spacing	Sub-Band
ETSI	01010610057	ODU-A 7GHz, TR245, Lo, B2 (7484.0 - 7568.0 MHz), Circular WG, Neg Pol	7 GHz ODU-A	245 MHz	B2-Lo
	01010610058	ODU-A 7GHz, TR245, Hi, B2 (7729.0 - 7813.0 MHz), Circular WG, Neg Pol			B2-Hi
	01010610059	ODU-A 7GHz, TR245, Lo, B3 (7568.0 - 7652.0 MHz), Circular WG, Neg Pol			B3-Lo
	01010610060	ODU-A 7GHz, TR245, Hi, B3 (7813.0 - 7897.0 MHz), Circular WG, Neg Pol			B3-Hi
NTIA	01010610068	ODU-A 7 GHz, TR300, Lo, B1 (7090.0 – 7210.0 MHz) Circular WG, Neg Pol	7 GHz ODU-A	300 MHz	B1-Lo
	01010610069	ODU-A 7 GHz, TR300, Hi, B1 (7390.0 – 7510.0 MHz) Circular WG, Neg Pol			B1-Hi
	01010610070	ODU-A 7 GHz, TR300, Lo, B2 (7210.0 – 7330.0 MHz) Circular WG, Neg Pol			B2-Lo
	01010610071	ODU-A 7 GHz, TR300, Hi, B2 (7510.0 – 7630.0 MHz) Circular WG, Neg Pol			B2-Hi
	01010610072	ODU-A 7 GHz, TR300, Lo, B3 (7330.0 – 7450.0 MHz) Circular WG, Neg Pol			B3-Lo
	01010610073	ODU-A 7 GHz, TR300, Hi, B3 (7630.0 – 7750.0 MHz) Circular WG, Neg Pol			B3-Hi
ETSI	01010611001	ODU-A 8GHz, TR119 / 126, Lo, B1 (8279.0 - 8307.0 MHz), Circular WG, Neg Pol	8 GHz ODU-A	119 & 126 MHz	B1-Lo
	01010611002	ODU-A 8GHz, TR119 / 126, Hi, B1 (8398.0 - 8426.0 MHz), Circular WG, Neg Pol			B1-Hi
	01010611003	ODU-A 8GHz, TR119 / 126, Lo, B2 (8293.0 - 8321.0 MHz), Circular WG, Neg Pol			B2-Lo
	01010611004	ODU-A 8GHz, TR119 / 126, Hi, B2 (8412.0 - 8440.0 MHz), Circular WG, Neg Pol			B2-Hi
	01010611005	ODU-A 8GHz, TR119 / 126, Lo, B3 (8307.0 - 8335.0 MHz), Circular WG, Neg Pol			B3-Lo
	01010611006	ODU-A 8GHz, TR119 / 126, Hi, B3 (8426.0 - 8454.0 MHz), Circular WG, Neg Pol			B3-Hi
	01010611007	ODU-A 8GHz, TR119 / 126, Lo, B4 (8321.0 - 8349.0 MHz), Circular WG, Neg Pol			B4-Lo
	01010611008	ODU-A 8GHz, TR119 / 126, Hi, B4 (8440.0 - 8468.0 MHz), Circular WG, Neg Pol			B4-Hi
	01010611009	ODU-A 8GHz, TR119 / 126, Lo, B5 (8335.0 - 8363.0 MHz), Circular WG, Neg Pol			B5-Lo
	01010611010	ODU-A 8GHz, TR119 / 126, Hi, B5 (8454.0 - 8482.0 MHz), Circular WG, Neg Pol			B5-Hi
	01010611011	ODU-A 8GHz, TR119 / 126, Lo, B6 (8349.0 - 8377.0 MHz), Circular WG, Neg Pol			B6-Lo
	01010611012	ODU-A 8GHz, TR119 / 126, Hi, B6 (8468.0 - 8496.0 MHz), Circular WG, Neg Pol			B6-Hi
ETSI	01010611019	ODU-A 8GHz, TR208, Lo, B1 (8043.0 - 8113.0 MHz), Circular WG, Neg Pol	8 GHz ODU-A	208 MHz	B1-Lo
	01010611020	ODU-A 8GHz, TR208, Hi, B1 (8251.0 - 8321.0 MHz), Circular WG, Neg Pol			B1-Hi
	01010611021	ODU-A 8GHz, TR208, Lo, B2 (8099.0 - 8169.0 MHz), Circular WG, Neg Pol			B2-Lo
	01010611022	ODU-A 8GHz, TR208, Hi, B2 (8307.0 - 8377.0 MHz), Circular WG, Neg Pol			B2-Hi
	01010611023	ODU-A 8GHz, TR208, Lo, B3 (8155.0 - 8225.0 MHz), Circular WG, Neg Pol			B3-Lo
	01010611024	ODU-A 8GHz, TR208, Hi, B3 (8363.0 - 8433.0 MHz), Circular WG, Neg Pol			B3-Hi

Standard	ODU-A P/N	ODU-A Description	Main Frequency	T/R Spacing	Sub-Band
ETSI	01010611025	ODU-A 8GHz, TR208, Lo, B4 (8211.0 - 8281.0 MHz), Circular WG, Neg Pol	8 GHz ODU-A	208 MHz	B4-Lo
	01010611026	ODU-A 8GHz, TR208, Hi, B4 (8419.0 - 8489.0 MHz), Circular WG, Neg Pol			B4-Hi
ETSI	01010611027	ODU-A 8GHz, TR266, Lo, B1 (7905.0 - 8024.0 MHz), Circular WG, Neg Pol	8 GHz ODU-A	266 MHz	B1-Lo
	01010611028	ODU-A 8GHz, TR266, Hi, B1 (8171.0 - 8290.0 MHz), Circular WG, Neg Pol			B1-Hi
	01010611029	ODU-A 8GHz, TR266, Lo, B2 (8017.0 - 8136.0 MHz), Circular WG, Neg Pol			B2-Lo
	01010611030	ODU-A 8GHz, TR266, Hi, B2 (8283.0 - 8402.0 MHz), Circular WG, Neg Pol			B2-Hi
ETSI	01010611031	ODU-A 8GHz, TR311, Lo, B2 (7835.0 - 7971.0 MHz), Circular WG, Neg Pol	8 GHz ODU-A	311.32 MHz	B2-Lo
	01010611032	ODU-A 8GHz, TR311, Hi, B2 (8146.0 - 8282.0 MHz), Circular WG, Neg Pol			B2-Hi
	01010611033	ODU-A 8GHz, TR311, Lo, B3 (7717.0 - 7867.0 MHz), Circular WG, Neg Pol			B3-Lo
	01010611034	ODU-A 8GHz, TR311, Hi, B3 (8028.0 - 8178.0 MHz), Circular WG, Neg Pol			B3-Hi
NTIA	01010611036	ODU-A 8 GHz, TR360, Lo, B1 (7750.0 – 7870.0 MHz), Circular WG, Net Pol	8 GHz ODU-A	360 MHz	B1-Lo
	01010611037	ODU-A 8 GHz, TR360, Hi, B1 (8110.0 – 8230.0 MHz), Circular WG, Net Pol			B1-Hi
	01010611038	ODU-A 8 GHz, TR360, Lo, B2 (7870.0 – 7990.0 MHz), Circular WG, Net Pol			B2-Lo
	01010611039	ODU-A 8 GHz, TR360, Hi, B2 (8230.0 – 8350.0 MHz), Circular WG, Net Pol			B2-Hi
	01010611040	ODU-A 8 GHz, TR360, Lo, B3 (7990.0 – 8110.0 MHz), Circular WG, Net Pol			B3-Lo
	01010611041	ODU-A 8 GHz, TR360, Hi, B3 (8350.0 – 8470.0 MHz), Circular WG, Net Pol			B3-Hi
FCC & ETSI	1010208001	ODU-A 11GHz, TR 490 & 500, Lo, B5 (10700.0 - 10890.0 MHz), Rectangular WG, Neg Pol	11 GHz ODU-A	490 & 500 MHz	B5-Lo
	1010208002	ODU-A 11GHz, TR 490 & 500, Hi, B5 (11200.0 - 11390.0 MHz), Rectangular WG, Neg Pol			B5-Hi
	1010208003	ODU-A 11GHz, TR 490 & 500, Lo, B6 (10855.0 - 11045.0 MHz), Rectangular WG, Neg Pol			B6-Lo
	1010208004	ODU-A 11GHz, TR 490 & 500, Hi, B6 (11355.0 - 11545.0 MHz), Rectangular WG, Neg Pol			B6-Hi
	1010208005	ODU-A 11GHz, TR 490 & 500, Lo, B7 (11010.0 - 11200.0 MHz), Rectangular WG, Neg Pol			B7-Lo
	1010208006	ODU-A 11GHz, TR 490 & 500, Hi, B7 (11510.0 - 11700.0 MHz), Rectangular WG, Neg Pol			B7-Hi
ETSI	01010208007	ODU-A 11GHz, TR530, Lo, B1 (10675.0 - 10855.0 MHz), Rectangular WG, Neg Pol	11 GHz ODU-A	530 MHz	B1-Lo
	01010208008	ODU-A 11GHz, TR530, Hi, B1 (11205.0 - 11385.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	01010208009	ODU-A 11GHz, TR530, Lo, B2 (10795.0 - 10975.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	01010208010	ODU-A 11GHz, TR530, Hi, B2 (11325.0 - 11505.0 MHz), Rectangular WG, Neg Pol			B2-Hi
	01010208011	ODU-A 11GHz, TR530, Lo, B3 (10915.0 - 11135.0 MHz), Rectangular WG, Neg Pol			B3-Lo
	01010208012	ODU-A 11GHz, TR530, Hi, B3 (11445.0 - 11665.0 MHz), Rectangular WG, Neg Pol			B3-Hi

Standard	ODU-A P/N	ODU-A Description	Main Frequency	T/R Spacing	Sub-Band
ETSI	01010208013	ODU-A 11GHz, TR530, Lo, B4 (11035.0 - 11215.0 MHz), Rectangular WG, Neg Pol	11 GHz ODU-A	530 MHz	B4-Lo
	01010208014	ODU-A 11GHz, TR530, Hi, B4 (11565.0 - 11745.0 MHz), Rectangular WG, Neg Pol			B4-Hi
ETSI	01010583001	ODU-A 13GHz, TR266, Lo, B1 (12751.0 - 12814.0 MHz), Rectangular WG, Neg Pol	13 GHz ODU-A	266 MHz	B1-Lo
	01010583002	ODU-A 13GHz, TR266, Hi, B1 (13017.0 - 13080.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	01010583003	ODU-A 13GHz, TR266, Lo, B2 (12807.0 - 12870.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	01010583004	ODU-A 13GHz, TR266, Hi, B2 (13073.0 - 13136.0 MHz), Rectangular WG, Neg Pol			B2-Hi
	01010583005	ODU-A 13GHz, TR266, Lo, B3 (12863.0 - 12926.0 MHz), Rectangular WG, Neg Pol			B3-Lo
	01010583006	ODU-A 13GHz, TR266, Hi, B3 (13129.0 - 13192.0 MHz), Rectangular WG, Neg Pol			B3-Hi
	01010583007	ODU-A 13GHz, TR266, Lo, B4 (12919.0 - 12982.0 MHz), Rectangular WG, Neg Pol			B4-Lo
	01010583008	ODU-A 13GHz, TR266, Hi, B4 (13185.0 - 13248.0 MHz), Rectangular WG, Neg Pol			B4-Hi
ETSI	01010584022	ODU-A 15GHz, TR315, Lo, B1 (14627.0 - 14746.0 MHz), Rectangular WG, Neg Pol	15 GHz ODU-A	315 MHz	B1-Lo
	01010584023	ODU-A 15GHz, TR315, Hi, B1 (14942.0 - 15061.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	01010584024	ODU-A 15GHz, TR315, Lo, B2 (14725.0 - 14844.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	01010584025	ODU-A 15GHz, TR315, Hi, B2 (15040.0 - 15159.0 MHz), Rectangular WG, Neg Pol			B2-Hi
	01010584026	ODU-A 15GHz, TR315, Lo, B3 (14823.0 - 14942.0 MHz), Rectangular WG, Neg Pol			B3-Lo
	01010584027	ODU-A 15GHz, TR315, Hi, B3 (15138.0 - 15257.0 MHz), Rectangular WG, Neg Pol			B3-Hi
ETSI	01010584001	ODU-A 15GHz, TR420, Lo, B4 (14501.0 - 14613.0 MHz), Rectangular WG, Neg Pol	15 GHz ODU-A	420 MHz	B4-Lo
	01010584002	ODU-A 15GHz, TR420, Hi, B4 (14921.0 - 15033.0 MHz), Rectangular WG, Neg Pol			B4-Hi
	01010584003	ODU-A 15GHz, TR420, Lo, B5 (14606.0 - 14725.0 MHz), Rectangular WG, Neg Pol			B5-Lo
	01010584004	ODU-A 15GHz, TR420, Hi, B5 (15026.0 - 15145.0 MHz), Rectangular WG, Neg Pol			B5-Hi
	01010584005	ODU-A 15GHz, TR420, Lo, B6 (14718.0 - 14837.0 MHz), Rectangular WG, Neg Pol			B6-Lo
	01010584006	ODU-A 15GHz, TR420, Hi, B6 (15138.0 - 15257.0 MHz), Rectangular WG, Neg Pol			B6-Hi
	01010584007	ODU-A 15GHz, TR420, Lo, B7 (14816.0 - 14928.0 MHz), Rectangular WG, Neg Pol			B7-Lo
	01010584008	ODU-A 15GHz, TR420, Hi, B7 (15236.0 - 15348.0 MHz), Rectangular WG, Neg Pol			B7-Hi
ETSI	01010584009	ODU-A 15GHz, TR490, Lo, B4 (14403.0 - 14522.0 MHz), Rectangular WG, Neg Pol	15 GHz ODU-A	490 MHz	B4-Lo
	01010584010	ODU-A 15GHz, TR490, Hi, B4 (14893.0 - 15012.0 MHz), Rectangular WG, Neg Pol			B4-Hi
	01010584011	ODU-A 15GHz, TR490, Lo, B5 (14515.0 - 14634.0 MHz), Rectangular WG, Neg Pol			B5-Lo
	01010584012	ODU-A 15GHz, TR490, Hi, B5 (15005.0 - 15124.0 MHz), Rectangular WG, Neg Pol			B5-Hi

