

# PTP 850S Millimeter Wave Radio

## QUICK LOOK:

**PTP 850S, single core radio with All Outdoor core radio capable of 4096 QAM with ACM**

- Support 6-38 GHz
- Support L1 Link Aggregation
- Support 1+0, 2+0 (non-XPIC) configuration



### Radio

11-18 GHz

1+0, 2+0 (non-XPIC)

Ability to upgrade existing links for additional capacity with a single cable via Layer 1 Link Aggregation

### Radio Features

Protection: 1+1 HSB

High spectral utilization: BPSK to 4096 QAM w/ACM

Channel bandwidth: 14 to 224 MHz

Multiband (with PTP-820E or PTP-850E)

### Ethernet

#### Ethernet Interfaces

Port 1:

Electric: 10/100/1000Base-T RJ-45

Management and Traffic

Port 2:

SFP cage which supports – Regular and CSFP standards

Regular SFP provides Eth2

CSFP (Dual BiDir SFP) provides Eth2 and Eth3

Port 3:

SFP+ cage supporting a 10G single ETH interface.

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

#### Ethernet Features

MTU – 9612 Bytes

Quality of Service

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

8 CoS queues per port

Deep buffering (configurable up to 64 Mbit per queue)

WRED

P-bit marking/remarking

4K VLANs

VLAN add/remove/translate

MSTP, ERP (ITU-T G.8032)

Y.1731 Ethernet OAM

Y.1731 Ethernet Bandwidth Notification (ETH-BN)

## PTP 850S Millimeter Wave Radio

### Management Protocols

SNMP

REST

SDN Support: NETCONF/YANG

### Synchronization

Enhanced Ethernet Equipment Clock (eEEEC) Specification (G.8262.1)

PTP Telecom Boundary Clock (T-BC) and Time Slave Clock (T-TSC) Specification (G.8273.2)

PTP Telecom Transparent Clock (T-TC) Specification (G.8273.3)

Enhanced SyncE Network Limits (G.8261, clause 9.2.1)

Enhanced PTP Network Limits (G.8271.1)

Ethernet Synchronization Messaging Channel (ESMC) (G.8264, clause 11)

PTP Telecom Profile for Time (Full Timing Support) (G.8275.1)

Precision Time Protocol (version 2, IEEE1588-2008)

### Security

Secured protocols (HTTPS, SNMPV3, SSH, SFTP)

RADIUS authentication and authorization

TACACS+ authentication and authorization (session-based)

AES Encryption – AES 256

### Standard

#### MEF

Carrier Ethernet 2.0

Supported Ethernet Standards

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

10GBase LR (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

### Standards Compliance

Radio Spectral Efficiency: EN 302 217-2

EMC: EN 301 489-1, EN 301 489-4, Class A(Europe)

FCC 47 CFR, part 15, subpart B, class A(US)

ICES-003, Class A(Canada)

TEC/SD/DD/EMC-221/05/OCT-16, Class A (India)

IEC 61000-4-29

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

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

Ingress Protection: IP67

### Technical

#### Mechanical Specifications

Dimensions (Direct Mount HW) –  
217mm(H), 210mm(W), 85mm(D), 4kg  
8.54(H), 8.27”(W), 3.35”(D), 8.82 lbs.

Pole Diameter Range (for Remote Mount Installation)  
8.89cm – 11.43cm; 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

DC Input range: -40.5 to -60 VDC

#### Power Consumption Specifications

Active:

11GHz: 45W

18GHz: 29W

Standby (muted):

