Cambium Networks™

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## CAMBIUM POINT-TO-POINT RADIOS

# BUILT TO RUN, BUILT TO LAST


**PTP DURABILITY** FACT SHEET

# EXCEPTIONAL DURABILITY AND RELIABILITY

**When making a major purchase, you inherently want to believe that your chosen product will operate flawlessly, forever. No one likes dealing with malfunctions, whether from a car, a computer, a television or a microwave radio. Of course, no manufacturer can guarantee that their products won't fail at some point. However, our Cambium Networks Point-to-Point (PTP) Wireless Ethernet Solutions[1] have an impressive and reassuring track record for durability and reliability – even when deployed in some of the most hostile locations around the globe. As evidence of that durability and reliability, our PTP radios have logged more than 2.2 billion operational field hours worldwide. That sure sounds like forever.**

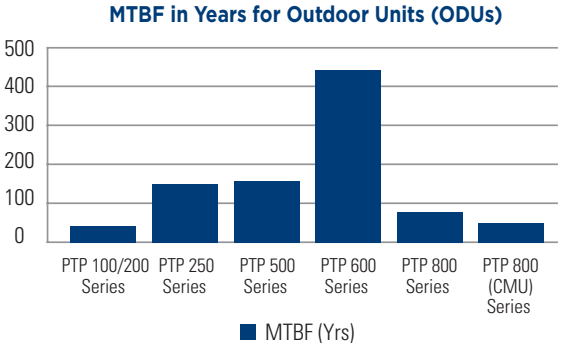
## ENGINEERED FOR THE WORST

There is no place where durability and reliability are more crucial than in outdoor wireless communications. Mounted on high towers and rooftops, PTP bridges have to operate in extreme temperatures, through all types of weather and often in very hostile environments. As a result, PTP bridges have been engineered and quality-tested to withstand rain, sleet, snow, hot desert sun, icy mountain tops, salty sea air and dusty plains.

To ensure that PTP radios will provide the best possible protection from the adverse effects of the elements, the units are manufactured with industrial-grade components which are stronger and more resistant to external forces. One PTP radio even fell over and continued to send and receive data until the service team could replace the roof-mounting hardware and realign the radios.

## MEAN TIME BETWEEN FAILURES (MTBF)

MTBF is the projected elapsed time between equipment failures. For PTP products, MTBF years are based on field component failure rates and calculations, excluding product returns due to lightning damage, packaging problems and incorrect installation procedures.




As shown above, the MTBF[2] for PTP 500 and 600 Outdoor Units (ODUs) is 155 and 441 years respectively. MTBF for the PTP 800 ODU is 80 years and 40 years for the PTP 100 and 200 ODUs. In addition, the MTBF for the PTP 800 Compact Modem Unit (CMU) is 58 years. Because the CMU is a relatively new product that has less time in the field, the CMU's MTBF is a theoretical calculation based on component-failure calculations. Similarly, the PTP 250 ODU's MTBF is 150 years based on component-failure calculations.

[1] While all Cambium PTP systems are highly durable and reliable, certain characteristics may not apply to all models.

[2] MTBF values are based on field component failure rates and component-failure calculations from data collected through December 2010.

# **DEPLOY** PTP RADIOS **VIRTUALLY ANYWHERE**

The percentage of PTP 500 and 600 Return Material Authorizations (RMAs) for any and all reasons is less than two percent. However, the importance of deploying lightning protection units cannot be overstated. As an example, in-field history shows that PTP 600 returns resulting from field component failure represent the smallest percentage of the total number of returns. In comparison, returns due to lightning damage make up nearly double the number of returns due to field component failure. Deploying Cambium PTP Lightning Protection Units (LPUs) with PTP radios greatly decreases the number of PTP product returns.

## TEMPERATURE RANGES

All Cambium PTP products can withstand wide temperature extremes. This ability to communicate reliably in very cold and very hot temperatures lets you deploy PTP radios from the Arctic Circle to the Sahara Desert and down to Antarctica. In fact, PTP radios are helping scientists in Antarctica study the effects of weather and climate on day-to-day life. Those radio links operate reliably through freezing temperatures, blizzard conditions, ice and melting snow.

**PTP OPERATING TEMPERATURES**

| Cambium PTP Product | Temperature Range (Fahrenheit) | Temperature Range (Celsius) |
|---|---|---|
| PTP 100, 200 | –40° to +131° F | –40° to +55° C |
| PTP 250 | –40° to +140° F | –40° to +60° C |
| PTP 500, 600 | –40° to +140° F | –40° to +60° C |
| PTP 800 | –27° to +131° F | –33° to +55° C |

Every PTP link undergoes rigorous temperature testing before shipment. That means 100 percent of the systems are temperature tested. During those tests, links are installed. Then the temperature is lowered to the minimum temperature. Following the cold test, the temperature is ramped up to the maximum temperature. At each temperature extreme, the systems are tested to ensure that they will boot up properly and operate reliably. In contrast, comparable systems do limited sample testing.

