

# PTP 820S Licensed Microwave Radio

QUICK LOOK:

**PTP 820S, single core radio with All Outdoor core radio capable of 2048 QAM with ACM**

- Support 6-38 GHz
- Support 1+0, 1+1 HSB, 2+0 SP or DP
- Support Advance Frequency reuse



**Radio**

6-38 GHz

1+0, 1+1 HSB, 2+0 SP or DP

Multi-Band (PTP 850E, PTP 820E)

**Radio Features**

Protection: 1+1 HSB

QPSK to 2048 QAM w/ACM

Advanced Frequency Reuse (AFR)

**Ethernet**

**Ethernet Interfaces**

Traffic Interfaces – 1 x 10/100/1000Base-T (RJ-45) and 2 x 1000base-X (SFP) or 2 x 10/100/1000 Base-T (electrical SFP)

Management Interface - 1 x 10/100 Base-T (RJ-45)

Optical SFP Types - Optical 1000Base-LX (1310 nm) or SX (850nm)

Note: SFP devices must be of industrial grade (-40°C to +85°C)

**Ethernet Features**

MTU – 9600 Bytes

Quality of Service

- Multiple Classification criteria (VLAN ID, p-bits, IPv4, DSCP, IPv6 TC, MPLS EXP)

- 8 priority queues

- Deep buffering (configurable up to 64 Mbit per queue)

- WRED

- P-bit marking/remarking

4K VLANs

VLAN add/remove/translate

Frame Cut Through – controlled latency and PDV for delay sensitive applications

Header De-Duplication – Capacity boosting by eliminating inefficiency in all layers (L2, MPLS, L3, L4, Tunneling – GTP for LTE, GRE)

Y.1731 Ethernet OAM

Y.1731 Ethernet Bandwidth Notification (ETH-BN)

Adaptive Bandwidth Notification (ABN)

## PTP 820S Licensed Microwave Radio

### Management Protocols

SNMP

REST

SDN Support: NETCONF/YANG

### Synchronization

Synchronization Distribution

Sync Distribution over any traffic interface (GE/FE)

Sync-E (ITU-T G.8261, G.8262)

SSM/ESMC Support for ring/mesh applications (ITU-T G.8264)

Sync-E Regenerator mode, providing PRC grade (ITU-T G.811) performance for smart pipe applications.

IEEE-1588

Optimized Transport for reduced PDV

IEEE-1588 TC

### Security

AES 256-bit Encryption

Secured protocols (HTTPS, SNMPV3, SSH, SFTP)

Radius authentication and authorization

TACACS+ authentication and authorization (session-based)

### Standard

#### MEF

Carrier Ethernet 2.0

Supported Ethernet Standards

10/100/1000base-T/X (IEEE 802.3)

Ethernet VLANs (IEEE 802.3ac)

Virtual LAN (VLAN, IEEE 802.1Q)

Class of service (IEEE 802.1p)

Provider bridges (QinQ – IEEE 802.1ad)

Link aggregation (IEEE 802.3ad)

Auto MDI/MDIX for 1000baseT

RFC 1349: IPv4 TOS

RFC 2474: IPv4 DSCP

RFC 2460: IPv6 Traffic Classes

### Standards Compliance

EMC: EN 301 489-1, EN 301 489-4, Class B (Europe), FCC 47 CFR, part 15, class B (US), ICES-003, Class B (Canada), TEC/EMI/TEL-001/01, Class B (India)

Surge: EN61000-4-5, Class 4 (for PWR and ETH1/PoE ports)

Safety: EN 60950-1, IEC 60950-1, UL 60950-1, CSA-C22.2 No.60950-1, EN 60950-22, UL 60950-22, CSAC22.2.60950-22

Ingress Protection: IP66-compliant

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

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

### Technical

#### Mechanical Specifications

Dimensions: 230mm(H), 233mm(W), 98mm(D), 6.0kg;

9.05"(H), 9.07"(W), 3.86"(D), 13.23 lbs.

#### Pole Diameter Range (for Remote Mount Installation):

8.89 cm – 11.43 cm; 3.5" – 4.5"

#### Environmental Specifications

-33°C to +55°C (-45°C to +60°C extended);

-27°F to +131°F (-49°F to +140°F extended)

#### Power Input Specifications

Standard Input: -48 VDC

IDU DC Input range: -40 to -60 VDC

#### Power Consumption Specifications

Maximum Power Consumption: 6-11 GHz: 35W; 13-38 GHz: 42W

## PTP 820S Licensed Microwave Radio

Transmit Power (dBm)										
Transmit Power	6 GHz	7 GHz	8 GHz	10-11 GHz	13-15 GHz	18 GHz	23 GHz	24 GHz UL HP	26 GHz	28-38 GHz
<b>QPSK</b>	28	28	28	26	24	22	20	-17	21	18
<b>8 PSK</b>	28	28	28	26	24	22	20	-17	21	18
<b>16 QAM</b>	28	27	27	26	23	21	20	-17	20	17
<b>32 QAM</b>	27	26	26	25	22	20	20	-17	19	16
<b>64 QAM</b>	27	26	26	25	22	20	20	-17	19	16
<b>128 QAM</b>	27	26	26	25	22	20	20	-17	19	16
<b>256 QAM</b>	27	26	24	25	20	20	18	-17	17	14
<b>512 QAM</b>	25	24	24	24	20	18	18	-17	17	14
<b>1024 QAM</b>	25	24	24	23	20	18	17	-17	16	13
<b>2048 QAM</b>	23	22	22	21	18	16	16	-17	15	12