Standard	ODU-A P/N	ODU-A Description	Main Frequency	T/R Spacing	Sub-Band
ETSI	01010584013	ODU-A 15GHz, TR490, Lo, B6 (14627.0 - 14746.0 MHz), Rectangular WG, Neg Pol	15 GHz ODU-A	490 MHz	B6-Lo
	01010584014	ODU-A 15GHz, TR490, Hi, B6 (15117.0 - 15236.0 MHz), Rectangular WG, Neg Pol			B6-Hi
	01010584015	ODU-A 15GHz, TR490, Lo, B7 (14739.0 - 14858.0 MHz), Rectangular WG, Neg Pol			B7-Lo
	01010584016	ODU-A 15GHz, TR490, Hi, B7 (15229.0 - 15348.0 MHz), Rectangular WG, Neg Pol			B7-Hi
ETSI	01010584028	ODU-A 15GHz, TR644, Lo, B1 (14400.0 - 14512.0 MHz), Rectangular WG, Neg Pol	15 GHz ODU-A	644 MHz	B1-Lo
	01010584029	ODU-A 15GHz, TR644, Hi, B1 (15044.0 - 15156.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	01010584030	ODU-A 15GHz, TR644, Lo, B2 (14498.0 - 14610.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	01010584031	ODU-A 15GHz, TR644, Hi, B2 (15142.0 - 15254.0 MHz), Rectangular WG, Neg Pol			B2-Hi
	01010584032	ODU-A 15GHz, TR644, Lo, B3 (14596.0 - 14708.0 MHz), Rectangular WG, Neg Pol			B3-Lo
	01010584033	ODU-A 15GHz, TR644, Hi, B3 (15240.0 - 15352.0 MHz), Rectangular WG, Neg Pol			B3-Hi
ETSI	01010584020	ODU-A 15GHz, TR728, Lo B2 (14500.0 - 14625.0 MHz), Rectangular WG, Neg Pol	15 GHz ODU-A	728 MHz	B2-Lo
	01010584021	ODU-A 15GHz, TR728, Hi B2 (15228.0 - 15353.0 MHz), Rectangular WG, Neg Pol			B2-Hi
ETSI	1010209001	ODU-A 18GHz, TR1010 & 1008, Lo, B1 (17685.0 - 17985.0 MHz), Rectangular WG, Neg Pol	18 GHz ODU-A	1010 & 1008 MHz	B1-Lo
	1010209002	ODU-A 18GHz, TR1010 & 1008, Hi, B1 (18695.0 - 18995.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	1010209003	ODU-A 18GHz, TR1010 & 1008, Lo, B2 (17930.0 - 18230.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	1010209004	ODU-A 18GHz, TR1010 & 1008, Hi, B2 (18940.0 - 19240.0 MHz), Rectangular WG, Neg Pol			B2-Hi
	1010209005	ODU-A 18GHz, TR1010 & 1008, Lo, B3 (18180.0 - 18480.0 MHz), Rectangular WG, Neg Pol			B3-Lo
	1010209006	ODU-A 18GHz, TR1010 & 1008, Hi, B3 (19190.0 - 19490.0 MHz), Rectangular WG, Neg Pol			B3-Hi
	1010209007	ODU-A 18GHz, TR1010 & 1008, Lo, B4 (18400.0 - 18700.0 MHz), Rectangular WG, Neg Pol			B4-Lo
	1010209008	ODU-A 18GHz, TR1010 & 1008, Hi, B4 (19410.0 - 19710.0 MHz), Rectangular WG, Neg Pol			B4-Hi
FCC	1010209013	ODU-A 18GHz, TR1560, Lo, B3 (17700.0 - 18140.0 MHz), Rectangular WG, Neg Pol	18 GHz ODU-A	1560 MHz	B3-Lo
	1010209014	ODU-A 18GHz, TR1560, Hi, B3 (19260.0 - 19700.0 MHz), Rectangular WG, Neg Pol			B3-Hi
ETSI	1010210001	ODU-A 23GHz, TR1008, Lo, B1 (21994.0 - 22330.0 MHz), Rectangular WG, Neg Pol	23 GHz ODU-A	1008 MHz	B1-Lo
	1010210002	ODU-A 23GHz, TR1008, Hi, B1 (23002.0 - 23338.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	1010210003	ODU-A 23GHz, TR1008, Lo, B2 (22274.0 - 22610.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	1010210004	ODU-A 23GHz, TR1008, Hi, B2 (23282.0 - 23618.0 MHz), Rectangular WG, Neg Pol			B2-Hi

Standard	ODU-A P/N	ODU-A Description	Main Frequency	T/R Spacing	Sub-Band
FCC	1010210005	ODU-A 23GHz, TR1200, Lo, B5 (21200.0 - 21600.0 MHz), Rectangular WG, Neg Pol	23 GHz ODU-A	1200 MHz	B5-Lo
	1010210006	ODU-A 23GHz, TR1200, Hi, B5 (22400.0 - 22800.0 MHz), Rectangular WG, Neg Pol			B5-Hi
	1010210007	ODU-A 23GHz, TR1200, Lo, B6 (21600.0 - 22000.0 MHz), Rectangular WG, Neg Pol			B6-Lo
	1010210008	ODU-A 23GHz, TR1200, Hi, B6 (22800.0 - 23200.0 MHz), Rectangular WG, Neg Pol			B6-Hi
	1010210009	ODU-A 23GHz, TR1200, Lo, B7 (22000.0 - 22400.0 MHz), Rectangular WG, Neg Pol			B7-Lo
	1010210010	ODU-A 23GHz, TR1200, Hi, B7 (23200.0 - 23600.0 MHz), Rectangular WG, Neg Pol			B7-Hi
ETSI	1010210011	ODU-A 23GHz, TR1232, Lo, B1 (21200.0 - 21500.0 MHz), Rectangular WG, Neg Pol	23 GHz ODU-A	1232 MHz	B1-Lo
	1010210012	ODU-A 23GHz, TR1232, Hi, B1 (22432.0 - 22732.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	1010210013	ODU-A 23GHz, TR1232, Lo, B2 (21472.0 - 21786.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	1010210014	ODU-A 23GHz, TR1232, Hi, B2 (22704.0 - 23018.0 MHz), Rectangular WG, Neg Pol			B2-Hi
	1010210015	ODU-A 23GHz, TR1232, Lo, B3 (21779.0 - 22093.0 MHz), Rectangular WG, Neg Pol			B3-Lo
	1010210016	ODU-A 23GHz, TR1232, Hi, B3 (23011.0 - 23325.0 MHz), Rectangular WG, Neg Pol			B3-Hi
	1010210017	ODU-A 23GHz, TR1232, Lo, B4 (22086.0 - 22386.0 MHz), Rectangular WG, Neg Pol			B4-Lo
	1010210018	ODU-A 23GHz, TR1232, Hi, B4 (23318.0 - 23618.0 MHz), Rectangular WG, Neg Pol			B4-Hi
FCC	01010403001	ODU-A 26GHz, TR800, Lo, B1 (24250.0 - 24450.0 MHz), Rectangular WG, Neg Pol	26 GHz ODU-A	800 MHz	B1-Lo
	01010403002	ODU-A 26GHz, TR800, Hi, B1 (25050.0 - 25250.0 MHz), Rectangular WG, Neg Pol			B1-Hi
ETSI	1010403003	ODU-A 26GHz, TR1008, Lo, B1 (24549.0 - 24885.0 MHz), Rectangular WG, Neg Pol	26 GHz ODU-A	1008 MHz	B1-Lo
	1010403004	ODU-A 26GHz, TR1008, Hi, B1 (25557.0 - 25893.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	1010403005	ODU-A 26GHz, TR1008, Lo, B2 (24829.0 - 25165.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	1010403006	ODU-A 26GHz, TR1008, Hi, B2 (25837.0 - 26173.0 MHz), Rectangular WG, Neg Pol			B2-Hi
	1010403007	ODU-A 26GHz, TR1008, Lo, B3 (25109.0 - 25445.0 MHz), Rectangular WG, Neg Pol			B3-Lo
	1010403008	ODU-A 26GHz, TR1008, Hi, B3 (26117.0 - 26453.0 MHz), Rectangular WG, Neg Pol			B3-Hi
ETSI	01009420001	ODU-A 28GHz, TR1008, Lo, B1 (27520.0 - 28025.0 MHz), Rectangular WG, Neg Pol	28 GHz ODU-A	1008 MHz	B1-Lo
	01009420002	ODU-A 28GHz, TR1008, Hi, B1 (28528.0 - 29033.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	01009420003	ODU-A 28GHz, TR1008, Lo, B2 (27968.0 - 28473.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	01009420004	ODU-A 28GHz, TR1008, Hi, B2 (28976.0 - 29481.0 MHz), Rectangular WG, Neg Pol			B2-Hi
ETSI	01010612001	ODU-A 32GHz, TR812, Lo, B1 (31815.0 - 32207.0 MHz), Rectangular WG, Neg Pol	32 GHz ODU-A	812 MHz	B1-Lo
	01010612002	ODU-A 32GHz, TR812, Hi, B1 (32627.0 - 33019.0 MHz), Rectangular WG, Neg Pol			B1-Hi
	01010612003	ODU-A 32GHz, TR812, Lo, B2 (32179.0 - 32571.0 MHz), Rectangular WG, Neg Pol			B2-Lo
	01010612004	ODU-A 32GHz, TR812, Hi, B2 (32991.0 - 33383.0 MHz), Rectangular WG, Neg Pol			B2-Hi

Standard	ODU-A P/N	ODU-A Description	Main Frequency	T/R Spacing	Sub-Band
FCC	1010433002	ODU-A 38GHz, TR700, Lo, B1 (38595.0 - 38805.0 MHz), Circular WG, Neg Pol	38 GHz ODU-A	700 MHz	B1-Lo
	1010433003	ODU-A 38GHz, TR700, Hi, B1 (39295.0 - 39505.0 MHz), Circular WG, Neg Pol			B1-Hi
	1010433004	ODU-A 38GHz, TR700, Lo, B2 (38795.0 - 39005.0 MHz), Circular WG, Neg Pol			B2-Lo
	1010433005	ODU-A 38GHz, TR700, Hi, B2 (39495.0 - 39705.0 MHz), Circular WG, Neg Pol			B2-Hi
	1010433006	ODU-A 38GHz, TR700, Lo, B3 (38995.0 - 39205.0 MHz), Circular WG, Neg Pol			B3-Lo
	1010433007	ODU-A 38GHz, TR700, Hi, B3 (39695.0 - 39905.0 MHz), Circular WG, Neg Pol			B3-Hi
	1010433008	ODU-A 38GHz, TR700, Lo, B4 (39195.0 - 39405.0 MHz), Circular WG, Neg Pol			B4-Lo
	1010433009	ODU-A 38GHz, TR700, Hi, B4 (39895.0 - 40105.0 MHz), Circular WG, Neg Pol			B4-Hi
ETSI	1010433010	ODU-A 38GHz, TR1260, Lo, B1 (37044.0 - 37632.0 MHz), Circular WG, Neg Pol	38 GHz ODU-A	1260 MHz	B1-Lo
	1010433011	ODU-A 38GHz, TR1260, Hi, B1 (38304.0 - 38892.0 MHz), Circular WG, Neg Pol			B1-Hi
	1010433012	ODU-A 38GHz, TR1260, Lo, B2 (37604.0 - 38192.0 MHz), Circular WG, Neg Pol			B2-Lo
	1010433001	ODU-A 38GHz, TR1260, Hi, B2 (38864.0 - 39452.0 MHz), Circular WG, Neg Pol			B2-Hi

