MOTOROLA

Point-to-Point Solutions for the Most Challenging Locations & Applications

Ideally suited for removing network bottlenecks and establishing challenging links over water, through trees, over hills and around buildings at a fraction of the cost of wireline alternatives.

The Motorola point-to-point series of Orthogonal Frequency Division Multiplexing (OFDM) wireless Ethernet bridges includes the PTP 400 & 600 Series. These solutions enable service providers to transmit IP data, VoIP, video and channelized voice for a broad array of applications:

- Uniting Campuses with high bandwidth requirements.
- Providing the backbone for Canopy access point clusters and metro Wi-Fi networks.
- Backhauling cellular systems.
- Replacing fiber networks.

The PTP 400 and 600 Series of Ethernet bridges are designed for Line of Sight (LoS), near-Line-of-Sight (nLoS) and Non-Line-of-Sight (NLoS) applications with low latency (less than 7 milliseconds for the PTP 400 Series; less than 1 millisecond for the PTP 600 Series) and high reliability for deployment in the 5.4 and 5.7 GHz frequency bands.

The point-to-point series of wireless Ethernet bridges are offered with a choice of integrated and connectorized antennas providing the flexibility to establish challenging links over water, through trees, over hills and around buildings (using the small integrated antenna, or higher gain flat or parabolic antennas with the connectorized versions).

The point-to-point series of products are designed for easy deployment in a matter of hours and to operate for years in extreme weather conditions from -40° to +60° C.

The Motorola point-to-point solutions also offer a high carrier-to-interference (C/I) ratio, which enables exceptional performance in high interference environments. They also deliver enhanced link performance due to several technological innovations known to enhance the quality, speed and reliability of wireless communications:

Multiple-Input Multiple-Output (MIMO). Since NLOS environments create signal issues, connections are subject to massive periodic fading. Signals are also prone to be out-of-phase, dramatically raising the risk that they will cancel each other. With Motorola's MIMO coding, numerous data streams are transmitted between multiple transmitters and receivers.

At the receiving end, all the data streams are compared and evaluated until the data image is accurately stored and sequenced. This ensures a considerable reduction in fade margin, resulting in greater range and a much higher probability of delivering consistent quality regardless of obstacles in the path.

OFDM. Where transmit diversity transmits data on multiple beams, OFDM transmits the same beam on multiple frequencies or sub-carriers. Normally, overlapping carriers would experience interference. However, through special signal processing, the carriers are spaced orthogonally (at right angles) so they don't see each other, thus allowing higher channel bandwidth and higher resistance to multi-path interference and frequency selective fading. In a WiMAX solution, the signal is transmitted over 256 OFDM sub-carriers that make for a more robust link. The Motorola PTP 400 & 600 Series transmit on 1,024 sub-carriers per transceiver, so the solution is 10 times more robust in the link.

Adaptive Modulation. Here, the radio power output modulation is dynamically modified according to the received signal level. Since the channel may vary in intensity on a sub-second basis, adapting the modulation dynamically allows the maximum amount of data possible to be sent across the path while keeping the link quality at the highest level.

Advanced Spectrum Management. The PTP 400 & 600 Series point-to-point solutions make use of unique spectrum management capabilities. These capabilities consist of three techniques that allow optimization of carrier frequency based on link conditions:

- Intelligent Dynamic Frequency Selection – transmitter and receiver mutually agree upon which frequency will most reliably sustain the data link at a high throughput level. Enhanced gathering and mining of statistics ensure the best frequencies are used with the minimum of interference.
- Fixed Frequency – the operator presets link frequency so that it stays within the best channel known to be available.
- Channel Tuning – operators can adjust the center of the channel up or down to optimally fit it into the available spectrum.

Receive Signal Level. Powerful transmitters combined with super-sensitive receivers deliver Best-in-Class 163 to 168.6 dB. This is a maximum of 25 times better than most competing products when comparing like antenna gain.

Compression. Lower modulation modes (BPSK, QPSK 1/2 and QPSK 2/3) sacrifice link speed for a lower error rate. Compression allows users to double link speeds for most types of data without sacrificing data quality.

COMPONENTS

The PTP 400 & 600 Series include an outdoor unit and a small powered indoor unit, mounting equipment and embedded web servers to manage the link either directly or remotely.

Outdoor Units. Each outdoor unit includes a pair of transmitters and a pair of receivers. The unit's small size and neutral color make it ideal for aesthetically restrictive areas. The integrated version includes a built-in antenna. The connectorized version connects to an external antenna (purchased separately). An external antenna increases signal gain and, therefore, the range and robustness of the link. Each indoor unit connects to an outdoor unit with a CAT-5e cable and to the local area network via a standard RJ-45 connector.

Indoor Units. At each end of the link, the indoor unit runs the link management software and connects to its outdoor unit via a powered CAT-5e cable and communicates with the local area network via a standard RJ-45 connector.

Link Management Software. This software allows the operator to set up and control the link via a web interface. The operator can also download diagnostics in an Excel format to characterize link performance and identify possible actions for improvement. The software can provide information about transmit power, receive signal strength, interference problems and any problems caused by other operators transmitting in the same area.

Estimator Tool. The Link Estimator Tool is an Excel spreadsheet that allows customers to determine link performance characteristics given certain assumptions about geography, distance, and antenna height, transmit power and other factors.

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