Receive Sensitivity															
	3.5 & 5 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-96.5	-96.0	-96.0	-96.0	-95.5	-96.5	-95.5	-94.5	-96.0	-95.0	-94.5	-94.5	-94.5	-94.0	-94.0
<b>16 QAM</b>	-90.0	-89.0	-89.0	-89.0	-89.0	-89.5	-88.5	-88.0	-89.0	-88.0	-87.5	-88.0	-87.5	-87.5	-87.0
<b>32 QAM</b>	-86.5	-85.5	-85.5	-85.5	-85.5	-86.0	-85.0	-84.5	-85.5	-84.5	-84.0	-84.5	-84.0	-84.0	-83.5
<b>64 QAM</b>	-83.0	-82.5	-82.5	-82.0	-83.0	-82.0	-81.0	-82.5	-81.5	-81.0	-81.0	-81.0	-81.0	-80.5	-80.5
<b>128 QAM</b>	-79.5	-79.0	-79.0	-78.5	-79.5	-78.5	-77.5	-79.0	-78.0	-77.5	-77.5	-77.5	-77.5	-77.0	-77.0
<b>256 QAM</b>	-76.5	-75.5	-75.5	-75.5	-76.5	-75.0	-74.5	-75.5	-75.0	-74.5	-74.5	-74.5	-74.0	-74.0	-73.5
	7 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-93.5	-93.0	-93.0	-93.0	-92.5	-93.5	-92.5	-91.5	-93.0	-92.0	-91.5	-91.5	-91.5	-91.0	-91.0
<b>8 PSK</b>	-87.5	-87.0	-87.0	-87.0	-86.5	-87.5	-86.5	-85.5	-87.0	-86.0	-85.5	-85.5	-85.5	-85.0	-85.0
<b>16 QAM</b>	-87.0	-86.5	-86.5	-86.5	-86.0	-87.0	-86.0	-85.0	-86.5	-85.5	-85.0	-85.0	-85.0	-84.5	-84.5
<b>32 QAM</b>	-83.5	-83.0	-83.0	-83.0	-82.5	-83.5	-82.5	-81.5	-83.0	-82.0	-81.5	-81.5	-81.5	-81.0	-81.0
<b>64 QAM</b>	-80.5	-80.0	-80.0	-80.0	-79.5	-80.5	-79.5	-78.5	-80.0	-79.0	-78.5	-78.5	-78.5	-78.0	-78.0
<b>128 QAM</b>	-77.5	-76.5	-76.5	-76.5	-76.5	-77.5	-76.0	-75.5	-76.5	-76.0	-75.5	-75.5	-75.0	-75.0	-74.5
<b>256 QAM</b>	-74.0	-73.5	-73.5	-73.0	-73.0	-74.0	-73.0	-72.0	-73.5	-72.5	-72.0	-72.0	-72.0	-71.5	-71.5
<b>512 QAM</b>	-72.0	-71.5	-71.5	-71.0	-72.0	-71.0	-70.0	-70.0	-71.5	-70.5	-70.0	-70.0	-70.0	-69.5	-69.5
<b>1024 QAM (strong FEC)</b>	-68.5	-68.0	-68.0	-67.5	-68.5	-68.5	-67.5	-66.5	-68.0	-67.0	-66.5	-66.5	-66.5	-66.0	-66.0
<b>1024 QAM (light FEC)</b>	-68.0	-67.0	-67.0	-67.0	-67.5	-67.5	-66.5	-66.0	-67.0	-66.0	-65.5	-66.0	-65.5	-65.5	-65.0

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**Receive Sensitivity (dBm @BER=10-6) - continued**

