

# PTP 820C High Power Licensed Microwave Radio



## All-Outdoor / Multi-Core

### Specifications

#### RADIO

- 6-11 GHz
- Channel Bandwidth: 5-80 MHz
- Field Changeable Diplexers
- 1+0, 2+0 XPIC, 1+0 SD, 2 x 1+0 East-West, 2+2 SD/HSB, 2+0 SP/DP, 2 x 2+0 SP/DP, 4x4 MIMO, AFR\*
- Multiband (with PTP 850E or PTP 820E)

#### Radio Features

- Multi-Carrier Adaptive Bandwidth Control (up to 2+0)
- Protection: 1+1/2+2 HSB
- QPSK to 2048 QAM w/ACM
- 4x4 LoS MIMO
- XPIC
- Advanced Space Diversity (ASD)
- Advanced Frequency Reuse (AFR)\*

#### ETHERNET

##### Ethernet Interfaces

- Traffic Interfaces – 1 x 10/100/1000Base-T (RJ-45) and 1x1000base-X (SFP) or 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 per port
  - Deep buffering (configurable up to 64 Mbit per queue)
  - WRED
  - P-bit marking/remarking
- 4K VLANs
- VLAN add/remove
- 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, also known as EOAM)

#### 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

#### 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 (Q-in-Q – 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

##### Security

- AES 256-bit Encryption
- Secured protocols (HTTPS, SNMPV3, SSH, SFTP)
- RADIUS authentication and authorization

- TACACS+ authentication and authorization (session-based)
- Standards Compliance
- Radio Spectral Efficiency: EN 302 217-2-2
  - 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 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

- Storage: ETSI EN 300 019-1-1 Class 1.2
- Transportation: ETSI EN 300 019-1-2 Class 2

## TECHNICAL SPECIFICATION

### Mechanical Specifications

- Dimensions: 315mm(H), 284mm(W), 107mm(D), 12kg; 12.4”(H), 11.2”(W), 4.2”(D), 26.5 lbs. (includes diplexer or OCU unit)
- Pole Diameter Range (for Remote Mount Installation): 88.9 mm – 114.3 mm; 3.5” – 4.5”

### Environmental Specifications

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- -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
- DC Input range: -40 to -60 VDC
- Separate DC feed

### Power Consumption Specifications

- Maximum Power Consumption (Multi-Core Operation): 135W
- Maximum Power Consumption (1+0 Operation): 81W

## Specifications

### TRANSMIT POWER (dBm)

Transmit Power	Frequency (GHz)			
	6	7	8	11
QPSK	37	37	36	34
8 PSK	37	37	36	34
16 QAM	36	36	35	33
32 QAM	36	36	35	33
64 QAM	35	35	34	32
128 QAM	34	34	33	32
256 QAM	33	32	32	31
512 QAM	33	32	32	31
1024 QAM	31	30	30	30
2048 QAM	31	29	29	29

#### Note:

Nominal TX power is subject to change until the relevant frequency band is formally released. See the frequency rollout plan. The values listed in this section are typical. Actual values may differ in either direction by up to 1dB. The Transmit Power values shown in the tables below are for the radio unit only. To determine the TX power of the complete IP-20C-HP unit, diplexer losses must also be considered.

### Diplexer Unit Typical Losses

Frequency	6-8 GHz	11 GHz
Losses (dB)	1.3	0.7

### RECEIVE SENSITIVITY (dBm @BER=10<sup>-6</sup>)

Modulation	Channel Size	Frequency (GHz)			
		6	7	8	11
QPSK	5 MHz	-97.1	-97.3	-96.7	-96.8
16 QAM		-90.6	-90.8	-90.2	-90.3
32 QAM		-87.3	-87.5	-86.9	-87.0
64 QAM		-84.1	-84.3	-83.7	-83.8
128 QAM		-80.6	-80.8	-80.2	-80.3
256 QAM		-77.1	-77.3	-76.7	-76.8
QPSK	7 MHz	-95.0	-94.5	-94.5	-95.0
8 PSK		-89.0	-88.5	-88.5	-89.0
16 QAM		-88.5	-88.0	-88.0	-88.5
32 QAM		-85.0	-84.5	-84.5	-85.0
64 QAM		-82.0	-81.5	-81.5	-82.0
128 QAM		-79.0	-78.0	-78.0	-79.0
256 QAM		-75.5	-75	-75	-75.5
512 QAM		-73.5	-73	-73	-73.5
1024 QAM (strong FEC)		-70.0	-69.5	-69.5	-70.0
1024 QAM (light FEC)		-69.5	-68.5	-68.5	-69