## WIND SPEED SURVIVAL

In addition to temperature extremes, PTP bridges are able to withstand high winds up to 202 miles per hour (325 kilometers per hour). Wind speed survival was confirmed in wind tunnel tests performed at the University of Maryland. The result was that the PTP radio and antenna sustained 202 mph (325 kph) winds with no mechanical defects.

**PTP WIND SPEED SURVIVAL**

| Cambium PTP Product | Miles Per Hour | Kilometers Per Hour |
|---|---|---|
| PTP 100, 200 | 118 mph | 190 kph |
| PTP 250 | 150 mph | 240 kph |
| PTP 500, 600 | 202 mph | 325 kph |
| PTP 800 | 150 mph | 240 kph |

# DESIGNED FOR **HARSH OUTDOOR CONDITIONS**

## IP66

The IP Code, or Ingress Protection Rating, classifies the degrees of protection provided against the intrusion of solid objects, dust and water in electrical enclosures. PTP ODUs with aluminum casings are IP66 rated for dust protection and water ingress due to spraying or splashing water. The ODU casings were verified to the IP66 standard by testing with dust and powerful water jets aimed at the enclosure from any direction.

## ATEX AND HAZLOC CERTIFICATION

In addition, PTP 600 radios are tested and certified to meet the ATEX (ATmospheres EXplosibles) and HAZLOC (Hazardous Locations) directives for equipment operations in environments with an explosive atmosphere. Typical locations which require these certifications include petrochemical plants, fixed offshore platforms and other areas where a potentially explosive atmosphere may be present.

## SUMMARY

All Cambium PTP systems are designed for the rigors of outdoor use. That means you have the flexibility to deploy your wireless links wherever you need them, without concern about the environment. You can have full confidence that your PTP systems will consistently carry your data, voice and video communications and operate unattended for years. Simply put, PTP radios are built to run effortlessly and built to last into the next generation.

# PTP Series Comparison

| | ePMP™ 1000 FORCE 110 PTP | PTP 450 | PTP 650L | PTP 650S | PTP 650 |
|---|---|---|---|---|---|
| |  |  |  |  |  |
| FREQUENCY BANDS | 5.15 to 5.97 GHz | 3.5 GHz<br>3.65 GHz<br>5.4/5.8 GHz | 4.9 – 6.05 GHz | 4.9 – 6.05 GHz | 4.9 – 6.05 GHz |
| MAX AGGREGATE CAPACITY | 220 Mbps | 125 Mbps | 100 / 300 Mbps | 450 Mbps | 450 Mbps |
| RANGE | Up to 64 km | Up to 40 km | Up to 200 km | Up to 2 km<br>(upgrade to 200 km) | Up to 200 km |
| CONFIGURATIONS | Integrated 25 dBi | Integrated 9 dBi<br>or Connectorized<br>(Lens/Reflector options) | Integrated 19dBi | Integrated 19 dBi | Integrated 23 dBi<br>or Connectorized |
| LATENCY (ONE WAY) | 1-2 ms | 3-5 ms | 1-3 ms | 1-3 ms | 1-3 ms |
| SPECTRAL EFFICIENCY /<br>CHANNEL BANDWIDTHS | 5.5 bps/Hz<br>5/10/20/40 MHz | 6.25 bps/Hz<br>5/10/20 MHz | 10 bps/Hz<br>5/10 (15/20/30) MHz | 10 bps/Hz<br>5/10/15/20/30/ 40/45 MHz | 10 bps/Hz<br>5/10/15/20/30/ 40/45 MHz |
| TDD SYNCHRONIZATION | No<br>(in low latency mode) | Yes | Yes | Yes | Yes |
| RUGGEDIZATION | IP55 | IP55 | IP66/67 | IP66/67 | IP66/67 |
| SECURITY | 128-bit AES<br>https/SNMPv2c | 128-bit AES<br>https/SNMPv3 (4Q14) | 128/256-bit AES<br>SNMPv3/https | 128/256-bit AES<br>SNMPv3/https | 128/256-bit AES<br>SNMPv3/https |
| OTHER FEATURES | QoS (3 levels) | QoS (2 levels)<br>Up to 85/15 TDD ratio | Dynamic Spectrum Optimization™ (DSO)<br>QoS (8 levels)<br>1588v2, SyncE (4G/LTE Ready) (650S and 650 only)<br>Fiber/SFP<br>IPv4/IPv6<br>802.3at PoE Output<br>OOBM<br>9600 byte frames<br>T1/E1 TDM Option<br>Adaptive Symmetry | | |
| LINKPLANNER SUPPORT | Yes (4Q14) | Yes (4Q14) | Yes | Yes | Yes |