Standard	ODU-B P/N	ODU-B Description	Main Frequency	T/R Spacing	Sub-Band
FCC	85009317001	ODU-B 11 GHz, TR490 & 500, Lo, B5 (10700.0 – 10890.0 MHz), Rectangular WG, Neg Pol	11 GHz ODU-B	490 & 500 MHz	B5-Lo
	85009317002	ODU-B 11 GHz, TR490 & 500, Hi, B5 (11200.0 – 11390.0 MHz), Rectangular WG, Neg Pol			B5-Hi
	85009317003	ODU-B 11 GHz, TR490 & 500, Lo, B6 (10855.0 – 11045.0 MHz), Rectangular WG, Neg Pol			B6-Lo
	85009317004	ODU-B 11 GHz, TR490 & 500, Hi, B6 (11355.0 – 11545.0 MHz), Rectangular WG, Neg Pol			B6-Hi
	85009317005	ODU-B 11 GHz, TR490 & 500, Lo, B7 (11010.0 – 11200.0 MHz), Rectangular WG, Neg Pol			B7-Lo
	85009317006	ODU-B 11 GHz, TR490 & 500, Hi, B7 (11510.0 – 11700.0 MHz), Rectangular WG, Neg Pol			B7-Hi
FCC	85009318001	ODU-B 18 GHz, TR1560, Lo, B3 (17700.0 – 18140.0 MHz), Rectangular WG, Neg Pol	18 GHz ODU-B	1560 MHz	B3-Lo
	85009318002	ODU-B 18 GHz, TR1560, Hi, B3 (19260.0 – 19700.0 MHz), Rectangular WG, Neg Pol			B3-Hi
FCC	85009319001	ODU-B 23 GHz, TR1200, Lo, B5 (21200.0 – 21600.0 MHz), Rectangular WG, Neg Pol	23 GHz ODU-B	1200 MHz	B5-Lo
	85009319002	ODU-B 23 GHz, TR1200, Hi, B5 (22400.0 – 22800.0 MHz), Rectangular WG, Neg Pol			B5-Hi
	85009319003	ODU-B 23 GHz, TR1200, Lo, B6 (21600.0 – 22000.0 MHz), Rectangular WG, Neg Pol			B6-Lo
	85009319004	ODU-B 23 GHz, TR1200, Hi, B6 (22800.0 – 23200.0 MHz), Rectangular WG, Neg Pol			B6-Hi
	85009319005	ODU-B 23 GHz, TR1200, Lo, B7 (22000.0 – 22400.0 MHz), Rectangular WG, Neg Pol			B7-Lo
	85009319006	ODU-B 23 GHz, TR1200, Hi, B7 (23200.0 – 23600.0 MHz), Rectangular WG, Neg Pol			B7-Hi

3.2 IRFU ORDERING GUIDANCE

The PTP 800i and PTP 810i systems are designed for all-indoor deployment and for long haul/trunk radio backhaul systems. Such all-indoor installations require no tower-mounted electronics, thus simplifying maintenance and troubleshooting.

The high-power Indoor Radio Frequency Unit (IRFU) is supported by PTP 800 Release 05-00 and higher.

The high-power Indoor Radio Frequency Unit (IRFU) is supported by PTP 810 Release 01-10 and higher.

All-Indoor solutions consist of transceivers and branch units. Each IRFU shelf can be equipped with up to two transceivers. The IRFU is designed to have one transceiver cover one frequency band. One 6 GHz transceiver covers L6, U6 and FCC 7 GHz. One 11 GHz transceiver covers the complete 11 GHz band.

- The 6 GHz tuning range is 5.925 – 7.125 GHz, which supports:
  - L6 (5.925 – 6.425 GHz) for FCC/IC
  - U6 (6.425 – 6.875 GHz) for FCC
  - U6 (6.425 – 7.125 GHz) for IC
  - 7 GHz (6.875 – 7.125 GHz), for FCC
- The 11 GHz tuning range is 10.696 – 11.71 GHz, which supports:
  - 11 GHz (10.70 – 11.71 GHz) for FCC/IC

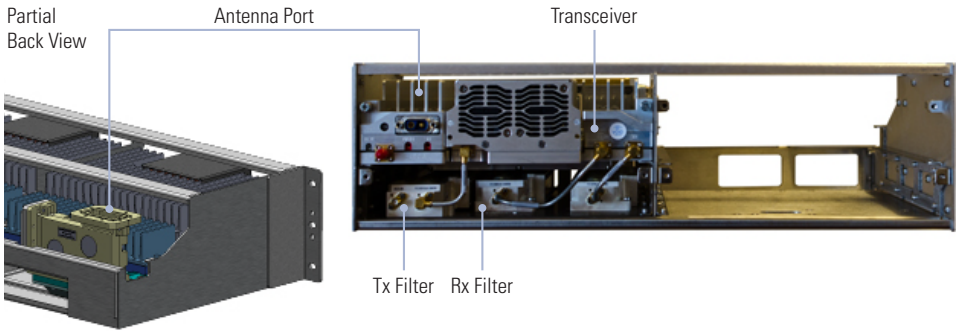
The IRFU does not have T/R spacing limitations. It can support any paired or unpaired frequency for both the FCC and IC regions.

The branch units consist of Tx filters, Rx filters and combining circulators. In a 1+1 HSB system, the branch unit also is equipped with an RF relay switch and can receive a splitter.

A 50 Ohm coaxial cable interconnects the IRFU and the modem unit. The branch unit connects the IRFU to the antennas through an elliptical waveguide.

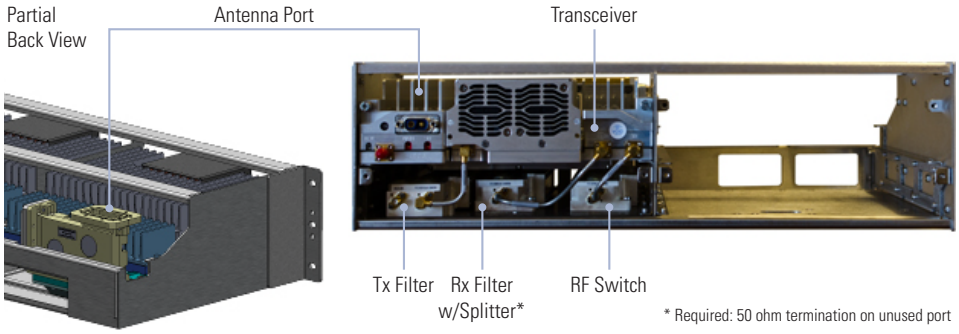
For a 6 GHz IRFU, the flange type for the IRFU antenna port is CPR-137G. For a 11 GHz IRFU, the flange type is CPR90G. To order an IRFU, several things need to be determined:

- Two platforms:
  - 6 GHz - covers L6, U6 and FCC 7 GHz
  - 11 GHz – covers 11 GHz, two variation based on RF filter bandwidth:
    - > 30 MHz – RF filter bandwidth supports the 10/30 MHz channel for 11 GHz only
    - > 40 MHz – RF filter bandwidth supports the 40 MHz channel for 11 GHz only
- The central frequency for both Tx and Rx needs to be provided when ordering. The reason is that the Tx and Rx filter body is fine tuned in the factory based on the central Tx/Rx frequency. It is not in field tuneable.
- There are different configurations from which you need to choose as shown in the following examples.



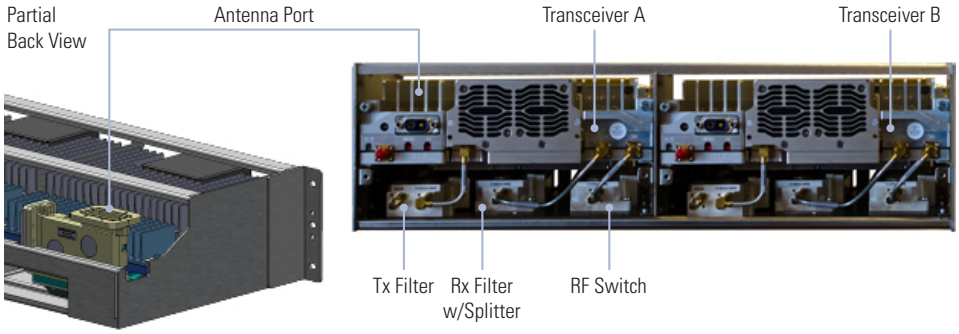
1+0 Configuration (Unprotected)

– 1+0 MHSB ready to upgrade to 1+1 – the RF switch, splitter and cable are included, which means there will be no traffic interruption during a future 1+1 upgrade



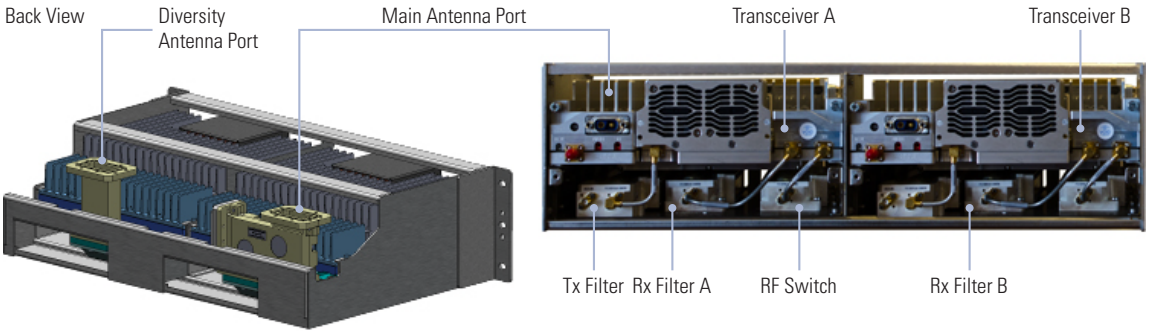
1+0 MHSB Ready to Upgrade to 1+1 Configuration

- With 1+1 HSB, two versions for the splitter are available:
  - Equal Receiver Splitter:
    - For 6/7 GHz, Receiver A – 3.2 dB typical, 3.5 dB maximum, and Receiver B – 4.1 dB typical, 4.5 dB max
    - For 11 GHz, Receiver A – 3.3 dB typical, 3.6 dB maximum; and Receiver B – 4.5 dB typical, 4.7 dB max
  - Unequal Receiver Splitter:
    - For 6/7/8 GHz, Receiver A – 1.3 dB typical, 1.6 dB maximum; and Receiver B – 7.8 dB typical, 8.4 dB max
    - For 11 GHz, Receiver A – 1.7 dB typical, 2.1 dB maximum; and Receiver B – 8.2 dB typical, 8.5 dB max



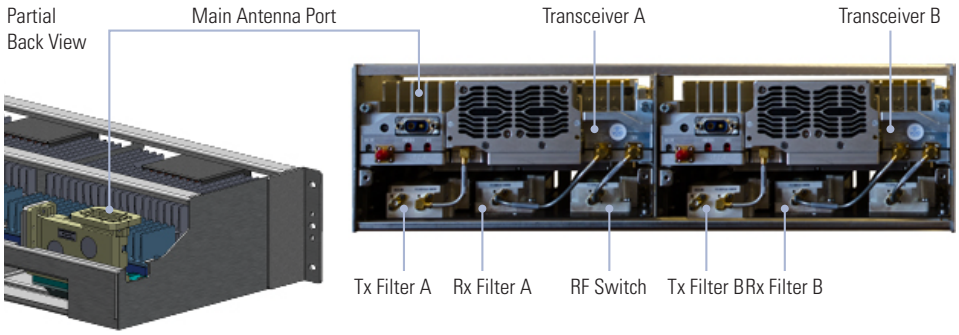
1+1 HSB Configuration

- 1+1 HSB with SD



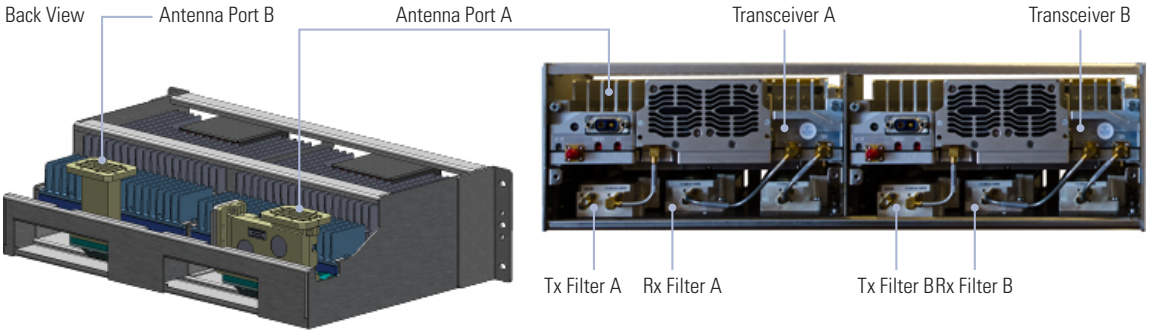
1+1 HSB with Spatial Diversity Configuration

- The Coupled Transceiver supports radio link aggregation using a single-polarization antenna.



Coupled Transceiver Configuration

- The Uncoupled Transceiver Configuration, with both sides A and B fully populated, supports ribbon setup or radio link aggregation with a dual-polarization antenna.



Repeater Configuration

The following table provides ordering information for PTP 800i IRFUs.