11GHz: 25W

18GHz: 9W

*\*Support in future release, for availability, please check release notes*

## PTP 850S Millimeter Wave Radio

Throughput Capacity (Mbps)						
Modulation	Capacity (Mbps)	Capacity De-Dup	Capacity (Mbps)	Capacity De-Dup	Capacity (Mbps)	Capacity De-Dup
	14 MHz		28 MHz		40 MHz	
<b>BPSK</b>	6-8	7-24	18-22	19-67	15-31	27-97
<b>QPSK</b>	16-20	17-62	40-48	42-150	54-67	57-207
<b>8 QAM</b>	26-32	27-100	59-72	62-224	83-101	87-314
<b>16 QAM</b>	37-46	39-142	84-102	88-318	113-139	119-432
<b>32 QAM</b>	50-61	53-190	111-136	117-423	150-184	158-572
<b>64 QAM</b>	62-76	65-236	138-168	144-523	185-227	195-705
<b>128 QAM</b>	76-93	80-288	166-203	174-632	225-275	236-855
<b>256 QAM</b>	87-106	91-330	192-234	201-728	242-296	254-920
<b>512 QAM</b>	96-118	101-366	204-249	214-776	265-324	278-1009
<b>1024 QAM Strong</b>	102-125	107-388	223-272	234-847	301-368	316-1145
<b>1024 QAM Light</b>	108-132	114-412	236-289	248-899	320-391	336-1217
<b>2048 QAM</b>	113-138	118-429	258-315	271-981	346-423	364-1317
<b>4096 QAM</b>	–	–	275-336	289-1047	366-448	385-1393
	56 MHz		80 MHz		112 MHz	
<b>BPSK</b>	40-49	42-151	54-66	57-206	79-97	83-301
<b>QPSK</b>	83-102	88-317	111-135	116-421	162-198	170-617
<b>8 QAM</b>	123-150	129-468	158-193	166-601	242-296	254-922
<b>16 QAM</b>	172-210	180-653	227-277	238-862	330-404	347-1257
<b>32 QAM</b>	227-277	238-863	298-365	313-1135	435-532	457-1656
<b>64 QAM</b>	279-341	293-1062	366-447	384-1391	535-654	562-2035
<b>128 QAM</b>	338-413	355-1286	433-529	454-1645	647-791	680-2461
<b>256 QAM</b>	391-478	410-1486	498-609	523-1896	740-905	777-2500
<b>512 QAM</b>	420-514	442-1599	548-670	576-2084	804-983	844-2500
<b>1024 QAM Strong</b>	457-559	480-1740	596-729	626-2268	872-1066	916-2500
<b>1024 QAM Light</b>	486-594	511-1849	633-774	665-2409	926-1132	973-2500
<b>2048 QAM</b>	527-644	553-2004	670-820	704-2500	999-1221	1049-2500
<b>4096 QAM</b>	542-663	570-2063	708-865	743-2500	1034-1264	1086-2500

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Transmit Power (dBm)										
Channel Size	6	7	8	11	13	15	18	23	26	28-38
<b>BPSK - 8 PSK</b>	28	27	27	30	27	24	24	25	23	18
<b>16 QAM</b>	28	27	27	29	27	24	24	24	23	17
<b>32 QAM</b>	27	26	26	28	26	24	24	24	23	16
<b>64 QAM</b>	27	26	26	27	24	23	23	23	23	16
<b>128 QAM</b>	27	26	26	27	24	23	23	23	23	16
<b>256 QAM</b>	27	26	26	27	24	22	23	22	21	14
<b>512 QAM</b>	25	25	25	27	24	22	22	22	21	14
<b>1024 QAM</b>	25	24	24	26	22	20	21	21	20	13
<b>2048 QAM</b>	23	24	24	26	21	20	20	21	18	12
<b>4096 QAM</b>	21	23	22	25	19	18	19	19	-	-