	10 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-92.0	-91.5	-91.5	-91.5	-91.0	-92.0	-91.0	-90.0	-91.5	-90.5	-87.0	-90.0	-90.0	-89.5	-89.0
<b>8 PSK</b>	-87.0	-86.0	-86.0	-86.0	-86.0	-87.0	-85.5	-85.0	-86.0	-85.5	-81.5	-85.0	-84.5	-84.5	-84.0
<b>16 QAM</b>	-85.5	-85.0	-85.0	-85.0	-84.5	-85.5	-84.5	-83.5	-85.0	-84.0	-80.5	-83.5	-83.5	-83.0	-82.5
<b>32 QAM</b>	-82.0	-81.5	-81.5	-81.5	-81.0	-82.0	-81.0	-80.0	-81.5	-80.5	-77.0	-80.0	-80.0	-79.5	-79.0
<b>64 QAM</b>	-79.0	-78.5	-78.5	-78.5	-78.0	-79.0	-77.5	-77.0	-78.5	-77.5	-74.0	-77.0	-77.0	-76.5	-76.0
<b>128 QAM</b>	-75.5	-75.0	-75.0	-75.0	-74.5	-75.5	-74.5	-73.5	-75.0	-74.0	-70.5	-73.5	-73.5	-73.0	-72.5
<b>256 QAM</b>	-72.5	-72.0	-72.0	-72.0	-71.5	-72.5	-71.5	-70.5	-72.0	-71.0	-67.5	-70.5	-70.5	-70.0	-69.5
<b>512 QAM</b>	-70.0	-69.5	-69.5	-69.5	-69.0	-70.0	-68.5	-68.0	-69.5	-68.5	-65.0	-68.0	-68.0	-67.5	-67.0
<b>1024 QAM (strong FEC)</b>	-67.0	-66.5	-66.5	-66.5	-66.0	-67.0	-66.0	-65.0	-66.5	-65.5	-62.0	-65.0	-65.0	-64.5	-64.0
<b>1024 QAM (light FEC)</b>	-66.5	-65.5	-65.5	-65.5	-65.5	-66.5	-65.0	-64.5	-65.5	-65.0	-61.0	-64.5	-64.0	-64.0	-63.5
	14 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-90.5	-90.0	-90.0	-90.0	-89.5	-90.5	-89.5	-88.5	-90.0	-89.0	-88.5	-88.5	-88.5	-88.0	-88.0
<b>8 PSK</b>	-84.5	-84.0	-84.0	-84.0	-83.5	-85.5	-83.5	-82.5	-84.0	-83.0	-82.5	-82.5	-82.5	-82.0	-82.0
<b>16 QAM</b>	-83.5	-83.0	-83.0	-83.0	-82.5	-83.5	-82.5	-81.5	-83.0	-82.0	-81.5	-81.5	-81.5	-81.0	-81.0
<b>32 QAM</b>	-80.5	-79.5	-79.5	-79.5	-79.5	-80.5	-79.0	-78.5	-79.5	-79.0	-78.5	-78.5	-78.0	-78.0	-77.5
<b>64 QAM</b>	-77.5	-76.5	-76.5	-76.5	-76.5	-77.0	-76.0	-75.5	-76.5	-76.0	-75.5	-75.5	-75.0	-75.0	-74.5
<b>128 QAM</b>	-74.0	-73.5	-73.5	-73.5	-73.0	-74.0	-73.0	-72.0	-73.5	-72.5	-72.0	-72.0	-72.0	-71.5	-71.5
<b>256 QAM</b>	-71.5	-70.5	-70.5	-70.5	-70.5	-71.0	-70.0	-69.5	-70.5	-69.5	-69.0	-69.5	-69.0	-69.0	-68.5
<b>512 QAM</b>	-68.5	-68.0	-68.0	-68.0	-67.5	-68.5	-67.5	-66.5	-68.0	-67.0	-66.5	-66.5	-66.5	-66.0	-66.0
<b>1024 QAM (strong FEC)</b>	-65.5	-65.0	-65.0	-65.0	-64.5	-65.5	-64.5	-63.5	-65.0	-64.0	-63.5	-63.5	-63.5	-63.0	-63.0
<b>1024 QAM (light FEC)</b>	-65.0	-64.0	-64.0	-64.0	-64.0	-64.5	-63.5	-63.0	-64.0	-63.5	-63.0	-63.0	-62.5	-62.5	-62.0
	20 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-89.0	-88.5	-88.5	-88.5	-88.0	-89.0	-88.0	-87.0	-88.5	-87.5	-84.0	-87.0	-87.0	-86.5	-86.0
<b>8 PSK</b>	-84.0	-83.5	-83.5	-83.5	-83.0	-84.0	-83.0	-82.0	-83.5	-82.5	-79.0	-82.0	-82.0	-81.5	-81.0
<b>16 QAM</b>	-82.5	-82.0	-82.0	-82.0	-81.5	-82.5	-81.0	-80.5	-82.0	-81.0	-77.5	-80.5	-80.5	-80.0	-79.5
<b>32 QAM</b>	-79.0	-78.5	-78.5	-78.5	-78.0	-79.0	-77.5	-77.0	-78.5	-77.5	-74.0	-77.0	-77.0	-76.5	-76.0
<b>64 QAM</b>	-76.0	-75.0	-75.0	-75.0	-75.0	-76.0	-74.5	-74.0	-75.0	-74.5	-70.5	-74.0	-73.5	-73.5	-73.0
<b>128 QAM</b>	-73.0	-72.0	-72.0	-72.0	-72.0	-73.0	-71.5	-71.0	-72.0	-71.5	-67.5	-71.0	-70.5	-70.5	-70.0
<b>256 QAM</b>	-70.0	-69.5	-69.5	-69.5	-69.0	-70.0	-68.5	-68.0	-69.5	-68.5	-65.0	-68.0	-68.0	-67.5	-67.0
<b>512 QAM</b>	-67.5	-66.5	-66.5	-66.5	-66.5	-67.5	-66.0	-65.5	-66.5	-66.0	-62.0	-65.5	-65.0	-65.0	-64.5
<b>1024 QAM (strong FEC)</b>	-64.5	-63.5	-63.5	-63.5	-63.5	-64.5	-63.0	-62.5	-63.5	-63.0	-59.0	-62.5	-62.0	-62.0	-61.5
<b>1024 QAM (light FEC)</b>	-63.5	-63.0	-63.0	-63.0	-62.5	-63.5	-62.5	-61.5	-63.0	-62.0	-58.5	-61.5	-61.5	-61.0	-60.5
<b>2048 QAM</b>	-60.0	-59.5	-59.5	-59.5	-59.0	-60.0	-59.0	-58.0	-59.5	-58.5	-55.0	-58.0	-58.0	-57.5	-57.0