IRFU P/N	IRFU Description (FCC/IC only)	Additional Info Required when Ordering
58009282002	IRFU,ANSI,6G,1+0,HP	Tx & Rx center freq
58009282013	IRFU,ANSI,6G,1+0 MHSB Ready to upgrade to 1+1,EQ,HP	Tx & Rx center freq
58009282014	IRFU,ANSI,6G,1+0 MHSB Ready to upgrade to 1+1,UNEQ,HP	Tx & Rx center freq
58009282005	IRFU,ANSI,6G,1+1,EQ,HP	Tx & Rx center freq
58009282006	IRFU,ANSI,6G,1+1,UNEQ,HP	Tx & Rx center freq
58009282004	IRFU,ANSI,6G,1+1 with SD,HP	Tx & Rx center freq
58009282007	IRFU,ANSI,6G,Coupled Tcvrs	Tx & Rx center freq

IRFU P/N	IRFU Description (FCC/IC only)	Additional Info Required when Ordering
58009281002	IRFU,ANSI,11G,1+0,10/30MHz,HP	Tx & Rx center freq
58009281019	IRFU,ANSI,11G,1+0 MHSB Ready to upgrade to 1+1,EQ,10/30MHz,HP	Tx & Rx center freq
58009281021	IRFU,ANSI,11G,1+0 MHSB Ready to upgrade to 1+1,UNEQ,10/30MHz,HP	Tx & Rx center freq
58009281004	IRFU,ANSI,11G,1+1,EQ,10/30MHz,HP	Tx & Rx center freq
58009281006	IRFU,ANSI,11G,1+1,UNEQ,10/30MHz,HP	Tx & Rx center freq
58009281008	IRFU,ANSI,11G,1+1 with SD,10/30MHz,HP	Tx & Rx center freq
58009281010	IRFU,ANSI,11G,Coupled Tcvrs,10/30MHz,HP	Tx & Rx center freq
58009281003	IRFU,ANSI,11G,1+0,40MHz,HP	Tx & Rx center freq
58009281020	IRFU,ANSI,11G,1+0 MHSB Ready to upgrade to 1+1,EQ,40MHz,HP	Tx & Rx center freq
58009281022	IRFU,ANSI,11G,1+0 MHSB Ready to upgrade to 1+1,UNEQ,40MHz,HP	Tx & Rx center freq
58009281005	IRFU,ANSI,11G,1+1,EQ,40MHz,HP	Tx & Rx center freq
58009281007	IRFU,ANSI,11G,1+1,UNEQ,40MHz,HP	Tx & Rx center freq
58009281009	IRFU,ANSI,11G,1+1 with SD,40MHz,HP	Tx & Rx center freq
58009281011	IRFU,ANSI,11G,Coupled Tcvrs,40MHz,HP	Tx & Rx center freq
58009281032	IRFU,ANSI,Uncoupled Tcvrs,Side A "6G,HP" and Side B "6G,HP"	Tx & Rx center freq for both side A and B
58009281030	IRFU,ANSI,Uncoupled Tcvrs,Side A "6G,HP" and Side B "11G,10/30 MHz,HP"	Tx & Rx center freq for both side A and B
58009281031	IRFU,ANSI,Uncoupled Tcvrs,Side A "6G,HP" and Side B "11G,40 MHz,HP"	Tx & Rx center freq for both side A and B
58009281027	IRFU,ANSI,Uncoupled Tcvrs,Side A "11G,10/30 MHz,HP" and Side B "11G,10/30 MHz,HP"	Tx & Rx center freq for both side A and B
58009281028	IRFU,ANSI,Uncoupled Tcvrs,Side A "11G,10/30 MHz,HP" and Side B "11G,40 MHz,HP"	Tx & Rx center freq for both side A and B
58009281029	IRFU,ANSI,Uncoupled Tcvrs,Side A "11G,40 MHz,HP" and Side B "11G,40 MHz,HP"	Tx & Rx center freq for both side A and B

3.3 IRFU SPARE OPTIONS

We also offer IRFU spares for end customers.

Typically you should order a Transceiver module (XCVR) and a Fan module to provide equipment redundancy.

The front covers for spares and cable assemblies only need to be ordered when the original part is missing or damaged. Typically, you will only need a new filter when the licensed central frequency of Tx or Rx is changing, or when the IRFU needs to be re-deployed to a new location with a different frequency assignment.

PTP P/N	Description
58009282001	XCVR,ANSI,6G,HP
58009281001	XCVR,ANSI,11G,HP
64009324003	FAN Assembly of IRFU
64009324001	IRFU Shelf Frontal Cover
64009324002	IRFU Shelf Frontal Extended Cover
30009399001	Cable Assembly Kit 1, SMA, M-M, R/A
30009399004	Cable Assembly Kit 2, SMA, M-M, R/A
30009399005	Cable Assembly Kit 3, SMA, M-M, R/A
30009399006	Cable Assembly Kit 4, SMA, M-M, R/A
30009399007	Cable Assembly Kit 5, SMA, M-M, R/A
30009399008	Cable Assembly Kit 6, SMA, M-M, R/A
30009399009	Cable Assembly Kit 7, SMA, M-M, R/A
30009399010	Cable Assembly Kit 8, SMA, M-M, R/A
30009399011	Cable Assembly Kit 9, SMA, M, R/A-M, R/A
30009399002	Cable Assembly Kit 10, SMA, M, R/A-M, R/A
30009399003	Cable Assembly Kit 11, SMA, M, R/A-M, R/A
91009314001	Tx Filter Assembly,6G, 10/30MHz
91009314004	Rx Filter Assembly,6G, 10/30MHz
91009314002	Tx Filter Assembly,11G, 40 MHz
91009314003	Tx Filter Assembly,11G, 10/30MHz
91009314005	Rx Filter Assembly,11G, 40 MHz
91009314006	Rx Filter Assembly,11G, 10/30MHz

3.4 IRFU UPGRADE KIT OPTIONS

We provide different upgrade kits for IRFU upgrades, including

- 1+0 to 1+1 MHSB: Contains Transceiver, RF switch, Rx splitter and interconnect cables. User traffic will be affected during upgrade.
  - Equal Receiver Splitter:
    - For 6/7 GHz, Receiver A – 3.2 dB typical, 3.5 dB maximum, and Receiver B – 4.1 dB typical, 4.5 dB max
    - For 11 GHz, Receiver A – 3.3 dB typical, 3.6 dB maximum; and Receiver B – 4.5 dB typical, 4.7 dB max
  - Unequal Receiver Splitter:
    - For 6/7 GHz, Receiver A – 1.3 dB typical, 1.6 dB maximum; and Receiver B – 7.8 dB typical, 8.4 dB max
    - For 11 GHz, Receiver A – 1.7 dB typical, 2.1 dB maximum; and Receiver B – 8.2 dB typical, 8.5 dB max
- 1+0 MHSB Ready to 1+1 MHSB: Contains transceiver and interconnect cables. No user traffic interruption during upgrade.
- 1+0 to 1+1 MHSB with SD: Contains transceiver, Rx filters, RF switch, Rx splitter, circulator assembly and interconnect cables. User traffic will be affected during upgrade.
- 1+0 MHSB Ready to 1+1 MHSB with SD: Contains transceiver, Rx filters, circulator assembly and interconnect cables. No user traffic interruption during upgrade.
  - For 11 GHz, the variation due to filter bandwidth still applies:
    - 30 MHz – RF filter bandwidth, supports 10/30 MHz channel, 11 GHz only
    - 40 MHz – RF filter bandwidth, supports 40 MHz channel, 11 GHz only

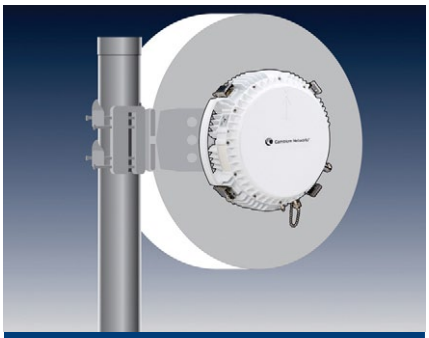
P/N	Description	Additional Info Required when Ordering (Tech Edit)
58009282008	IRFU,ANSI,6G,EQ,HP, 1+0 to 1+1 MHSB Upgrade Kit	None
58009282009	IRFU,ANSI,6G,UNEQ,HP,1+0 to 1+1 MHSB Upgrade Kit	None
58009282011	IRFU,ANSI,6G,HP,1+0 MHSB Ready to 1+1 MHSB Upgrade Kit	None
58009282012	IRFU,ANSI,6G,HP,1+0 MHSB Ready to 1+1 MHSB with SD Upgrade Kit	Rx center freq
58009282010	IRFU,ANSI,6G,HP,1+0 to 1+1 MHSB with SD Upgrade Kit	Rx center freq
58009281014	IRFU,ANSI,11G,EQ,HP, 1+0 to 1+1 MHSB Upgrade Kit	None
58009281015	IRFU,ANSI,11G,UNEQ,HP,1+0 to 1+1 MHSB Upgrade Kit	None
58009281017	IRFU,ANSI,11G,HP,1+0 MHSB Ready to 1+1 MHSB Upgrade Kit	None
58009281018	IRFU,ANSI,11G,HP,1+0 MHSB Ready to 1+1 MHSB with SD Upgrade Kit,10/30 MHz	Rx center freq
58009281016	IRFU,ANSI,11G,HP,1+0 to 1+1 MHSB with SD Upgrade Kit,10/30 MHz	Rx center freq
58009281025	IRFU,ANSI,11G,HP,1+0 MHSB Ready to 1+1 MHSB with SD Upgrade Kit,40 MHz	Rx center freq
58009281026	IRFU,ANSI,11G,HP,1+0 to 1+1 MHSB with SD Upgrade Kit,40 MHz	Rx center freq

4. ANTENNA & ANTENNA ACCESSORIES

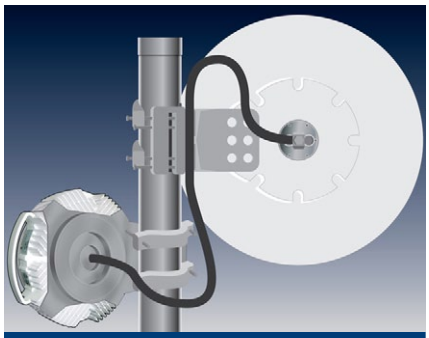
We provide both single-polarization and dual-polarization antennas for PTP 800 and PTP 810 radios using the Andrew ValuLine® series (VHLP, VHLPX), HP, HPX, HSX, and PAR series.

4.1 ODU MOUNTING OPTIONS

There are two different mounting options for an ODU: direct mount and remote mount. When you plan your PTP 800 or PTP 810 link, PTP LINKPlanner gives you the opportunity to choose direct or remote mount. Then your BOM will include the appropriate equipment for your mounting option.



Direct Mount



Remote Mount

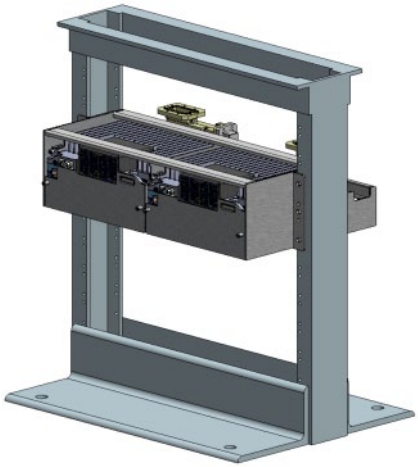
Direct mount: In a direct-mount configuration, your ODU is mounted directly to the antenna using clips. It can only be supported with a customized single-polarization antenna equipped with our antenna interface.

Remote mount: When the remote-mount option is chosen, your ODU is mounted using an ODU Remote Mount Kit and connected to the antenna using a flexible waveguide. For a remote mount installation, the following flexible waveguide flanges are used:

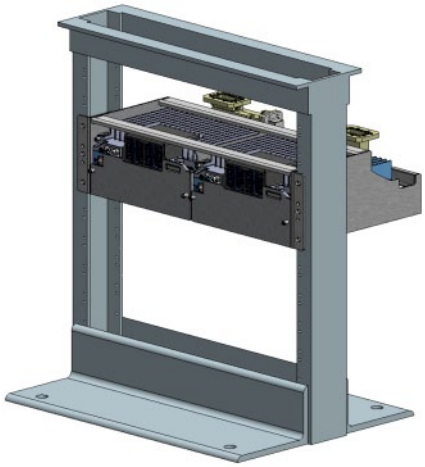
Frequency	Antenna Flange	Remote Mount Kit Flange	Flexible Waveguide Flange	Notes
6 GHz	PDR70	UDR70	UDR70/PDR70	
6 GHz	CPR137G	UDR70	CPR137G/PDR70	
7/8 GHz	PDR84	UBR84	UBR84/PBR84	
11 GHz	PDR100	UBR120	UBR120/PBR120	A tapered transition is required (PBR120/UDR100)
11 GHz	CPR90G	UBR120	CPR90G/PDR100	A tapered transition is required (PBR120/UDR100)
13 GHz	PBR120	UBR120	UBR120/PBR120	
15 GHz	PBR140	UBR140	UBR140/PBR140	
18/23/26 GHz	PBR220	UBR220	UBR220/PBR220	
28/32/38 GHz	PBR320	UBR320	UBR320/PBR320	

4.2 IRFU MOUNTING OPTIONS

The PTP 800i IRFU should be mounted in a rack and supports both ETSI and NEBS (ANSI) rack mounting.