Receive Sensitivity (dBm @10E-6)														
	14 MHz	6 GHz	7-8 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>BPSK</b>	-91.5	-91.0	-90.5	-91.5	-90.5	-89.5	-91	-90.0	-89.5	-89.5	-89.5	-89.5	-89.0	-89.0
<b>QPSK</b>	-90.5	-90.0	-89.5	-90.5	-89.5	-88.5	-90	-89.0	-88.5	-88.5	-88.5	-88.5	-88.0	-88.0
<b>8 PSK</b>	-84.5	-84.0	-83.5	-85.5	-83.5	-82.5	-84	-83.0	-82.5	-82.5	-82.5	-82.5	-82.0	-82.0
<b>16 QAM</b>	-83.5	-83.0	-82.5	-83.5	-82.5	-81.5	-83	-82.0	-81.5	-81.5	-81.5	-81.5	-81.0	-81.0
<b>32 QAM</b>	-80.5	-79.5	-79.5	-80.5	-79.0	-78.5	-79.5	-79.0	-78.5	-78.5	-78.5	-78.0	-78.0	-77.5
<b>64 QAM</b>	-77.5	-76.5	-76.5	-77.0	-76.0	-75.5	-76.5	-76.0	-75.5	-75.5	-75.5	-75.0	-75.0	-74.5
<b>128 QAM</b>	-74.0	-73.5	-73.0	-74.0	-73.0	-72.0	-73.5	-72.5	-72.0	-72.0	-72.0	-72.0	-71.5	-71.5
<b>256 QAM</b>	-71.5	-70.5	-70.5	-71.0	-70.0	-69.5	-70.5	-69.5	-69.0	-69.5	-69.5	-69.0	-69.0	-68.5
<b>512 QAM</b>	-68.5	-68.0	-67.5	-68.5	-67.5	-66.5	-68.0	-67.0	-66.5	-66.5	-66.5	-66.5	-66.0	-66.0
<b>1024 QAM Strong</b>	-65.5	-65.0	-64.5	-65.5	-64.5	-63.5	-65.0	-64.0	-63.5	-63.5	-63.5	-63.5	-63.0	-63.0
<b>1024 QAM Light</b>	-65.0	-64.0	-64.0	-64.5	-63.5	-63.0	-64.0	-63.5	-63.0	-63.0	-63.0	-62.5	-62.5	-62.0
	28 MHz	6 GHz	7-8 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>28 MHz</b>	6		7-8	10	11	13	15	18	23	24	26	28-31	32	38
<b>BPSK</b>	-88.5	-88.0	-87.5	-88.5	-87.5	-86.5	-88.0	-87.0	-86.5	-86.5	-86.5	-86.5	-86.0	-86.0
<b>QPSK</b>	-87.5	-87.0	-86.5	-87.5	-86.5	-85.5	-87.0	-86.0	-85.5	-85.5	-85.5	-85.5	-85.0	-85.0
<b>8 PSK</b>	-83.0	-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>16 QAM</b>	-81.0	-80.5	-80.0	-81.0	-79.5	-79.0	-80.5	-79.5	-79.0	-79.0	-79	-79.0	-78.5	-78.0
<b>32 QAM</b>	-77.5	-77.0	-76.5	-77.5	-76.0	-75.5	-77.0	-76.0	-75.5	-75.5	-75.5	-75.5	-75.0	-74.5
<b>64 QAM</b>	-74.5	-74.0	-73.5	-74.5	-73.0	-72.5	-74.0	-73.0	-72.5	-72.5	-72.5	-72.5	-72.0	-71.5
<b>128 QAM</b>	-71.5	-70.5	-70.5	-71.0	-70.0	-69.5	-70.5	-69.5	-69.0	-69.5	-69.5	-69.0	-69.0	-68.5
<b>256 QAM</b>	-68.5	-67.5	-67.5	-68.0	-67.0	-66.5	-67.5	-66.5	-66.0	-66.5	-66.5	-66.0	-66.0	-65.5
<b>512 QAM</b>	-66.0	-65.0	-65.0	-66.0	-64.5	-64.0	-65.0	-64.5	-64.0	-64.0	-64.0	-63.5	-63.5	-63.0
<b>1024 QAM Strong</b>	-63.0	-62.5	-62.0	-63.0	-61.5	-61.0	-62.5	-61.5	-61.0	-61.0	-61.0	-61.0	-60.5	-60.0
<b>1024 QAM Light</b>	-62.0	-61.5	-61.0	-62.0	-60.5	-60.0	-61.5	-60.5	-60.0	-60.0	-60.0	-60.0	-59.5	-59.0
<b>2048 QAM</b>	-58.5	-58.0	-57.5	-58.5	-57.0	-56.5	-58.0	-57.0	-56.5	-56.5	-56.5	-56.5	-56.0	-55.5
<b>4096 QAM</b>	-55.5	-55.0	-54.5	-55.5	-54.0	-53.5	-55.0	-	-	-	-	-	-	-