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Modulation	Channel Size	Frequency (GHz)			
		6	7	8	11
QPSK	10 MHz	-93.1	-93.3	-92.7	-92.8
8 PSK		-87.2	-87.4	-86.8	-86.9
16 QAM		-86.1	-86.3	-85.7	-85.8
32 QAM		-82.9	-83.1	-82.5	-82.6
64 QAM		-79.9	-80.1	-79.5	-79.6
128 QAM		-76.7	-76.9	-76.3	-76.4
256 QAM		-73.8	-74.0	-73.4	-73.5
512 QAM		-71.2	-71.4	-70.8	-70.9
1024 QAM (strong FEC)		-68.2	-68.4	-67.8	-67.9
1024 QAM (light FEC)		-67.4	-67.6	-67.0	-67.1
QPSK	14 MHz	-91.3	-91.5	-90.9	-91.0
8 PSK		-87.3	-87.5	-86.9	-87.0
16 QAM		-84.2	-84.4	-83.8	-83.9
32 QAM		-81.1	-81.3	-80.7	-80.8
64 QAM		-77.9	-78.1	-77.5	-77.6
128 QAM		-74.7	-74.9	-74.3	-74.4
256 QAM		-71.3	-71.5	-70.9	-71.0
512 QAM		-68.1	-68.3	-67.7	-67.8
1024 QAM (strong FEC)		-64.6	-64.8	-64.2	-64.3
1024 QAM (light FEC)		-64.1	-64.3	-63.7	-63.8
QPSK	20 MHz	-90.0	-90.2	-89.6	-89.7
8 PSK		-86.0	-86.2	-85.6	-85.7
16 QAM		-83.1	-83.3	-82.7	-82.8
32 QAM		-79.7	-79.9	-79.3	-79.4
64 QAM		-76.5	-76.7	-76.1	-76.2
128 QAM		-73.5	-73.7	-73.1	-73.2
256 QAM		-70.4	-70.6	-70.0	-70.1
512 QAM		-67.6	-67.8	-67.2	-67.3
1024 QAM (strong FEC)		-64.7	-64.9	-64.3	-64.4
1024 QAM (light FEC)		-64.0	-64.2	-63.6	-63.7
2048 QAM		-61.5	-61.7	-61.1	-61.2
QPSK	25 MHz	-88.9	-89.1	-88.5	-88.6
8 PSK		-84.9	-85.1	-84.5	-84.6
16 QAM		-82.0	-82.2	-81.6	-81.7
32 QAM		-78.7	-78.9	-78.3	-78.4
64 QAM		-75.6	-75.8	-75.2	-75.3
128 QAM		-72.5	-72.7	-72.1	-72.2
256 QAM		-69.4	-69.6	-69.0	-69.1
512 QAM		-66.5	-66.7	-66.1	-66.2
1024 QAM (strong FEC)		-63.6	-63.8	-63.2	-63.3
1024 QAM (light FEC)		-62.7	-62.9	-62.3	-62.4
2048 QAM		-60.6	-60.8	-60.2	-60.3

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Modulation	Channel Size	Frequency (GHz)			
		6	7	8	11
QPSK	28 MHz	-88.2	-88.4	-87.8	-87.9
8 PSK		-84.2	-84.4	-83.8	-83.9
16 QAM		-81.2	-81.4	-80.8	-80.9
32 QAM		-77.9	-78.1	-77.5	-77.6
64 QAM		-74.8	-75.0	-74.4	-74.5
128 QAM		-71.8	-72.0	-71.4	-71.5
256 QAM		-68.6	-68.8	-68.2	-68.3
512 QAM		-66.3	-66.5	-65.9	-66.0
1024 QAM (strong FEC)		-63.0	-63.2	-62.6	-62.7
1024 QAM (light FEC)		-62.2	-62.4	-61.8	-61.9
2048 QAM		-59.7	-59.9	-59.3	-59.4
QPSK	30 MHz	-88.2	-88.4	-87.8	-87.9
8 PSK		-84.2	-84.4	-83.8	-83.9
16 QAM		-81.2	-81.4	-80.8	-80.9
32 QAM		-77.9	-78.1	-77.5	-77.6
64 QAM		-74.8	-75.0	-74.4	-74.5
128 QAM		-71.8	-72.0	-71.4	-71.5
256 QAM		-68.6	-68.8	-68.2	-68.3
512 QAM		-66.3	-66.5	-65.9	-66.0
1024 QAM (strong FEC)		-63.0	-63.2	-62.6	-62.7
1024 QAM (light FEC)		-62.2	-62.4	-61.8	-61.9
2048 QAM		-59.7	-59.9	-59.3	-59.4
QPSK	40 MHz	-87.0	-87.2	-86.6	-86.7
8 PSK		-83.0	-83.2	-82.6	-82.7
16 QAM		-80.1	-80.3	-79.7	-79.8
32 QAM		-76.7	-76.9	-76.3	-76.4
64 QAM		-73.6	-73.8	-73.2	-73.3
128 QAM		-70.6	-70.8	-70.2	-70.3
256 QAM		-68.3	-68.5	-67.9	-68.0
512 QAM		-65.5	-65.7	-65.1	-65.2
1024 QAM (strong FEC)		-62.0	-62.2	-61.6	-61.7
1024 QAM (light FEC)		-61.3	-61.5	-60.9	-61.0
2048 QAM		-59.0	-59.2	-58.6	-58.7
QPSK	50 MHz	-86.2	-86.4	-85.8	-85.9
8 PSK		-81.9	-82.1	-81.5	-81.6
16 QAM		-79.0	-79.2	-78.6	-78.7
32 QAM		-76.0	-76.2	-75.6	-75.7
64 QAM		-72.6	-72.8	-72.2	-72.3
128 QAM		-70.1	-70.3	-69.7	-69.8
256 QAM		-66.5	-66.7	-66.1	-66.2
512 QAM		-64.0	-64.2	-63.6	-63.7