NEBS Mounting



ETSI Mounting

The waveguide / flange specification is as follows:

Frequency (GHz)	Waveguide	Flange Type	Holes
L6, U6 FCC 7 GHz	WR-137	CPR-137G	Tapped for #8-32 screws
11	WR-90	CPR-90G	

4.3 ANTENNA OPTIONS

For Split-Mount deployments, we provide customized single-polarization antennas from Andrew for direct mounting to ODUs, and Andrew standard single-polarization and dual-polarization for remote mounting to ODUs. Ordering details are provided in the following tables.

P/N	Direct-Mount, Single Polarization Antennas for ODU-A and ODU-B	Antenna Interface
85009298001	3' HP Antenna, 5.925 ~ 7.125 GHz, Single Pol, Mot Interface	Mot
85010089050	4' HP Antenna, 5.925 ~ 7.125 GHz, Single Pol, Mot Interface	Mot
85010089021	6' HP Antenna, 5.925 ~ 7.125 GHz, Single Pol, Mot Interface	Mot
85010089045	2' HP Antenna, 7.10 ~ 8.5 GHz, Single Pol, Mot Interface	Mot
85009298002	3' HP Antenna, 7.10 ~ 8.5 GHz, Single Pol, Mot Interface	Mot
85010089051	4' HP Antenna, 7.125 ~ 8.5 GHz, Single Pol, Mot Interface	Mot
85010089025	6' HP Antenna, 7.125 ~ 8.5 GHz, Single Pol, Mot Interface	Mot
85010089049	2' HP Antenna, 10.125 ~ 11.70 GHz, Single Pol, Mot Interface	Mot
85009298003	3' HP Antenna, 10.125 ~ 11.70 GHz, Single Pol, Mot Interface	Mot
85010089052	4' HP Antenna, 10.125 ~ 11.70 GHz, Single Pol, Mot Interface	Mot
85010089003	2.6' HP Antenna, 10.70 ~ 11.70 GHz, Single Pol, Mot Interface	Mot
85010089005	6' HP Antenna, 10.70 ~ 11.70 GHz, Single Pol, Mot Interface	Mot
85010089053	1' HP Antenna, 12.75 ~ 13.25 GHz, Single Pol, Mot Interface	Mot
85010089046	2' HP Antenna, 12.70 ~ 13.25 GHz, Single Pol, Mot Interface	Mot
85009298004	3' HP Antenna, 12.70 ~ 13.25 GHz, Single Pol, Mot Interface	Mot
85010089054	4' HP Antenna, 12.70 ~ 13.25 GHz, Single Pol, Mot Interface	Mot
85010089030	6' HP Antenna, 12.75 ~ 13.25 GHz, Single Pol, Mot Interface	Mot
85010089055	1' HP Antenna, 14.25 ~ 15.35 GHz, Single Pol, Mot Interface	Mot
85010089056	4' HP Antenna, 14.25 ~ 15.35 GHz, Single Pol, Mot Interface	Mot
85010089035	6' HP Antenna, 14.25 ~ 15.35 GHz, Single Pol, Mot Interface	Mot
85010089047	2' HP Antenna, 14.40 ~ 15.35 GHz, Single Pol, Mot Interface	Mot
85009298005	3' HP Antenna, 14.40 ~ 15.35 GHz, Single Pol, Mot Interface	Mot
85010089057	1' HP Antenna, 17.70 ~ 19.70 GHz, Single Pol, Mot Interface	Mot
85010089042	2' HP Antenna, 17.70 ~ 19.70 GHz, Single Pol, Mot Interface	Mot
85009298006	3' HP Antenna, 17.70 ~ 19.70 GHz, Single Pol, Mot Interface	Mot
85010089058	4' HP Antenna, 17.70 ~ 19.70 GHz, Single Pol, Mot Interface	Mot
85010089010	6' HP Antenna, 17.70 ~ 19.70 GHz, Single Pol, Mot Interface	Mot
85010089059	1' HP Antenna, 21.20 ~ 23.60 GHz, Single Pol, Mot Interface	Mot
85010089043	2' HP Antenna, 21.20 ~ 23.60 GHz, Single Pol, Mot Interface	Mot
85009298007	3' HP Antenna, 21.20 ~ 23.60 GHz, Single Pol, Mot Interface	Mot
85010089060	4' HP Antenna, 21.20 ~ 23.60 GHz, Single Pol, Mot Interface	Mot
85010089015	6' HP Antenna, 21.20 ~ 23.60 GHz, Single Pol, Mot Interface	Mot

1 – 2.6 ft

4 – 6 ft

P/N	Direct-Mount, Single Polarization Antennas for ODU-A and ODU-B	Antenna Interface
85010089061	1' HP Antenna, 24.25 ~ 26.50 GHz, Single Pol, Mot Interface	Mot
85010089044	2' HP Antenna, 24.25 ~ 26.50 GHz, Single Pol, Mot Interface	Mot
85009298008	3' HP Antenna, 24.25 ~ 26.50 GHz, Single Pol, Mot Interface	Mot
85010089062	4' HP Antenna, 24.25 ~ 26.50 GHz, Single Pol, Mot Interface	Mot
85010089064	1' HP Antenna, 27.50 ~ 29.50 GHz, Single Pol, Mot Interface	Mot
85010089041	2' HP Antenna, 27.50 ~ 29.50 GHz, Single Pol, Mot Interface	Mot
85010089036	1' HP Antenna, 31.80 ~ 33.40 GHz, Single Pol, Mot Interface	Mot
85010089037	2' HP Antenna, 31.80 ~ 33.40 GHz, Single Pol, Mot Interface	Mot
85010089063	1' HP Antenna, 37.00 ~ 40.00 GHz, Single Pol, Mot Interface	Mot
85010089048	2' HP Antenna, 37.00 ~ 40.00 GHz, Single Pol, Mot Interface	Mot
85009302001	3' HP Antenna, 5.925 ~ 7.125 GHz, Dual Pol with OMK	Mot
85009302002	4' HP Antenna, 5.925 ~ 7.125 GHz, Dual Pol with OMK	Mot
85009302003	6' HP Antenna, 5.925 ~ 7.125 GHz, Dual Pol with OMK	Mot
85009303001	2' HP Antenna, 7.125 ~ 8.5 GHz, Dual Pol with OMK	Mot
85009303002	3' HP Antenna, 7.125 ~ 8.5 GHz, Dual Pol with OMK	Mot
85009303003	4' HP Antenna, 7.125 ~ 8.5 GHz, Dual Pol with OMK	Mot
85009303004	6' HP Antenna, 7.125 ~ 8.5 GHz, Dual Pol with OMK	Mot
85009304001	2' HP Antenna, 10.125 ~ 11.70 GHz, Dual Pol with OMK	Mot
85009304002	3' HP Antenna, 10.125 ~ 11.70 GHz, Dual Pol with OMK	Mot
85009304003	4' HP Antenna, 10.125 ~ 11.70 GHz, Dual Pol with OMK	Mot
85009304004	6' HP Antenna, 10.125 ~ 11.70 GHz, Dual Pol with OMK	Mot
85009305001	1' HP Antenna, 12.75 ~ 13.25 GHz, Dual Pol with OMK	Mot
85009305002	2' HP Antenna, 12.75 ~ 13.25 GHz, Dual Pol with OMK	Mot
85009305003	3' HP Antenna, 12.75 ~ 13.25 GHz, Dual Pol with OMK	Mot
85009305004	4' HP Antenna, 12.75 ~ 13.25 GHz, Dual Pol with OMK	Mot
85009305005	6' HP Antenna, 12.75 ~ 13.25 GHz, Dual Pol with OMK	Mot
85009306001	1' HP Antenna, 14.25 ~ 15.35 GHz, Dual Pol with OMK	Mot
85009306002	2' HP Antenna, 14.25 ~ 15.35 GHz, Dual Pol with OMK	Mot
85009306003	3' HP Antenna, 14.40 ~ 15.35 GHz, Dual Pol with OMK	Mot
85009306004	4' HP Antenna, 14.25 ~ 15.35 GHz, Dual Pol with OMK	Mot
85009306005	6' HP Antenna, 14.25 ~ 15.35 GHz, Dual Pol with OMK	Mot
85009307001	1' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol with OMK	Mot
85009307002	2' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol with OMK	Mot
85009307003	3' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol with OMK	Mot
85009307004	4' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol with OMK	Mot
85009307005	6' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol with OMK	Mot

P/N	Direct-Mount, Single Polarization Antennas for ODU-A and ODU-B	Antenna Interface
85009308001	1' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol with OMK	Mot
85009308002	2' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol with OMK	Mot
85009308003	3' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol with OMK	Mot
85009308004	4' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol with OMK	Mot
85009308005	6' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol with OMK	Mot

P/N	Remote-Mount, Single and Dual Polarization Antennas for ODU-A and ODU-B	Antenna Interface
85010091022	3' HP Antenna, 5.925 ~ 7.125 GHz, Single Pol, PDR70	PDR70
85010091024	4' HP Antenna, 5.925 ~ 7.125 GHz, Single Pol, PDR70	PDR70
85010091007	6' HP Antenna, 5.925 ~ 7.125 GHz, Single Pol, PDR70	PDR70
85009328001	HP4 - 4' SP Antenna, 5.725 ~ 6.425 GHz with radome, Single Pol, CPR137G	CPR137G
85009328002	HP4 - 4' SP Antenna, 6.425 ~ 7.125 GHz with radome, Single Pol, CPR137G	CPR137G
85009294001	PAR6 - 6' SP Antenna, 5.925 ~7.125 GHz with radome, Single Pol, CPR137G	CPR137G
85009294002	PAR8 - 8' SP Antenna, 5.925 ~ 7.125 GHz with radome, Single Pol, CPR137G	CPR137G
85009294003	PAR10 - 10' SP Antenna, 5.925 ~ 7.125 GHz w/o radome, Single Pol, CPR137G	CPR137G
85009294004	PAR12 - 12' SP Antenna, 5.925 ~ 7.125 GHz w/o radome, Single Pol, CPR137G	CPR137G
85009301001	HP4 – 4' SP Antenna, 10.7 ~ 11.7 GHz with radome, Single Pol, CPR90G	CPR90G
85009294005	PAR6 – 6' SP Antenna, 10.7 ~ 11.7 GHz with radome, Single Pol, CPR90G	CPR90G
85009294006	PAR8 – 8' SP Antenna, 10.7 ~ 11.7 GHz with radome, Single Pol, CPR90G	CPR90G
85009295001	10' Radome for PAR10 antenna	
85009295002	12' Radome for PAR12 antenna	
85010091020	2' HP Antenna, 7.10 ~ 8.5 GHz, Single Pol, PDR84	PDR84
85010091023	3' HP Antenna, 7.10 ~ 8.5 GHz, Single Pol, PDR84	PDR84
85010091025	4' HP Antenna, 7.125 ~ 8.5 GHz, Single Pol, PDR84	PDR84
85010091011	6' HP Antenna, 7.125 ~ 8.5 GHz, Single Pol, PDR84	PDR84
85010091019	2' HP Antenna, 10.125 ~ 11.70 GHz, Single Pol, PDR100	PDR100
85010091017	3' HP Antenna, 10.125 ~ 11.70 GHz, Single Pol, PDR100	PDR100
85010091026	4' HP Antenna, 10.125 ~ 11.70 GHz, Single Pol, PDR100	PDR100
85010091003	2.6' HP Antenna, 10.70 ~ 11.70 GHz, Single Pol, PDR100	PDR100
85010091005	6' HP Antenna, 10.70 ~ 11.70 GHz, Single Pol, PDR100	PDR100
85010091021	2' HP Antenna, 12.70 ~ 13.25 GHz, Single Pol, PBR120	PBR120
85010091018	3' HP Antenna, 12.70 ~ 13.25 GHz, Single Pol, PBR120	PBR120
85010091012	1' HP Antenna, 12.75 ~ 13.25 GHz, Single Pol, PBR120	PBR120
85010091027	4' HP Antenna, 12.75 ~ 13.25 GHz, Single Pol, PBR120	PBR120
85010091016	6' HP Antenna, 12.75 ~ 13.25 GHz, Single Pol, PBR120	PBR120