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Receive Sensitivity (dBm @10E-6) - continued														
	40 MHz	6 GHz	7-8 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>BPSK</b>	-87.0	-86.5	-86.0	-87.0	-86.0	-85.0	-86.5	-85.5	-85.0	-85.0	-85.0	-85.0	-84.5	-84.5
<b>QPSK</b>	-86.0	-85.5	-85.0	-86.0	-85.0	-84.0	-85.5	-84.5	-84.0	-84.0	-84.0	-84.0	-83.5	-83.5
<b>8 PSK</b>	-81.0	-80.5	-80.0	-81.0	-79.5	-79.0	-80.5	-79.5	-79.0	-79.0	-79.0	-79.0	-78.5	-78.0
<b>16 QAM</b>	-79.5	-79.0	-78.5	-79.5	-78.0	-77.5	-79.0	-78.0	-77.5	-77.5	-77.5	-77.5	-77.0	-76.5
<b>32 QAM</b>	-76.0	-75.0	-75.0	-75.5	-74.5	-74.0	-75.0	-74.0	-73.5	-74.0	-73.5	-73.5	-73.5	-73.0
<b>64 QAM</b>	-73.0	-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	-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	-66.5	-65.5	-65.0	-66.0	-65.0	-64.5	-65.0	-64.5	-64.5	-64.5	-64.0
<b>512 QAM</b>	-64.0	-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</b>	-61.5	-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</b>	-60.5	-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	-58.0	-56.5	-56.0	-57.0	-56.5	-56.0	-56.0	-55.5	-55.5	-55.5	-55.0
<b>4096 QAM</b>	-55.0	-54.0	-54.0	-55.0	-53.5	-53.0	-54.0	-	-	-	-	-	-	-
	56 MHz	6 GHz	7-8 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>BPSK</b>	-85.5	-85.0	-84.5	-85.5	-84.0	-83.5	-85.0	-84.0	-83.5	-83.5	-83.5	-83.5	-83.0	-82.5
<b>QPSK</b>	-84.5	-84.0	-83.5	-84.5	-83.0	-82.5	-84.0	-83.0	-82.5	-82.5	-82.5	-82.5	-82.0	-81.5
<b>8 PSK</b>	-80.0	-79.0	-79.0	-79.5	-78.5	-78.0	-79.0	-78.0	-77.5	-78.0	-77.5	-77.5	-77.5	-77.0
<b>16 QAM</b>	-77.5	-77.0	-76.5	-77.5	-76.0	-75.5	-77.0	-76.0	-75.5	-75.5	-75.5	-75.5	-75.0	-74.5
<b>32 QAM</b>	-74.0	-73.0	-73.0	-73.5	-72.5	-72.0	-73.0	-72.0	-71.5	-72.0	-71.5	-71.5	-71.5	-71.0
<b>64 QAM</b>	-70.5	-70.0	-69.5	-70.5	-69.5	-68.5	-70.0	-69.0	-68.5	-68.5	-68.5	-68.5	-68.0	-68.0
<b>128 QAM</b>	-68.0	-67.0	-67.0	-67.5	-66.5	-66.0	-67.0	-66.0	-65.5	-66.0	-65.5	-65.5	-65.5	-65.0
<b>256 QAM</b>	-64.5	-64.0	-63.5	-64.5	-63.5	-62.5	-64.0	-63.0	-62.5	-62.5	-62.5	-62.5	-62.0	-62.0
<b>512 QAM</b>	-62.5	-62.0	-61.5	-62.5	-61.5	-60.5	-62.0	-61.0	-60.5	-60.5	-60.5	-60.5	-60.0	-60.0
<b>1024 QAM Strong</b>	-59.0	-58.5	-58.0	-59.0	-58.0	-57.0	-58.5	-57.5	-57.0	-57.0	-57.0	-57.0	-56.5	-56.5
<b>1024 QAM Light</b>	-58.0	-57.5	-57.0	-58.0	-57.0	-56.0	-57.5	-56.5	-56.0	-56.0	-56.0	-56.0	-55.5	-55.5
<b>2048 QAM</b>	-55.5	-54.5	-54.5	-55.0	-54.0	-53.5	-54.5	-53.5	-53.0	-53.5	-53.0	-53.0	-53.0	-52.5
<b>4096 QAM</b>	-52.5	-51.5	-51.5	-52.0	-51.0	-50.5	-	-	-	-	-	-	-	-
	80 MHz	6 GHz	7-8 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>BPSK</b>	-85.0	-85.0	-84.5	-85.5	-84.5	-83.5	-85.0	-84.0	-83.5	-83.5	-83.5	-83.5	-83.0	-83.5
<b>QPSK</b>	-82.5	-82.5	-82.5	-83.0	-82.0	-81.5	-82.5	-81.5	-81.0	-81.5	-81.5	-81.0	-81.0	-81.0
<b>8 PSK</b>	-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	-77.5
<b>16 QAM</b>	-76.0	-76.0	-75.5	-76.5	-75.0	-74.5	-76.0	-75.0	-74.5	-74.5	-74.5	-74.5	-74.0	-74.0
<b>32 QAM</b>	-72.5	-72.5	-72.0	-73.0	-71.5	-71.0	-72.5	-71.5	-71.0	-71.0	-71.0	-71.0	-70.5	-70.5
<b>64 QAM</b>	-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	-67.5
<b>128 QAM</b>	-66.5	-66.5	-66.0	-67.0	-66.0	-65.0	-66.5	-65.5	-65.0	-65.0	-65.0	-65.0	-64.5	-65.0
<b>256 QAM</b>	-63.5	-63.5	-63.0	-64.0	-63.0	-62.0	-63.5	-62.5	-62.0	-62.0	-62.0	-62.0	-61.5	-62.0
<b>512 QAM</b>	-61.0	-61.0	-61.0	-62.0	-60.5	-60.0	-61.0	-60.5	-60.0	-60.0	-60.0	-59.5	-59.5	-59.5
<b>1024 QAM Strong</b>	-58.0	-58.0	-57.5	-58.5	-57.5	-56.5	-58.0	-57.0	-56.5	-56.5	-56.5	-56.5	-56.0	-56.5
<b>1024 QAM Light</b>	-57.0	-57.0	-57.0	-58.0	-56.5	-56.0	-57.0	-56.5	-56.0	-56.0	-55.5	-55.5	-55.5	-55.5
<b>2048 QAM</b>	-54.5	-54.5	-54.5	-55.5	-54.0	-53.5	-54.5	-54.0	-53.5	-53.5	-53.0	-53.0	-53.0	-