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Receive Sensitivity (dBm @BER=10-6) - continued															
	25 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-87.5	-86.5	-86.5	-86.5	-86.5	-87.0	-86.0	-85.5	-86.5	-85.5	-82.0	-85.5	-85.0	-85.0	-84.0
<b>8 PSK</b>	-82.5	-82.0	-82.0	-82.0	-81.5	-82.5	-81.5	-80.5	-82.0	-81.0	-77.5	-80.5	-80.5	-80.0	-79.5
<b>16 QAM</b>	-80.5	-80.0	-80.0	-80.0	-79.5	-80.5	-79.5	-78.5	-80.0	-79.0	-75.5	-78.5	-78.5	-78.0	-77.5
<b>32 QAM</b>	-77.5	-77.0	-77.0	-77.0	-76.5	-77.5	-76.0	-75.5	-77.0	-76.0	-72.5	-75.5	-75.5	-75.0	-74.5
<b>64 QAM</b>	-74.5	-74.0	-74.0	-74.0	-73.5	-74.5	-73.5	-72.5	-74.0	-73.0	-69.5	-72.5	-72.5	-72.0	-71.5
<b>128 QAM</b>	-71.5	-71.0	-71.0	-71.0	-70.5	-71.5	-70.5	-69.5	-71.0	-70.0	-66.5	-69.5	-69.5	-69.0	-68.5
<b>256 QAM</b>	-68.5	-67.5	-67.5	-67.5	-67.5	-68.5	-67.0	-66.5	-67.5	-67.0	-63.0	-66.5	-66.0	-66.0	-65.5
<b>512 QAM</b>	-66.0	-65.0	-65.0	-65.0	-65.0	-66.0	-64.5	-64.0	-65.0	-64.5	-60.5	-64.0	-63.5	-63.5	-63.0
<b>1024 QAM (strong FEC)</b>	-63.0	-62.5	-62.5	-62.0	-62.0	-63.0	-61.5	-61.0	-62.5	-61.5	-58.0	-61.0	-61.0	-60.5	-60.0
<b>1024 QAM (light FEC)</b>	-62.5	-61.5	-61.5	-61.5	-61.5	-62.5	-61.0	-60.5	-61.5	-61.0	-57.0	-60.5	-60.0	-60.0	-59.5
<b>2048 QAM</b>	-58.5	-58.0	-58.0	-57.5	-58.5	-57.0	-56.5	-58.0	-57.0	-57.0	-53.5	-56.5	-56.5	-56.0	-55.5
	28 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-87.5	-87.0	-87.0	-87.0	-86.5	-87.5	-86.5	-85.5	-87.0	-86.0	-85.5	-85.5	-85.5	-85.0	-85.0
<b>8 PSK</b>	-83.0	-82.5	-82.5	-82.5	-82.0	-83.0	-82.0	-81.0	-82.5	-81.5	-81.0	-81.0	-81.0	-80.5	-80.5
<b>16 QAM</b>	-81.0	-80.5	-80.5	-80.5	-80.0	-81.0	-79.5	-79.0	-80.5	-79.5	-79.0	-79.0	-79.0	-78.5	-78.0
<b>32 QAM</b>	-77.5	-77.0	-77.0	-77.0	-76.5	-77.5	-76.0	-75.5	-77.0	-76.0	-75.5	-75.5	-75.5	-75.0	-74.5
<b>64 QAM</b>	-74.5	-74.0	-74.0	-74.0	-73.5	-74.5	-73.0	-72.5	-74.0	-73.0	-72.5	-72.5	-72.5	-72.0	-71.5
<b>128 QAM</b>	-71.5	-70.5	-70.5	-70.5	-70.5	-71.0	-70.0	-69.5	-70.5	-69.5	-69.0	-69.5	-69.0	-69.0	-68.5
<b>256 QAM</b>	-68.5	-67.5	-67.5	-67.5	-67.5	-68.0	-67.0	-66.5	-67.5	-66.5	-66.0	-66.5	-66.0	-66.0	-65.5
<b>512 QAM</b>	-66.0	-65.0	-65.0	-65.0	-65.0	-66.0	-64.5	-64.0	-65.0	-64.5	-64.0	-64.0	-63.5	-63.5	-63.0
<b>1024 QAM (strong FEC)</b>	-63.0	-62.5	-62.5	-62.0	-62.0	-63.0	-61.5	-61.0	-62.5	-61.5	-61.0	-61.0	-61.0	-60.5	-60.0
<b>1024 QAM (light FEC)</b>	-62.0	-61.5	-61.5	-61.0	-61.0	-62.0	-60.5	-60.0	-61.5	-60.5	-60.0	-60.0	-60.0	-59.5	-59.0
<b>2048 QAM</b>	-58.5	-58.0	-58.0	-57.5	-58.5	-57.0	-56.5	-58.0	-57.0	-57.0	-56.5	-56.5	-56.5	-56.0	-55.5
	30 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-87.5	-87.0	-87.0	-87.0	-86.5	-87.5	-86.0	-85.5	-87.0	-86.0	-85.5	-85.5	-85.5	-85.0	-84.5
<b>8 PSK</b>	-82.5	-81.5	-81.5	-81.5	-81.5	-82.5	-81.0	-80.5	-81.5	-81.0	-80.5	-80.5	-80.0	-80.0	-79.0
<b>16 QAM</b>	-81.0	-80.0	-80.0	-80.0	-80.0	-80.5	-79.5	-79.0	-80.0	-79.0	-78.5	-79.0	-78.5	-78.5	-77.5
<b>32 QAM</b>	-77.0	-76.5	-76.5	-76.5	-76.0	-77.0	-76.0	-75.0	-76.5	-75.5	-75.0	-75.0	-75.0	-74.5	-74.0
<b>64 QAM</b>	-74.5	-73.5	-73.5	-73.5	-73.5	-74.0	-73.0	-72.5	-73.5	-72.5	-72.0	-72.5	-72.0	-72.0	-71.0
<b>128 QAM</b>	-71.0	-70.5	-70.5	-70.5	-70.0	-71.0	-70.0	-69.0	-70.5	-69.5	-69.0	-69.0	-69.0	-68.5	-68.0
<b>256 QAM</b>	-68.0	-67.5	-67.5	-67.5	-67.0	-68.0	-67.0	-66.0	-67.5	-66.5	-66.0	-66.0	-66.0	-65.5	-65.0
<b>512 QAM</b>	-66.0	-65.5	-65.5	-65.5	-65.0	-66.0	-64.5	-64.0	-65.5	-64.5	-64.0	-64.0	-64.0	-63.5	-63.0
<b>1024 QAM (strong FEC)</b>	-63.0	-62.0	-62.0	-62.0	-62.0	-62.5	-61.5	-61.0	-62.0	-61.0	-60.5	-61.0	-60.5	-60.5	-59.5
<b>1024 QAM (light FEC)</b>	-62.0	-61.0	-61.0	-61.0	-61.0	-62.0	-60.5	-60.0	-61.0	-60.5	-60.0	-60.0	-59.5	-59.5	-58.5
<b>2048 QAM</b>	-58.0	-57.5	-57.5	-57.5	-57.0	-58.0	-56.5	-56.0	-57.5	-56.5	-56.0	-56.0	-56.0	-55.5	-55.0