P/N	Remote-Mount, Single and Dual Polarization Antennas for ODU-A and ODU-B	Antenna Interface
85010092048	3' HP Antenna, 5.925 ~ 7.125 GHz, Dual Pol, PDR70	PDR70
85010092060	4' HP Antenna, 5.925 ~ 7.125 GHz, Dual Pol, PDR70	PDR70
85010092021	6' HP Antenna, 5.925 ~ 7.125 GHz, Dual Pol, PDR70	PDR70
85010092051	2' HP Antenna, 7.10 ~ 8.5 GHz, Dual Pol, PDR84	PDR84
85010092059	3' HP Antenna, 7.10 ~ 8.5 GHz, Dual Pol, PDR84	PDR84
85010092061	4' HP Antenna, 7.125 -8.5 GHz, Dual Pol, PDR84	PDR84
85010092025	6' HP Antenna, 7.125 -8.5 GHz, Dual Pol, PDR84	PDR84
85010092052	2' HP Antenna, 10.125 ~ 11.70 GHz, Dual Pol, PDR100	PDR100
85010092042	3' HP Antenna, 10.125 ~ 11.70 GHz, Dual Pol, PDR100	PDR100
85010092062	4' HP Antenna, 10.125 ~ 11.70 GHz, Dual Pol, PDR100	PDR100
85010092003	2.6' HP Antenna, 10.70 ~ 11.70 GHz, Dual Pol , PDR100	PDR100
85010092005	6' HP Antenna, 10.70 ~ 11.70 GHz, Dual Pol, PDR100	PDR100
85010092056	2' HP Antenna, 12.70 ~ 13.25 GHz, Dual Pol, PBR120	PBR120
85010092043	3' HP Antenna, 12.70 ~ 13.25 GHz, Dual Pol, PBR120	PBR120
85010092026	1' HP Antenna, 12.75 ~ 13.25 GHz, Dual Pol, PBR120	PBR120
85010092063	4' HP Antenna, 12.75 ~ 13.25 GHz, Dual Pol, PBR120	PBR120
85010092030	6' HP Antenna, 12.75 ~ 13.25 GHz, Dual Pol, PBR120	PBR120
85010092031	1' HP Antenna, 14.25 ~ 15.35 GHz, Dual Pol, PBR140	PBR140
85010092064	4' HP Antenna, 14.25 ~ 15.35 GHz, Dual Pol, PBR140	PBR140
85010092035	6' HP Antenna, 14.25 ~ 15.35 GHz, Dual Pol, PBR140	PBR140
85010092057	2' HP Antenna, 14.40 ~ 15.35 GHz, Dual Pol, PBR140	PBR140
85010092044	3' HP Antenna, 14.40 ~ 15.35 GHz, Dual Pol, PBR140	PBR140
85010092006	1' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol, PBR220	PBR220
85010092053	2' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol, PBR220	PBR220
85010092045	3' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol, PBR220	PBR220
85010092065	4' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol, PBR220	PBR220
85010092010	6' HP Antenna, 17.70 ~ 19.70 GHz, Dual Pol, PBR220	PBR220
85010092011	1' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol, PBR220	PBR220
85010092054	2' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol, PBR220	PBR220
85010092046	3' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol, PBR220	PBR220
85010092066	4' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol, PBR220	PBR220
85010092015	6' HP Antenna, 21.20 ~ 23.60 GHz, Dual Pol, PBR220	PBR220
85010092016	1' HP Antenna, 24.25 ~ 26.50 GHz, Dual Pol, PBR220	PBR220
85010092055	2' HP Antenna, 24.25 ~ 26.50 GHz, Dual Pol, PBR220	PBR220
85010092047	3' HP Antenna, 24.25 ~ 26.50 GHz, Dual Pol, PBR220	PBR220
85010092067	4' HP Antenna, 24.25 ~ 26.50 GHz, Dual Pol, PBR220	PBR220

P/N	Remote-Mount, Single and Dual Polarization Antennas for ODU-A and ODU-B	Antenna Interface
85010092040	1' HP Antenna, 27.50 ~ 29.50 GHz, Dual Pol, PBR320	PBR320
85010092041	2' HP Antenna, 27.50 ~ 29.50 GHz, Dual Pol, PBR320	PBR320
85010092036	1' HP Antenna, 31.80 ~ 33.40 GHz, Dual Pol, PBR320	PBR320
85010092037	2' HP Antenna, 31.80 ~ 33.40 GHz, Dual Pol, PBR320	PBR320
85010092038	1' HP Antenna, 37.00 ~ 40.00 GHz, Dual Pol, PBR320	PBR320
85010092058	2' HP Antenna, 37.00 ~ 40.00 GHz, Dual Pol, PBR320	PBR320

P/N	Antennas for PTP 800i and PTP 810i All-Indoor Deployments	Antenna Interface
85009328001	HP4 - 4' SP Antenna, 5.725 ~ 6.425 GHz with radome, Single Pol, CPR137G (Spatial Diversity Receive Only)	CPR137G
85009328002	HP4 - 4' SP Antenna, 6.425 ~ 7.125 GHz with radome, Single Pol, CPR137G (Spatial Diversity Receive Only)	CPR137G
85009294001	PAR6 - 6' SP Antenna, 5.925 ~7.125 GHz with radome, Single Pol, CPR137G	CPR137G
85009294002	PAR8 - 8' SP Antenna, 5.925 ~ 7.125 GHz with radome, Single Pol, CPR137G	CPR137G
85009294003	PAR10 - 10' SP Antenna, 5.925 ~ 7.125 GHz w/o radome, Single Pol, CPR137G	CPR137G
85009294004	PAR12 - 12' SP Antenna, 5.925 ~ 7.125 GHz w/o radome, Single Pol, CPR137G	CPR137G
N060080L001A	HSX4 – 4' HP Antenna, 5.925 ~ 6.425 GHz with radome, Dual Pol, CPR137G	CPR137G
N060080L002A	HPX6 – 6' HP Antenna, 5.925 ~ 6.425 GHz with radome, Dual Pol, CPR137G	CPR137G
N060080L003A	HPX8 – 8' HP Antenna, 5.925 ~ 6.425 GHz with radome, Dual Pol, CPR137G	CPR137G
N060080L004A	HPX10 – 10' HP Antenna, 5.925 ~ 6.425 GHz with radome, Dual Pol, CP 137G	CPR137G
N060080L005A	HPX12 – 12' HP Antenna, 5.925 ~ 6.425 GHz with radome, Dual Pol, CPR137G	CPR137G
TBD	HPX4 – 4' HP Antenna, 6.425 ~ 7.125 GHz with radome, Dual Pol, CPR137G	CPR137G
N060080L006A	HPX6 – 6' HP Antenna, 6.425 ~ 7.125 GHz with radome, Dual Pol, CPR137G	CPR137G
N060080L007A	HPX8 – 8' HP Antenna, 6.425 ~ 7.125 GHz with radome, Dual Pol, CPR137G	CPR137G
N060080L008A	HPX10 – 10' HP Antenna, 6.425 ~ 7.125 GHz with radome, Dual Pol, CPR137G	CPR137G
N060080L009A	HPX12 – 12' HP Antenna, 6.425 ~ 7.125 GHz with radome, Dual Pol, CPR137G	CPR137G
85009301001	HP4 – 4' SP Antenna, 10.7 ~ 11.7 GHz with radome, Single Pol, CPR90G	CPR90G
85009294005	PAR6 – 6' SP Antenna, 10.7 ~ 11.7 GHz with radome, Single Pol, CPR90G	CPR90G
85009294006	PAR8 – 8' SP Antenna, 10.7 ~ 11.7 GHz with radome, Single Pol, CPR90G	CPR90G
N110080L001A	HPX4 – 4' HP Antenna, 10.7 ~ 11.7 GHz with radome, Dual Pol, CPR90G	CPR90G
N110080L002A	HPX6 – 6' HP Antenna, 10.7 ~ 11.7 GHz with radome, Dual Pol, CPR90G	CPR90G
N110080L003A	HPX8 – 8' HP Antenna, 10.7 ~ 11.7 GHz with radome, Dual Pol, CPR90G	CPR90G
85009295001	10' Radome for PAR10 antenna	
85009295002	12' Radome for PAR12 antenna	

4.4 ANTENNA ACCESSORIES

4.4.1 ODU REMOTE MOUNTING KIT

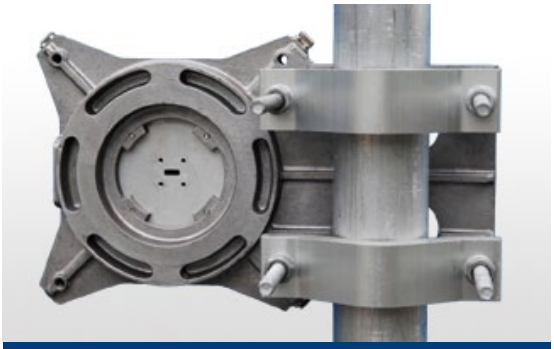
For Split-Mount deployments, a remote mounting kit is required for all remote mounting installations with both single-polarization and dual-polarization antennas. One remote mounting kit is required per ODU.

For an 11 GHz installation, a transition module is also required for the remote mounting kit in order to fit all interfaces from the remote mounting kit to the antenna.

P/N	Description
07010109008	ODU Remote Mount Kit 6 GHz – UDR70 output
07010109001	ODU Remote Mount Kit 7 GHz – UBR84 output
07010109002	ODU Remote Mount Kit 8 GHz – UBR84 output
07010109003	ODU Remote Mount Kit 11 ~ 13 GHz – UBR120 output
07010109004	ODU Remote Mount Kit 15 GHz – UBR140 output
07010109005	ODU Remote Mount Kit 18 ~ 26 GHz – UBR220 output
07010109006	ODU Remote Mount Kit 28 ~ 32 GHz – UBR320 output
07010109007	ODU Remote Mount Kit 38 GHz – UBR320 output
58010077001	Tapered Transition, WR75 ~ WR90, PBR120, UDR100

Tapered Transition

Remote Mounting Kit (Inside)



Remote Mounting Kit (Outside)

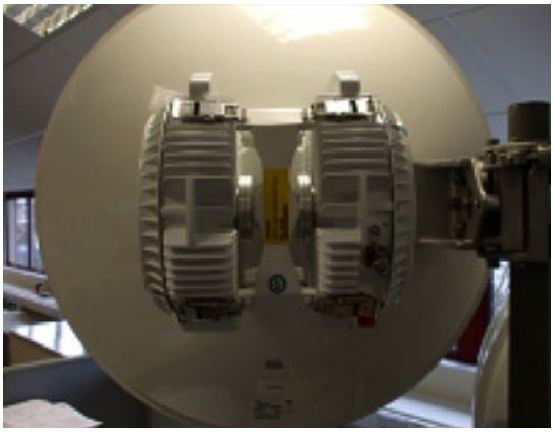
4.4.2 ODU COUPLER MOUNTING KIT

An ODU coupler-mounting kit is required for a 1+1 configuration or 2+0 configuration (two links sharing the same antenna but running on different channels).

The ODU coupler mounting kit supports direct mounting, using an Andrew-customized single-polarization antenna with a Mot-interface.

The ODU coupler mounting kit can be remote mounted with the ODU remote mounting kit. Two different couplers are available:

a. Symmetric 3 dB coupler
b. Asymmetric 6 dB coupler



P/N	1+1 ODU Coupler Mounting Kit
07010110021	ODU Coupler Mounting Kit 6 GHz – 3 dB
07010110022	ODU Coupler Mounting Kit 6 GHz – 6 dB
07010110001	ODU Coupler Mounting Kit 7 GHz – 3 dB
07010110002	ODU Coupler Mounting Kit 7 GHz – 6 dB
07010110003	ODU Coupler Mounting Kit 8 GHz – 3 dB
07010110004	ODU Coupler Mounting Kit 8 GHz – 6 dB
07010110005	ODU Coupler Mounting Kit 11 GHz – 3 dB
07010110006	ODU Coupler Mounting Kit 11 GHz – 6 dB
07010110007	ODU Coupler Mounting Kit 13 GHz – 3 dB
07010110008	ODU Coupler Mounting Kit 13 GHz – 6 dB
07010110009	ODU Coupler Mounting Kit 15 GHz – 3 dB
07010110010	ODU Coupler Mounting Kit 15 GHz – 6 dB

P/N	1+1 ODU Coupler Mounting Kit
07010110011	ODU Coupler Mounting Kit 18 GHz – 3 dB
07010110012	ODU Coupler Mounting Kit 18 GHz – 6 dB
07010110013	ODU Coupler Mounting Kit 23 GHz – 3 dB
07010110014	ODU Coupler Mounting Kit 23 GHz – 6 dB
07010110015	ODU Coupler Mounting Kit 26 GHz – 3 dB
07010110016	ODU Coupler Mounting Kit 26 GHz – 6 dB
07010110023	ODU Coupler Mounting Kit 28 GHz – 3 dB
07010110024	ODU Coupler Mounting Kit 28 GHz – 6 dB
07010110017	ODU Coupler Mounting Kit 32 GHz – 3 dB
07010110018	ODU Coupler Mounting Kit 32 GHz – 6 dB
07010110019	ODU Coupler Mounting Kit 38 GHz – 3 dB
07010110020	ODU Coupler Mounting Kit 38 GHz – 6 dB

4.4.3 ODU ORTHOGONAL MOUNTING KIT (OMK)

An ODU Orthogonal Mounting Kit (OMK) can support ODU direct mount for a 2+0 configuration with dual polarization. With OMK, a you can turn a single polarization Valuline series antenna into a dual polarization direct mount antenna for ODU-A or ODU-B installation.

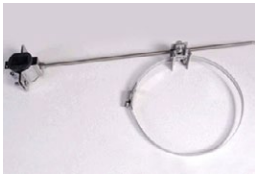
P/N	OMK
85009316001	ODU Orthogonal Mounting Kit 6 GHz
85009316002	ODU Orthogonal Mounting Kit 7/8 GHz
85009316004	ODU Orthogonal Mounting Kit 11 GHz
85009316005	ODU Orthogonal Mounting Kit 13 GHz
85009316006	ODU Orthogonal Mounting Kit 15 GHz
85009316007	ODU Orthogonal Mounting Kit 18 GHz
85009316008	ODU Orthogonal Mounting Kit 23 GHz

4.4.4 FLEX WAVEGUIDE FOR ODU REMOTE MOUNTING

A flexible waveguide is required for the ODU remote-mounting configuration. One flex waveguide is required per remote mounting kit. The flexible waveguide is available in a 3-foot length. During installation, two hangers are recommended per flexible waveguide.