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Modulation	Channel Size	Frequency (GHz)			
		6	7	8	11
1024 QAM (strong FEC)	50 MHz	-60.6	-60.8	-60.2	-60.3
1024 QAM (light FEC)		-59.8	-60.0	-59.4	-59.5
2048 QAM		-57.5	-57.7	-57.1	-57.2
QPSK	56 MHz	-85.1	-85.3	-84.7	-84.8
8 PSK		-81.3	-81.5	-80.9	-81.0
16 QAM		-78.1	-78.3	-77.7	-77.8
32 QAM		-74.8	-75.0	-74.4	-74.5
64 QAM		-71.7	-71.9	-71.3	-71.4
128 QAM		-68.9	-69.1	-68.5	-68.6
256 QAM		-65.7	-65.9	-65.3	-65.4
512 QAM		-63.2	-63.4	-62.8	-62.9
1024 QAM (strong FEC)		-59.9	-60.1	-59.5	-59.6
1024 QAM (light FEC)		-59.1	-59.3	-58.7	-58.8
2048 QAM		-56.8	-57.0	-56.4	-56.5
QPSK	60 MHz	-85.1	-85.3	-84.7	-84.8
8 PSK		-81.3	-81.5	-80.9	-81.0
16 QAM		-78.1	-78.3	-77.7	-77.8
32 QAM		-74.8	-75.0	-74.4	-74.5
64 QAM		-71.7	-71.9	-71.3	-71.4
128 QAM		-68.9	-69.1	-68.5	-68.6
256 QAM		-65.7	-65.9	-65.3	-65.4
512 QAM		-63.2	-63.4	-62.8	-62.9
1024 QAM (strong FEC)		-59.9	-60.1	-59.5	-59.6
1024 QAM (light FEC)		-59.1	-59.3	-58.7	-58.8
2048 QAM		-56.8	-57.0	-56.4	-56.5
QPSK	80 MHz	-84.1	-84.3	-83.7	-83.8
8 PSK		-80.4	-80.6	-80.0	-80.1
16 QAM		-77.4	-77.6	-77.0	-77.1
32 QAM		-74.0	-74.2	-73.6	-73.7
64 QAM		-71.1	-71.3	-70.7	-70.8
128 QAM		-68.1	-68.3	-67.7	-67.8
256 QAM		-65.4	-65.6	-65.0	-65.1
512 QAM		-62.7	-62.9	-62.3	-62.4
1024 QAM (strong FEC)		-59.5	-59.7	-59.1	-59.2
1024 QAM (light FEC)		-59.1	-59.3	-58.7	-58.8
2048 QAM		-56.2	-56.4	-55.8	-55.9