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Receive Sensitivity (dBm @10E-6) - continued														
	112 MHz	6 GHz	7-8 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>BPSK</b>	-82.0	-81.5	-81.0	-82.0	-80.5	-80.0	-81.5	-80.5	-80.0	-80.0	-80.0	-80.0	-79.5	-79.0
<b>QPSK</b>	-81.0	-80.5	-80.0	-81.0	-79.5	-79.0	-80.5	-79.5	-79.0	-79.0	-79.0	-79.0	-78.5	-78.0
<b>8 PSK</b>	-76.5	-75.5	-75.5	-76.0	-75.0	-74.5	-75.5	-74.5	-74.0	-74.0	-74.5	-74.0	-74.0	-73.5
<b>16 QAM</b>	-74.0	-73.5	-73.0	-74.0	-72.5	-72.0	-73.5	-72.5	-72.0	-72.0	-72.0	-72.0	-71.5	-71.0
<b>32 QAM</b>	-70.5	-69.5	-69.5	-70.0	-69.0	-68.5	-69.5	-68.5	-68.0	-68.0	-68.5	-68.0	-68.0	-67.5
<b>64 QAM</b>	-67.0	-66.5	-66.0	-67.0	-66.0	-65.0	-66.5	-65.5	-65.0	-65.0	-65.0	-65.0	-64.5	-64.5
<b>128 QAM</b>	-64.5	-63.5	-63.5	-64.0	-63.0	-62.5	-63.5	-62.5	-62.0	-62.0	-62.5	-62.0	-62.0	-61.5
<b>256 QAM</b>	-61.0	-60.5	-60.0	-61.0	-60.0	-59.0	-60.5	-59.5	-59.0	-59.0	-59.0	-59.0	-58.5	-58.5
<b>512 QAM</b>	-59.0	-58.5	-58.0	-59.0	-58.0	-57.0	-58.5	-57.5	-57.0	-57.0	-57.0	-57.0	-56.5	-56.5
<b>1024 QAM Strong</b>	-55.5	-55.0	-54.5	-55.5	-54.5	-53.5	-55.0	-54.0	-53.5	-53.5	-53.5	-53.5	-53.0	-53.0
<b>1024 QAM Light</b>	-54.5	-54.0	-53.5	-54.5	-53.5	-52.5	-54.0	-53.0	-52.5	-52.5	-52.5	-52.5	-52.0	-52.0
<b>2048 QAM</b>	-52.0	-51.0	-51.0	-51.5	-50.5	-50.0	-51.0	-50.0	-49.5	-5.00	-49.5	-49.5	-49.5	-

### 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.

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