P/N	Flexible Wave Guide
58010076016	Flexible Twist,WR137,PDR70, 35.0 inch, CPR137G, 5.85~8.2 GHz, VSWR 1.10
58010076017	Flexible Twist,WR137,PDR70, 35.0 inch, UDR70, 5.85~8.2 GHz, VSWR 1.10
58010076019	Flexible Twist,WR112,PBR84, 35.0 inch, UDR84, 7.05~10.0 GHz, VSWR 1.10
58010076005	Flexible Twist,WR75,PBR120, 35.0 inch, UBR120, 10.0~15.0 GHz, VSWR 1.10
58010076018	Flexible Twist,WR90,PDR100, 35.0 inch, CPR90G, 8.2~12.4 GHz, VSWR 1.10
58010076008	Flexible Twist,WR62,PBR140, 35.0 inch, UBR140, 12.4~18.0 GHz, VSWR 1.10
58010076011	Flexible Twist,WR42,PBR220, 35.0 inch, UBR220, 17.7~26.5 GHz, VSWR 1.25
58010076014	Flexible Twist,WR28,PBR320, 35.0 inch, UBR320, 26.5~40.1 GHz, VSWR 1.30
P/N	**Flexible Twist Hanger Kit**
07010118001	WR137 Flex Twist Hanger Kit
N000080L001A	WR90 Flex Twist Hanger Kit
07010118002	WR112 Flex Twist Hanger Kit
07010118003	WR75 Flex Twist Hanger Kit
07010118004	WR62 Flex Twist Hanger Kit
07010118005	WR42 Flex Twist Hanger Kit
07010118006	WR28 Flex Twist Hanger Kit

Flexible waveguide



Hanger

4.4.5 ALL-INDOOR DEPLOYMENT RELATED MATERIALS

For PTP 800i and PTP 810i All-Indoor deployments, a Premium Elliptical waveguide is required together with some accessories, including connectors, grounding kit, and pressure windows.

P/N	Premium Elliptical Waveguide
58009273001	EWP52 - Premium Elliptical Waveguide, 5.725 - 6.425 GHz (per ft)
58009273003	EWP63 - Premium Elliptical Waveguide, 6.425 - 7.125 GHz (per ft)
58009273002	EWP90 - Premium Elliptical Waveguide, 10.7 - 11.7 GHz (per ft)

P/N	Elliptical Waveguide Connectors
09009399001	Fixed-tuned CPR137G connector for EWP52
09009399003	Fixed-tuned CPR137G connector for EWP63
09009399002	Fixed-tuned CPR90G connector for EWP90

P/N	Elliptical Waveguide Grounding Kits
07009343002	Grounding Kit for waveguide EWP90
07009343001	Grounding Kit for waveguide EWP52 and EWP63

P/N	Elliptical Waveguide Hoisting Grips
07009344001	Hoisting Grip for waveguide EWP52 and EWP63
07009344002	Hoisting Grip for waveguide EWP90

P/N	Elliptical Waveguide Pressure Windows
58009283001	Pressure Window for WR137, 5.85-8.2 GHz, mates to CPR137G
58009283002	Pressure Window for WR90, 8.2-12.4 GHz, mates to CPR90G

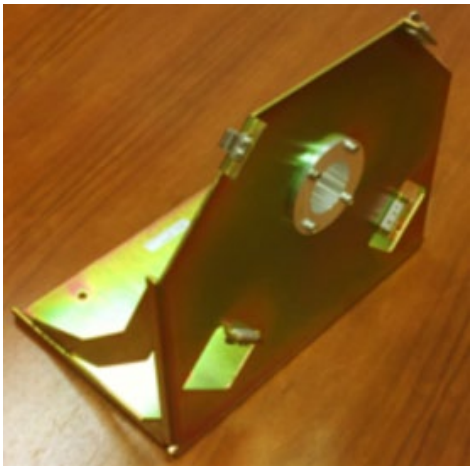
P/N	Elliptical Waveguide Dehydrator and Gas Distribution Manifolds
01009504002	DryLine Dehydrator, Low-pressure membrane, Wall Mountable, 115 Vac
58009284001	2-port Gas Distribution Manifold
58009284002	4-port Gas Distribution Manifold

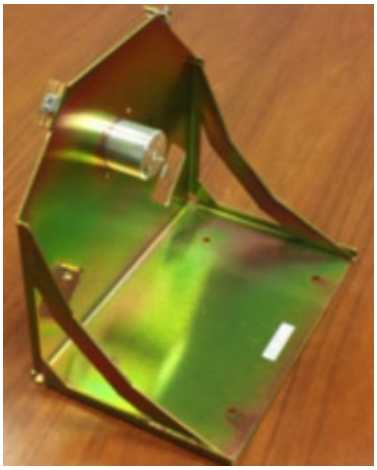
P/N	Flexible Waveguides for IRFU Installation
58009279001	Flexible Twist,WR90,CPR90G,12.0 inch,CPR90G,8.2 ~ 12.4 GHz, VSWR 1.10
58009279002	Flexible Twist,WR90,CPR90G,24.0 inch,CPR90G,8.2 ~ 12.4 GHz, VSWR 1.10
58009279003	Flexible Twist,WR90,CPR90G,35.0 inch,CPR90G,8.2 ~ 12.4 GHz, VSWR 1.10
58009280001	Flexible Twist,WR137,CPR137G,12.0 inch,CPR137G,5.85 ~ 8.2 GHz, VSWR 1.10
58009280002	Flexible Twist,WR137, CPR137G,24.0 inch,CPR137G,5.85 ~ 8.2 GHz, VSWR 1.10
58009280003	Flexible Twist,WR137, CPR137G,35.0 inch,CPR137G,5.85 ~ 8.2 GHz, VSWR 1.10

P/N	Flexible Waveguides for ODU-A All-Indoor Installation
30009404001	Flexible Twist,WR137,PDR70,12.0 inch, CPR137G,5.725 ~ 6.425 GHz, VSWR 1.03
30009404002	Flexible Twist,WR137,PDR70,24.0 inch, CPR137G,5.725 ~ 6.425 GHz, VSWR 1.03
30009404003	Flexible Twist,WR137,PDR70,35.0 inch, CPR137G,5.725 ~ 6.425 GHz, VSWR 1.03
30009404004	Flexible Twist,WR137,PDR70,12.0 inch, CPR137G,6.425 ~ 7.125 GHz, VSWR 1.03
30009404005	Flexible Twist,WR137,PDR70,24.0 inch, CPR137G,6.425 ~ 7.125 GHz, VSWR 1.03
30009404006	Flexible Twist,WR137,PDR70,35.0 inch, CPR137G,6.425 ~ 7.125 GHz, VSWR 1.03
67009255001	Flange Hardware Kit, PDR70
30009407001	Flexible Twist,WR90,PDR100,12.0 inch, CPR90G,10.7 ~ 11.7 GHz,VSWR 1.03
30009407002	Flexible Twist,WR90,PDR100,24.0 inch, CPR90G,10.7 ~ 11.7 GHz,VSWR 1.03
30009407003	Flexible Twist,WR90,PDR100,35.0 inch, CPR90G,10.7 ~ 11.7 GHz,VSWR 1.03
67009255002	Flange Hardware Kit, PDR 100

For ODU-A All-Indoor installation, one set of the flange hardware must also be ordered for each Flexible Waveguide.

P/N	Flexible Waveguide Mounting Hardware
07009303001	ODU Mount L-Bracket, 6G, WR112
07009303005	ODU Mount L-Bracket, 11, 13G, WR75

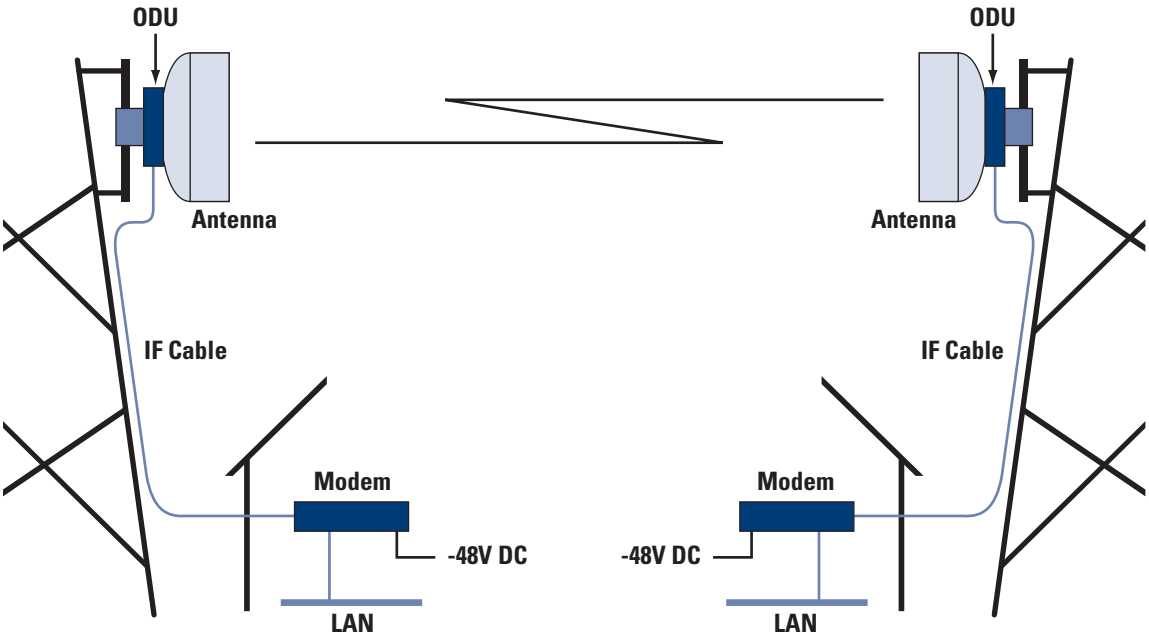




An ODU L-bracket can be used for rack mounting or cabinet mounting. A flat panel may be needed for rack mounting together with the ODU L-bracket.

5. CABLE AND CABLE ACCESSORIES

For Split-Mount deployments, your PTP 800 ODU and CMU are connected by a single coaxial IF cable. An installation will comprise antennas, ODUs, Modem Units, IF cables, and all other installation hardware.



5.1 IF CABLE BETWEEN IRFU AND MODEM UNIT

The Andrew CNT195 cable is recommended to connect a modem unit with the IRFU.

P/N	Description
30009403001	IF cable for PTP 800 CMU and IRFU
N000081L008A	IF cable for PTP 810 MMU and IRFU

5.2 IF CABLE BETWEEN ODU AND PTP 800 CMU OR PTP 810 MMU

The Andrew CNT400 cable is recommended to connect a PTP 800 CMU or PTP 810 MMU with the ODU. Using a CNT400 cable, the maximum distance between the ODU and Modem Unit is 190 meters (623 ft). The cable is available in 75 meters (246 ft) or 500 meters (1640 ft) in a reel. The CNT-600 cable or equivalent cable is recommended to support the maximum distance of 300 meters (984 ft) between the Modem Unit and ODU.

The PTP 800 CMU uses N-type connectors for the IF connection. The PTP 810 MMU uses TNC connectors for the IF connection.

P/N	Description
30010194001	50 Ohm Braided Coaxial Cable - 75 meters
30010195001	50 Ohm Braided Coaxial Cable - 500 meters
09010091001	RF Connector, N, Male, Straight for CNT-400 Cable
01010589001	RD Connector, N, Male, Right Angle for CNT-400 Cable
N000081L005A	TNC Male for CNT-400 braided cable
N000081L006A	TNC Male Right Angle for CNT-400 braided cable
N000081L007A	Type N Female to TNC Male Adapter

5.3 CABLE ASSEMBLY KIT

One cable assembly kit is required per IF drop cable installation. The kit can be used for both PTP 800 and PTP 810 installations.

For a PTP 810, one TNC connector needs to be purchased together with one Cable Assembly kit because the PTP 810's IF port requires a TNC connector.

P/N	Description
WB3616H	Coaxial Cable Installation Assembly Kit (w/o LPU)

The cable assembly kit includes:

	Component Description	Quantity	Notes
1	ODU ground cable	1	0.8 m, with an M5 lug eye on both ends
2	LPU grounding cable	2	0.6 m, with an M5 and M10 lug eye on each side
3	ODU to LPU cable	1	0.7 m jumper cable with N-type connector
4	Cable grounding kit	2	One cable grounding kit provided for the bottom of the tower and one at the entry to the building. Same as P/N: 01010419001
5	N-type connectors for the drop cable	4	Two connectors provided for the drop cable and two for the bottom SPD to CMU cable.
6	Vinyl insulating tape, 19mm (¾ inch)	1	0.19 m
7	Vinyl insulating tape, 51mm (2 inch)	1	0.51 m
8	Self-amalgamating tape	1	3.0 m
9	Tie wraps	50	
10	Instruction sheet	1	
11	Packing List	1	

5.4 LIGHTNING PROTECTION KIT

One lightning protection kit is required per IF drop cable installation. The kit includes two surge protection units and one mounting kit. The kit can be used for both PTP 800 and PTP 810 installations.