## ETHERNET THROUGHPUT

Modulation	Channel Size	Ethernet Throughput (Mbps)			Channel Size	Ethernet Throughput (Mbps)		
		No Compression	L2 Compression	Multi-Layer Compression		No Compression	L2 Compression	Multi-Layer Compression
QPSK	5 MHz	3	3-4	4-11	10 MHz	12	12-14	13-40
8 PSK		6	6-7	6-18		19	19-21	20-61
16 QAM		8	8-9	9-26		26	26-30	27-83
32 QAM		11	11-13	12-36		34	35-39	36-111
64 QAM		14	14-16	15-45		42	43-48	45-137
128 QAM		17	17-19	18-54		51	51-58	53-164
256 QAM		21	22-25	23-69		58	59-67	61-188
512 QAM		-	-	-		64	65-73	67-206
1024 QAM Strong		-	-	-		67	68-77	71-216
1024 QAM Light		-	-	-		72	72-82	75-230
QPSK	14 MHz	19	19-22	20-62	20 MHz	27	28-31	29-88
8 PSK		29	29-33	30-93		41	41-47	43-132
16 QAM		40	40-45	42-128		56	57-64	59-180
32 QAM		53	53-60	55-169		74	75-85	78-238
64 QAM		65	65-74	68-208		91	92-104	96-293
128 QAM		78	79-89	82-251		110	111-126	116-354
256 QAM		89	90-102	94-287		125	126-142	131-401
512 QAM		98	99-112	103-316		136	137-156	143-438
1024 QAM Strong		104	105-119	109-335		145	146-165	152-466
1024 QAM Light		111	111-126	116-355		154	155-176	162-495
2048 QAM	-	-	-	164	165-187	172-528		
QPSK	25 MHz	35	35-40	37-112	28 MHz	40	40-45	42-128
8 PSK		52	53-60	55-168		59	60-68	62-191
16 QAM		71	72-81	75-229		81	82-93	85-261
32 QAM		94	95-107	99-302		107	108-122	112-344
64 QAM		116	117-132	121-372		132	133-150	138-424
128 QAM		139	141-159	147-448		159	160-181	167-510
256 QAM		159	160-181	167-511		181	182-206	190-580
512 QAM		175	177-200	184-564		199	201-227	209-640
1024 QAM Strong		186	188-213	196-599		212	214-242	223-681
1024 QAM Light		198	199-226	208-636		225	227-257	236-723
2048 QAM	212	214-242	223-682	241	243-275	253-775		
QPSK	30 MHz	42	42-48	44-135	40 MHz	57	57-65	60-183
8 PSK		61	62-70	64-197		85	86-97	89-273
16 QAM		86	87-98	90-277		116	117-132	121-372
32 QAM		113	114-129	119-364		152	154-174	160-490
64 QAM		140	141-159	147-449		187	189-214	197-602
128 QAM		168	169-192	176-540		226	228-258	238-728
256 QAM		193	195-220	203-621		243	245-278	256-782
512 QAM		206	208-235	216-662		267	269-304	280-835
1024 QAM Strong		225	226-256	236-722		302	305-345	318-843

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Modulation	Channel Size	Ethernet Throughput (Mbps)			Channel Size	Ethernet Throughput (Mbps)		
		No Compression	L2 Compression	Multi-Layer Compression		No Compression	L2 Compression	Multi-Layer Compression
1024 QAM Light	30 MHz	238	240-271	250-764	40 MHz	321	324-366	337-847
2048 QAM		260	262-296	273-833		347	350-396	365-853
QPSK	50 MHz	69	70-79	73-223	56 MHz	81	82-93	86-262
8 PSK		108	108-123	113-346		121	122-138	127-390
16 QAM		146	147-166	153-469		165	166-188	173-531
32 QAM		183	185-209	193-589		217	219-248	228-698
64 QAM		237	239-270	249-761		267	269-305	280-835
128 QAM		276	278-315	290-836		323	325-368	339-847
256 QAM		327	330-374	344-848		369	372-421	388-858
512 QAM		355	358-405	373-855		401	404-457	421-865
1024 QAM Strong		387	390-441	406-862		436	439-497	458-873
1024 QAM Light		411	414-468	431-867		462	466-528	486-879
2048 QAM		443	446-505	465-874		487	491-555	511-884
QPSK		60 MHz	86	86-98		90-276	80 MHz	113
8 PSK	125		126-143	131-402	160	161-183		168-515
16 QAM	174		175-198	182-558	228	230-260		240-733
32 QAM	229		230-261	240-734	300	302-342		315-841
64 QAM	281		283-320	295-837	367	369-418		385-857
128 QAM	339		342-387	356-851	433	436-494		455-872
256 QAM	391		394-447	411-863	499	503-569		524-887
512 QAM	421		424-480	442-869	548	552-625		576-898
1024 QAM Strong	458		461-522	481-878	596	601-680		626-909
1024 QAM Light	486		490-555	511-884	633	638-722		665-917
2048 QAM	527		531-601	553-894	670	675-762		703-926