## PTP 820S Licensed Microwave Radio

Receive Sensitivity (dBm @BER=10-6) - continued															
	40 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-86.0	-85.5	-85.5	-85.5	-85.0	-86.0	-85.0	-84.0	-85.5	-84.5	-84.0	-84.0	-84.0	-83.5	-83.5
<b>8 PSK</b>	-81.0	-80.5	-80.5	-80.5	-80.0	-81.0	-79.5	-79.0	-80.5	-79.5	-79.0	-79.0	-79.0	-78.5	-78.0
<b>16 QAM</b>	-79.5	-79.0	-79.0	-79.0	-78.5	-79.5	-78.0	-77.5	-79.0	-78.0	-77.5	-77.5	-77.5	-77.0	-76.5
<b>32 QAM</b>	-76.0	-75.0	-75.0	-75.0	-75.5	-74.5	-74.0	-74.0	-75.0	-74.0	-73.5	-74.0	-73.5	-73.5	-73.0
<b>64 QAM</b>	-73.0	-72.0	-72.0	-72.0	-73.0	-71.5	-71.0	-72.0	-71.5	-71.0	-71.0	-71.0	-70.5	-70.5	-70.0
<b>128 QAM</b>	-70.0	-69.0	-69.0	-69.0	-70.0	-68.5	-68.0	-69.0	-68.5	-68.0	-68.0	-68.0	-67.5	-67.5	-67.0
<b>256 QAM</b>	-67.0	-66.0	-66.0	-66.0	-66.5	-65.5	-65.0	-66.0	-65.0	-65.0	-64.5	-65.0	-64.5	-64.5	-64.0
<b>512 QAM</b>	-64.0	-63.5	-63.5	-63.0	-64.0	-62.5	-62.0	-63.5	-62.5	-62.0	-62.0	-62.0	-62.0	-61.5	-61.0
<b>1024 QAM (strong FEC)</b>	-61.5	-61.0	-61.0	-60.5	-61.5	-60.0	-59.5	-61.0	-60.0	-59.5	-59.5	-59.5	-59.5	-59.0	-58.5
<b>1024 QAM (light FEC)</b>	-60.5	-60.0	-60.0	-59.5	-60.5	-59.5	-58.5	-60.0	-59.0	-58.5	-58.5	-58.5	-58.5	-58.0	-58.0
<b>2048 QAM</b>	-58.0	-57.0	-57.0	-57.0	-58.0	-56.5	-56.0	-57.0	-56.5	-56.0	-56.0	-56.0	-55.5	-55.5	-55.0
	50 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-85.5	-84.5	-84.5	-84.5	-84.5	-85.0	-84.0	-83.5	-84.5	-83.5	-80.0	-83.5	-83.0	-83.0	-82.5
<b>8 PSK</b>	-80.0	-79.5	-79.5	-79.5	-79.0	-80.0	-79.0	-78.0	-79.5	-78.5	-75.0	-78.0	-78.0	-78.0	-77.5
<b>16 QAM</b>	-78.5	-77.5	-77.5	-77.5	-77.5	-78.0	-77.0	-76.5	-77.5	-76.5	-73.0	-76.5	-76.0	-76.0	-75.5
<b>32 QAM</b>	-74.5	-74.0	-74.0	-74.0	-73.5	-74.5	-73.5	-72.5	-74.0	-73.0	-69.5	-72.5	-72.5	-72.5	-72.0
<b>64 QAM</b>	-71.5	-70.5	-70.5	-70.5	-71.5	-70.0	-69.5	-70.5	-70.0	-70.0	-66.0	-69.5	-69.0	-69.0	-68.5