P/N	Description
WB3657A	LPU END KIT PTP 800 (1 kit required per coaxial cable)

The Polyphaser BGXZ series Lightning Protection Unit (LPU) is recommended for your PTP 800 or PTP 810 installation. The lightning protection kit includes:

	Component Description	Qty	Notes
1	BGXZ Surge protection unit	2	From Polyphaser
2	Mounting kit for surge protection unit	1	

5.5 CABLE GROUNDING KIT

The Andrew 223158-2 cable grounding kit is recommended. Two cable grounding kits are already included in the cable assembly kit (see details in Section 4.2). The kit can be used for both PTP 800 and PTP 810 installations. The following kits are available for extra cable grounding:

P/N	Description
01010419001	Cable Grounding Kits for 1/4" and 3/8" cable

5.6 PTP 810 MMU CONSOLE PORT ADAPTER

The PTP 810 MMU supports local access using both Ethernet and a serial port connection for management. For customers who like to use a serial port, a console port adapter or customer-made cable is required (for Pin Diagram, see the PTP 810 User Manual).

Cambium Networks provides the following console port adapter:

P/N	Description
N000081L003A	PTP810 MMU Console Port Connector Adapter

5.7 CRIMP TOOL

A crimp tool is required to make the N-type connectors for the IF cable.

P/N	Description
66010063001	Crimp tool for N-type connector

5.8 HOISTING GRIP FOR CNT-400 CABLE

The hoisting grip tool can be used only one time and cannot be reused. The kit can be used for both PTP 800 and PTP 810 installations.

P/N	Description
07009304001	Hoisting Grip for CNT-400 cable

6. SOFTWARE

You do not need to order software separately. The radios are shipped pre-loaded with operational software. The latest software can be downloaded from PTP software.

For out-of-warranty products, you need to purchase a software support contract in order to get the latest software.

P/N	Description
WB3106A	1 Year PTP Software Support Contract (1-2 Links)
WB3107A	1 Year PTP Software Support Contract (3-5 Links)
WB3108A	1 Year PTP Software Support Contract (6+ Links)

7. WARRANTY AND SERVICES

7.1 STANDARD WARRANTY

With your purchase of a PTP 800 or 810 link, we provide a 12-month limited warranty on hardware components. Your standard warranty includes return-and-repair terms for damaged parts, plus minor software enhancements as available and 24x7 telephone support. Damaged units are shipped to our Repair Center where the units are repaired and returned within 30 calendar days.

In addition, two Extended Warranty[3] options are available. .

7.2 EXTENDED WARRANTY WITH ALL RISKS ADVANCED REPLACEMENT[4]

This warranty upgrades and/or extends the initial 12-month Standard Warranty to include All Risks equipment coverage with our Advanced Replacement program. The All Risks feature provides coverage for virtually all types of equipment damage, including lightning, dropped units, vandalism, fire and other types of damage. Under the Advanced Replacement program, replacement units are shipped from a Cambium repair center[5] the next business day after receipt of the returned product under a confirmed RMA. We pay shipping costs in both directions. Delivery times will depend on ship-to location and customs. This warranty also includes minor software enhancements as they become available and 24x7 telephone support.

P/N	Description
WB3560	PTP 800 Upgrade to All Risks Advanced Replacement Program During 1st Year Warranty
WB3561	PTP 800 Extended Warranty & All Risks Advanced Replacement Program, 1 Additional Yr
WB3562	PTP 800 Extended Warranty & All Risks Advanced Replacement Program, 2 Additional Yrs
WB3563	PTP 800 Extended Warranty & All Risks Advanced Replacement Program, 4 Additional Yrs
WB3922	PTP 800 ODU-A or ODU-B (End Only) Upgrade to All Risks Advanced Replacement Program During 1st Year Warranty
WB3923	PTP 800 ODU-A or ODU-B (End Only) Extended Warranty & All Risks Advanced Replacement Program, 1 Additional Yr
WB3924	PTP 800 ODU-A or ODU-B (End Only) Extended Warranty & All Risks Advanced Replacement Program, 2 Additional Yrs
WB3925	PTP 800 ODU-A or ODU-B (End Only) Extended Warranty & All Risks Advanced Replacement Program, 4 Additional Yrs
WB3929	PTP 800 CMU (End Only) Upgrade to All Risks Advanced Replacement Program During 1st Year Warranty
WB3930	PTP 800 CMU (End Only) Extended Warranty & All Risks Advanced Replacement Program, 1 Additional Yr
WB3931	PTP 800 CMU (End Only) Extended Warranty & All Risks Advanced Replacement Program, 2 Additional Yrs
WB3932	PTP 800 CMU (End Only) Extended Warranty & All Risks Advanced Replacement Program, 4 Additional Yrs
N000081S007A	PTP 810 MMU Upgrade to All Risks Advanced Replacement Program during 1st Year warranty
N000081S001A	PTP 810 MMU Extended Warranty & All Risks Advanced Replacement Program, 1 Additional Yr
N000081S002A	PTP 810 MMU Extended Warranty & All Risks Advanced Replacement Program, 2 Additional Yrs
N000081S003A	PTP 810 MMU Extended Warranty & All Risks Advanced Replacement Program, 4 Additional Yrs
WB4244	IRFU XVCR & FAN (End Only) All Risks Advanced Replacement Program during 1st Year warranty
WB4245	IRFU XVCR & FAN (End Only) All Risks Advanced Replacement Program, 1 Additional Yr
WB4246	IRFU XVCR & FAN (End Only) All Risks Advanced Replacement Program, 2 Additional Yrs
WB4247	IRFU XVCR & FAN (End Only) All Risks Advanced Replacement Program, 4 Additional Yrs

[3] Extended warranties are not offered on 1+1 hot standby kits, antennas, antenna accessories or mounting kits.

[4] PTP 800 and PTP 810 All Risks Advanced Replacement Extended Warranties may not be available in all geographic regions. No advanced replacement warranties are offered on 1+1 hot standby kits, antennas, antenna accessories or mounting kits.

[5] Based on your location, PTP 800 and PTP 810 equipment may ship from a location other than the UK.

7.3 EXTENDED WARRANTY WITH RETURN-AND-REPAIR

This warranty extends the initial 12-month Standard Warranty with 30-day return-and-repair terms through the second, third or fifth years of ownership. The warranty also includes minor software enhancements as they become available and 24 x 7 telephone support. Typically, you would choose this option when one or more spare units are purchased for use as replacement units.

P/N	Description
WB3557	PTP 800 Extended Warranty, 1 Additional Yr
WB3558	PTP 800 Extended Warranty, 2 Additional Yrs
WB3559	PTP 800 Extended Warranty, 4 Additional Yrs
WB3919	PTP 800 ODU-A or ODU-B (End Only) Extended Warranty, 1 Additional Yr
WB3920	PTP 800 ODU-A or ODU-B (End Only) Extended Warranty, 2 Additional Yrs
WB3921	PTP 800 ODU-A or ODU-B (End Only) Extended Warranty, 4 Additional Yrs
WB3926	PTP 800 CMU (End Only) Extended Warranty, 1 Additional Yr
WB3927	PTP 800 CMU (End Only) Extended Warranty, 2 Additional Yrs
WB3928	PTP 800 CMU (End Only) Extended Warranty, 4 Additional Yrs
WB4189	IRFU w/ one XVCR (End Only) Extended Warranty, 1 Additional Yr
WB4190	IRFU w/ one XVCR (End Only) Extended Warranty, 2 Additional Yrs
WB4191	IRFU w/ one XVCR (End Only) Extended Warranty, 4 Additional Yrs
N000081S004A	PTP 810 MMU Extended Warranty, 1 Additional Yr
N000081S005A	PTP 810 MMU Extended Warranty, 2 Additional Yrs
N000081S006A	PTP 810 MMU Extended Warranty, 4 Additional Yrs

7.4 FCC MICROWAVE LICENSE COORDINATION SERVICES

For customers in the United States, we offer FCC license coordination services through our partnership with Comsearch. The service covers a link study, Prior Coordination Notification (PCN), FCC application filing, Schedule-K completion, and a one- year license protection warranty.

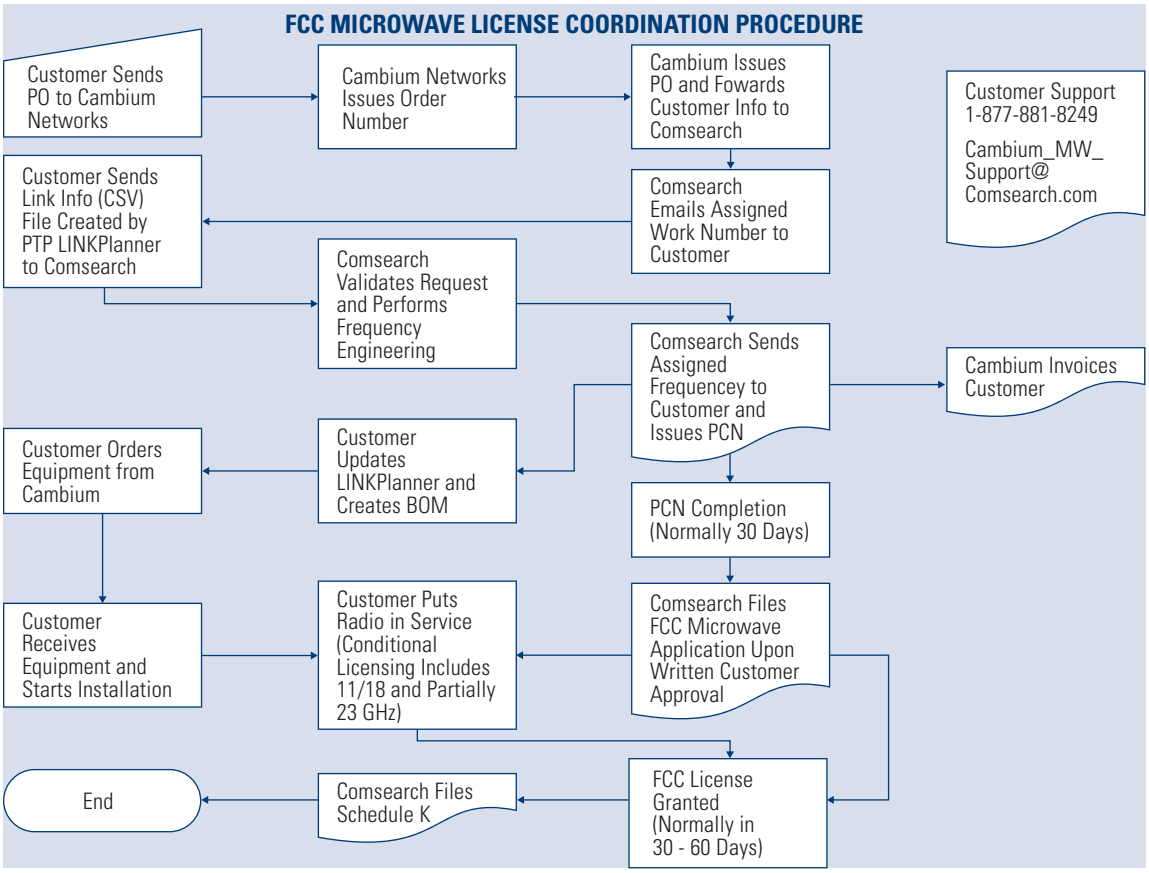
P/N	Description
WB3659	FCC Microwave Frequency Coordination Service (each hop)
WB4113	FCC Microwave Frequency Protection Service – 5 Additional Yrs
WB4114	FCC Microwave Frequency Protection Service – 10 Additional Yrs

Below is an overview of the FCC licensing services that we offer through our partnership with Comsearch.

- 6 ~ 38 GHz FCC microwave frequency coordination services include:
  - Frequency selection, interference analysis and engineering documentation
  - PCN and case resolution
  - FCC application preparation and filing, with Schedule-K completion

- The microwave license coordination service fee covers:
  - A single path, including multiple frequency pairs within the same band, if requested
  - Revisions to the original order at no additional cost before the license grant is provided – such revisions are not for new paths
  - One-year of frequency-protection service after the PCN is issued
- FCC licensing fee:
  - The license coordination service fee does NOT include the FCC licensing fee ($660 per transmit site).
  - The FCC licensing fee may be waived or discounted if the customer is a local government, municipality, education, hospital, etc.
  - The FCC licensing fee can be paid by the customer directly via the FCC web page or paid through Comsearch.
- A dedicated support contact is provided for you at:
  - Phone: 1-877-881-8249
  - Email: Cambium_MW_Support@Comsearch.com

The following chart shows the process between you, Comsearch and us.



It is important that you do not order your PTP 800 or PTP 810 system until you:

- Receive notification of the approved radio frequency from Comsearch
- Enter the approved frequency into the Cambium PTP LINKPlanner tool and get the appropriate BOM