PTP 650 SERIES

RELIABLE, HIGH-CAPACITY POINT-TO-POINT WIRELESS BROADBAND DESIGNED FOR YOUR MULTI-SERVICE NETWORK

Service providers, government public safety agencies, and critical infrastructure operators such as utilities and energy companies have experienced massive growth in data, voice, and video traffic over the past few years. This growth has imposed large bandwidth demands for reliable and secure broadband connectivity and backhaul worldwide.

Cambium Networks disrupts the performance-reliability continuum with the Cambium Point-to-Point (PTP) 650 Series solution. With up to 450 Mbps aggregate throughput, PTP 650 systems let you reliably and securely handle today's needs with scalability to meet future requirements.

FLEXIBLE, SPECTRALLY-EFFICIENT, SELF-OPTIMIZING SUB-6GHZ SOLUTION

Based on our widely-deployed, field-proven non-line-of-sight (NLOS) technology, PTP 650 wireless Ethernet bridges offer an ideal array of features that give you more capacity, greater operational flexibility, and the highest spectral efficiency in the industry. PTP 650 systems provide 4.9 to 6.05 GHz, multi-band flexibility in a single radio and operate in channel sizes from 5 to 45 MHz.

With Dynamic Spectrum Optimization (DSO), PTP 650 systems are constantly optimizing the channel of operation to maximize link reliability and performance. The systems can provide up to 99.999% availability in virtually any environment, including non-line-of-sight, long-distance line-of-sight, high interference, over water and desert, and through extreme weather conditions. As a result, you can deliver more throughput with less spectrum and less investment in even the most challenging environments.

DESIGNED WITH YOU IN MIND

Whether your organization is an enterprise, government agency, or service provider, PTP 650 systems are ideal solutions for a wide array of applications such as T1/E1 and fiber replacements or extensions; video surveillance backhaul; LTE, macro-cell, and small-cell backhaul; last-mile access; disaster recovery; network redundancy; and building-to-building campus connectivity.

FIELD TESTED AND INDUSTRY CERTIFIED

PTP 650 radios meet industry standards with proven compliance to assure you of interoperability, security, and ruggedization.

- FIPS 197 128/256-bit AES encryption
- IEEE 1588v2 and Synchronous Ethernet (SyncE)
- IPv6/IPv4 dual-stack management support
- Ingress Protection rated (IP66/67) protective aluminum radio enclosures
- MEF9 certification

RADIO TECHNOLOGY

RF bands[1]	Wide-band operation 4.9 to 6.05 GHz (Allowable frequencies and bands are dictated by individual country regulations. The most common bands are listed here.) 4.940 – 4.990 GHz (Public Safety) 5.15 – 5.25 GHz 5.25 – 5.35 GHz 5.470 – 5.725 GHz[2] 5.725 – 5.850 GHz 5.825 – 6.050 GHz
Channel sizes[3]	5, 10, 15, 20, 30, 40, and 45 MHz channels Channel sizes depend on individual country regulations
Spectral efficiency	10 bps/Hz maximum
Channel selection	By Dynamic Spectrum Optimization or manual intervention; automatic selection on start-up and continual self-optimization to avoid interference
Maximum transmit power[4]	Up to 27 dBm at BPSK; up to 23 dBm at 256 QAM
System gain[4]	Integrated: Up to 164 dB with 20 MHz channel and integrated 23 dBi antenna; varies with modulation mode, channel size and spectrum Connectorized: Varies with modulation mode and antenna type
Receiver sensitivity	-98 dBm with 5 MHz channel
Modulation / error correction	Fast Preemptive Adaptive Modulation featuring 13 modulation / FEC coding levels ranging from BPSK to 256 QAM dual payload MIMO
Duplex scheme	Synchronized Time Division Duplex (TDD) and Half Duplex Frequency Division Duplex (HD-FDD); dynamic or fixed transmit/receive ratio; each TDD-synchronized link requires a Cambium TDD-SYNC synchronization unit[5] to provide an accurate timing reference signal
Antenna	Integrated: Flat panel – 23 dBi Connectorized: Can operate with a selection of separately-purchased single- and dual-polarity antennas through 2 x N-type female connectors (local regulations should be checked prior to purchase)
Range	Up to 124 miles (200 km)
Security	FIPS-197 compliant 128/256-bit AES Encryption (optional) HTTPS and SNMPv3 Identity-based user accounts Configurable password rules User authentication and RADIUS support Event logging and management; optional logging via syslog Disaster recovery and vulnerability management