<b>128 QAM</b>	-68.5	-68.0	-68.0	-68.0	-67.5	-68.5	-67.5	-66.5	-68.0	-67.0	-63.5	-66.5	-66.5	-66.5	-66.0
<b>256 QAM</b>	-66.0	-65.0	-65.0	-65.0	-66.0	-64.5	-64.0	-65.0	-64.5	-64.5	-60.5	-64.0	-63.5	-63.5	-63.0
<b>512 QAM</b>	-63.5	-63.0	-63.0	-63.0	-62.5	-63.5	-62.0	-61.5	-63.0	-62.0	-58.5	-61.5	-61.5	-61.5	-61.0
<b>1024 QAM (strong FEC)</b>	-60.0	-59.5	-59.5	-59.0	-60.0	-58.5	-58.0	-59.5	-58.5	-58.5	-55.0	-58.0	-58.0	-58.0	-57.5
<b>1024 QAM (light FEC)</b>	-59.0	-58.0	-58.0	-58.0	-59.0	-57.5	-57.0	-58.0	-57.5	-53.5	-57.0	-56.5	-56.5	-56.5	-56.0
<b>2048 QAM</b>	-57.0	-56.0	-56.0	-56.0	-56.0	-55.5	-55.0	-56.0	-55.0	-51.5	-55.0	-54.5	-54.5	-54.5	-54.0
	56 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-84.0	-83.5	-83.5	-83.5	-83.0	-84.0	-83.0	-82.0	-83.5	-82.5	-82.0	-82.0	-82.0	-81.5	-81.5
<b>8 PSK</b>	-80.0	-79.5	-79.5	-79.5	-79.0	-80.0	-79.0	-78.0	-79.5	-78.5	-78.0	-78.0	-78.0	-77.5	-77.5
<b>16 QAM</b>	-77.5	-77.0	-77.0	-77.0	-76.5	-77.5	-76.5	-75.5	-77.0	-76.0	-75.5	-75.5	-75.5	-75.0	-75.0
<b>32 QAM</b>	-74.5	-73.5	-73.5	-73.5	-73.5	-74.0	-73.0	-72.5	-73.5	-72.5	-72.0	-72.5	-72.0	-72.0	-71.5
<b>64 QAM</b>	-71.0	-70.5	-70.5	-70.5	-70.0	-71.0	-70.0	-69.0	-70.5	-69.5	-69.0	-69.0	-69.0	-68.5	-68.5
<b>128 QAM</b>	-68.5	-67.5	-67.5	-67.5	-67.5	-68.0	-67.0	-66.5	-67.5	-66.5	-66.0	-66.5	-66.0	-66.0	-65.5
<b>256 QAM</b>	-65.0	-64.5	-64.5	-64.5	-64.0	-65.0	-64.0	-63.0	-64.5	-63.5	-63.0	-63.0	-63.0	-62.5	-62.5
<b>512 QAM</b>	-63.0	-62.5	-62.5	-62.5	-62.0	-63.0	-61.5	-61.0	-62.5	-61.5	-61.0	-61.0	-61.0	-60.5	-60.0
<b>1024 QAM (strong FEC)</b>	-59.5	-59.0	-59.0	-59.0	-58.5	-59.5	-58.5	-57.5	-59.0	-58.0	-57.5	-57.5	-57.5	-57.0	-57.0
<b>1024 QAM (light FEC)</b>	-58.5	-58.0	-58.0	-58.0	-57.5	-58.5	-57.5	-56.5	-58.0	-57.0	-56.5	-56.5	-56.5	-56.0	-56.0
<b>2048 QAM</b>	-54.0	-53.5	-53.5	-53.5	-53.0	-54.0	-53.0	-52.0	-53.5	-52.5	-52.0	-52.0	-52.0	-51.5	-51.5

## PTP 820S Licensed Microwave Radio

### Receive Sensitivity (dBm @BER=10-6) - continued

	60 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-84.5	-84.0	-84.0	-84.0	-83.5	-84.5	-83.0	-82.5	-84.0	-83.0	-82.5	-82.5	-82.5	-82.0	-81.5
<b>8 PSK</b>	-80.0	-79.0	-79.0	-79.0	-79.0	-79.5	-78.5	-78.0	-79.0	-78.0	-77.5	-78.0	-77.5	-77.5	-77.0
<b>16 QAM</b>	-77.5	-77.0	-77.0	-77.0	-76.5	-77.5	-76.0	-75.5	-77.0	-76.0	-75.5	-75.5	-75.5	-75.0	-74.5
<b>32 QAM</b>	-74.0	-73.0	-73.0	-73.0	-73.0	-73.5	-72.5	-72.0	-73.0	-72.0	-71.5	-72.0	-71.5	-71.5	-71.0
<b>64 QAM</b>	-70.5	-70.0	-70.0	-70.0	-69.5	-70.5	-69.5	-68.5	-70.0	-69.0	-68.5	-68.5	-68.5	-68.0	-68.0
<b>128 QAM</b>	-68.0	-67.0	-67.0	-67.0	-67.0	-67.5	-66.5	-66.0	-67.0	-66.0	-65.5	-66.0	-65.5	-65.5	-65.0
<b>256 QAM</b>	-64.5	-64.0	-64.0	-64.0	-63.5	-64.5	-63.5	-62.5	-64.0	-63.0	-62.5	-62.5	-62.5	-62.0	-62.0
<b>512 QAM</b>	-62.5	-62.0	-62.0	-62.0	-61.5	-62.5	-61.5	-60.5	-62.0	-61.0	-60.5	-60.5	-60.5	-60.0	-60.0
<b>1024 QAM (strong FEC)</b>	-59.0	-58.5	-58.5	-58.5	-58.0	-59.0	-58.0	-57.0	-58.5	-57.5	-57.0	-57.0	-57.0	-56.5	-56.5
<b>1024 QAM (light FEC)</b>	-58.0	-57.5	-57.5	-57.5	-57.0	-58.0	-57.0	-56.0	-57.5	-56.5	-56.0	-56.0	-56.0	-55.5	-55.5
<b>2048 QAM</b>	-55.5	-54.5	-54.5	-54.5	-54.5	-55.0	-54.0	-53.5	-54.5	-53.5	-53.0	-53.5	-53.0	-53.0	-52.5

  

	80 MHz	6 GHz	7 GHz	8 GHz	10 GHz	11 GHz	13 GHz	15 GHz	18 GHz	23 GHz	24 GHz	26 GHz	28-31 GHz	32 GHz	38 GHz
<b>QPSK</b>	-82.5	-82.0	-82.0	-82.0	-81.5	-82.5	-81.5	-80.5	-82.0	-81.0	-80.5	-80.5	-80.5	-80.0	-80.0
<b>8 PSK</b>	-78.5	-78.0	-78.0	-78.0	-77.5	-78.5	-77.5	-76.5	-78.0	-77.0	-76.5	-76.5	-76.5	-76.0	-76.0
<b>16 QAM</b>	-76.0	-75.5	-75.5	-75.5	-75.0	-76.0	-75.0	-74.0	-75.5	-74.5	-74.0	-74.0	-74.0	-73.5	-73.5
<b>32 QAM</b>	-73.0	-72.0	-72.0	-72.0	-72.0	-72.5	-71.5	-71.0	-72.0	-71.0	-70.5	-71.0	-70.5	-70.5	-70.0
<b>64 QAM</b>	-69.5	-69.0	-69.0	-69.0	-68.5	-69.5	-68.5	-67.5	-69.0	-68.0	-67.5	-67.5	-67.5	-67.0	-67.0
<b>128 QAM</b>	-67.0	-66.0	-66.0	-66.0	-66.0	-66.5	-65.5	-65.0	-66.0	-65.0	-64.5	-65.0	-64.5	-64.5	-64.0
<b>256 QAM</b>	-63.5	-63.0	-63.0	-63.0	-62.5	-63.5	-62.5	-61.5	-63.0	-62.0	-61.5	-61.5	-61.5	-61.0	-61.0
<b>512 QAM</b>	-61.5	-61.0	-61.0	-61.0	-60.5	-61.5	-60.0	-59.5	-61.0	-60.0	-59.5	-59.5	-59.5	-59.0	-58.5
<b>1024 QAM Strong</b>	-58.0	-57.5	-57.5	-57.5	-57.0	-58.0	-57.0	-56.0	-57.5	-56.5	-56.0	-56.0	-56.0	-55.5	-55.5
<b>1024 QAM Light</b>	-57.0	-56.5	-56.5	-56.5	-56.0	-57.0	-56.0	-55.0	-56.5	-55.5	-55.0	-55.0	-55.0	-54.5	-54.5
<b>2048 QAM</b>	-54.0	-53.5	-53.5	-53.5	-53.0	-54.0	-53.0	-52.0	-53.5	-52.5	-52.0	-52.0	-52.0	-51.5	-51.5

### Ethernet Throughput (Mbps)

Modulation	Channel Size	No Compression	L2 Compression	Channel Size	No Compression	L2 Compression
<b>QPSK</b>	5 MHz	3-4	4-13	10 MHz	13-15	13-48
<b>8 PSK</b>		-	-		19-23	20-73
<b>16 QAM</b>		8-10	9-32		26-32	28-100
<b>32 QAM</b>		11-14	12-43		35-43	37-133
<b>64 QAM</b>		14-17	15-54		43-53	45-164
<b>128 QAM</b>		17-21	18-65		52-63	54-196
<b>256 QAM</b>		19-24	20-74		59-72	62-225
<b>512 QAM</b>		-	-		65-79	68-247
<b>1024 QAM Strong</b>		-	-		68-83	72-260
<b>1024 QAM Light</b>		-	-		73-89	76-276