ETHERNET BRIDGING

Protocol	IEEE 802.3
User data throughput	Dynamically variable up to 450 Mbps Maximum conditions – 2x2, 45 MHz channel[1], 256 QAM Flexible capacity licensing model: Lite Capacity: Up to 125 Mbps Mid Capacity: Up to 250 Mbps Full Capacity: Up to 450 Mbps

Latency	1 – 3 ms one-direction latency
QoS	8 Queues
Packet classification	Layer 2 and Layer 3 IEEE 802.1p, MPLS, Ethernet priority
Packet performance	Line rate (>850K packets per second)
Timing transport	Synchronous Ethernet; IEEE 1588v2[5]
Frame support	Jumbo frame up to 9600 bytes
Flexible I/O	2 x Gigabit Ethernet copper ports: Gigabit Port 1: Data + PoE power input Gigabit Port 2: 802.3at PoE output port SFP port (single-mode fiber, multi-mode fiber, and copper Gigabit Ethernet options available)
T1/E1 TDM support	8 x T1/E1 TDM module (optional indoor unit)[5] G.823-compliant timing DC power input (compatible with AC+DC Power Injector output)
T1/E1 latency (one way)	1 to 3 ms typical depending on range, bandwidth, modulation mode and number of T1/E1 ports; accurate T1/E1 latency figures can be determined for any given configuration using the Cambium PTP LINKPlanner

MANAGEMENT & INSTALLATION

LED indicators	Power status, Ethernet link status, and activity on Extended Range PoE supply
Network management	In-band and out-of-band management (OOBM)[5]
System management	IPv6/IPv4 dual-stack management support Web access via browser using HTTP or HTTPS/TLS[6] SNMP v1, v2c and v3, MIB-II and proprietary PTP MIB Cambium Wireless Manager, WM 4.0/SP4 or higher Online spectrum analyzer (no impact on payload traffic or network operation)
Installation	Built-in audio and graphical assistance for link optimization
Connection	Distance between outdoor unit and primary network connection: up to 330 feet (100 meters) using Power-over-Gigabit Ethernet; longer distances up to 984 feet (300 meters) can be achieved using fiber interface

PHYSICAL

Dimensions	Integrated Outdoor Unit (ODU): Width 371mm (14.6"), Height 371mm (14.6"), Depth 81mm (3.2") Connectorized ODU: Width 204mm (8.0"), Height 318mm (12.5"), Depth 90mm (3.5")
Weight	Integrated ODU: 4.1 kg (8.95 lbs) including bracket Connectorized ODU: 3.1 kg (6.8 lbs) including bracket
Operating temperature	-40° to +140° F (-40° to +60° C), including solar radiation
Dust-water intrusion protection	IP66 and IP67
Wind speed survival	200 mph (322 kph)
Power supply	Two options: AC power injector: 32° to 104° F (0° to +40° C); 35 W; 90-240 VAC, 50/60 Hz Dimensions: Width 5.2" (132mm), Height 1.4" (36mm), Depth 2" (51mm) AC + DC power injector: -40° to 140° F (-40° to +60° C); 70 W; 90-240 VAC, 50/60 Hz Dimensions: Width 9.75" (250 mm), Height 1.5" (40 mm), Depth 3" (80 mm)
Power consumption	30 W maximum (up to 70 W with 802.3at device on auxiliary port)

ENVIRONMENTAL & REGULATORY

Protection and safety	UL60950-1; IEC60950-1; EN60950-1; CSA-C22.2 No. 60950-1; CB approval for Global
Radio	4.9 GHz: FCC Part 90Y, RSS-111 5.x GHz: FCC Part 15, sub-parts 15C and 15E; RSS 210 Issue 8; EN 302 502; EN 301 893 Eire ComReg 02/71R1, UK Approval to IR2007
EMC	Europe – EN 301 489-1 and -4

[1] Regulatory conditions for RF bands should be confirmed prior to system purchase. All bands use the same hardware. Individual bands and channel widths are available pending local regulatory approvals and region code licenses.
[2] Pending FCC authorization in North America.
[3] 5, 15, and 30 MHz channel widths will be available in a future release.
[4] Gain, maximum transmit power and effective radiated power may vary based on regulatory domain and region code license.
[5] Available in a future release.
[6] Web access via HTTPS/TLS is available on AES-enabled radios.

CN PTP 650 01-00 SS 102113