## PTP 820S Licensed Microwave Radio

Ethernet Throughput (Mbps) - continued						
Modulation	Channel Size	No Compression	L2 Compression	Channel Size	No Compression	L2 Compression
<b>QPSK</b>	14 MHz	19-24	20-74	20 MHz	28-34	29-105
<b>8 PSK</b>		29-36	31-112		42-51	44-158
<b>16 QAM</b>		40-49	42-153		57-70	60-217
<b>32 QAM</b>		53-65	56-203		75-92	79-286
<b>64 QAM</b>		66-80	69-249		92-113	97-352
<b>128 QAM</b>		79-97	83-301		112-136	117-424
<b>256 QAM</b>		90-110	95-344		126-155	133-481
<b>512 QAM</b>		100-122	105-380		138-169	145-526
<b>1024 QAM Strong</b>		106-129	111-402		147-180	154-559
<b>1024 QAM Light</b>		112-137	118-426		156-191	164-593
<b>2048 QAM</b>		-	-		166-203	175-633
<b>QPSK</b>	25 MHz	35-43	37-135	28 MHz	43-52	45-162
<b>8 PSK</b>		53-65	56-202		62-76	65-236
<b>16 QAM</b>		72-88	76-275		87-107	92-332
<b>32 QAM</b>		95-117	100-363		115-140	121-437
<b>64 QAM</b>		117-143	123-446		141-173	149-538
<b>128 QAM</b>		141-173	148-538		170-208	179-648
<b>256 QAM</b>		161-197	169-613		196-239	206-745
<b>512 QAM</b>		178-217	187-677		209-255	219-794
<b>1024 QAM Strong</b>		189-231	198-719		228-278	239-866
<b>1024 QAM Light</b>		201-245	211-763		241-295	253-917
<b>2048 QAM</b>		215-263	226-819		263-321	276-1000
<b>QPSK</b>	30 MHz	43-52	45-162	40 MHz	58-71	61-220
<b>8 PSK</b>		62-76	65-236		86-105	90-328
<b>16 QAM</b>		87-107	92-332		117-143	123-446
<b>32 QAM</b>		115-140	121-437		154-189	162-588
<b>64 QAM</b>		141-173	149-538		190-232	199-722
<b>128 QAM</b>		170-208	179-648		229-280	241-873
<b>256 QAM</b>		196-239	206-745		247-302	259-939
<b>512 QAM</b>		209-255	219-794		270-330	284-1000
<b>1024 QAM Strong</b>		228-278	239-866		306-375	322-1000
<b>1024 QAM Light</b>		241-295	253-917		325-398	342-1000
<b>2048 QAM</b>		263-321	276-1000		352-430	370-1000



## PTP 820S Licensed Microwave Radio

Ethernet Throughput (Mbps) - continued							
Modulation	Channel Size	No Compression	L2 Compression	Channel Size	No Compression	L2 Compression	
<b>QPSK</b>	50 MHz	70-86	74-267	56 MHz	87-106	91-331	
<b>8 PSK</b>		109-133	114-415		127-155	133-482	
<b>16 QAM</b>		148-181	155-563		176-215	185-670	
<b>32 QAM</b>		186-227	195-707		232-283	243-881	
<b>64 QAM</b>		240-293	252-913		284-348	299-1000	
<b>128 QAM</b>		280-342	294-1000		344-420	361-1000	
<b>256 QAM</b>		332-406	348-1000		397-485	416-1000	
<b>512 QAM</b>		360-440	378-1000		426-521	448-1000	
<b>1024 QAM Strong</b>		392-479	411-1000		464-567	487-1000	
<b>1024 QAM Light</b>		416-509	437-1000		493-602	517-1000	
<b>2048 QAM</b>		449-548	471-1000		534-653	561-1000	
<b>QPSK</b>	60 MHz	87-106	91-331	80 MHz	114-140	120-435	
<b>8 PSK</b>		127-155	133-482		162-198	170-618	
<b>16 QAM</b>		176-215	185-670		231-283	243-880	
<b>32 QAM</b>		232-283	243-881		304-371	319-1000	
<b>64 QAM</b>		284-348	299-1000		371-454	390-1000	
<b>128 QAM</b>		344-420	361-1000		439-536	461-1000	
<b>256 QAM</b>		397-485	416-1000		505-618	531-1000	
<b>512 QAM</b>		427-521	448-1000		555-679	583-1000	
<b>1024 QAM Strong</b>		464-567	487-1000		604-738	634-1000	
<b>1024 QAM Light</b>		493-602	517-1000		641-784	673-1000	
<b>2048 QAM</b>		534-653	561-1000		679-829	713-1000	

### ABOUT CAMBIUM NETWORKS

Cambium Networks empowers millions of people with wireless connectivity worldwide. Its wireless portfolio is used by commercial and government network operators as well as broadband service providers to connect people, places and things. With a single network architecture spanning fixed wireless and Wi-Fi, Cambium Networks enables operators to achieve maximum performance with minimal spectrum. End-to-end cloud management transforms networks into dynamic environments that evolve to meet changing needs with minimal physical human intervention. Cambium Networks empowers a growing ecosystem of partners who design and deliver gigabit wireless solutions that just work.