



WIRELESS NETWORK SOLUTIONS

Point-to-Point Solutions Portfolio

Wireless Connectivity and Backhaul



Reliable, High-Performance Point-to-Point Wireless Ethernet Bridges

Adapt or Perish

Over the past decade, the way we conduct business, exchange information and entertain ourselves has undergone a dramatic evolution. This evolution has been possible because of the Internet and wireless communications. Through the Internet, we have access to vast amounts of information, and wireless devices give us the means to capture that information anywhere, anytime. It's nearly impossible to imagine conducting business in today's global economy without these powerful enablers.

Workers are no longer chained to desks and telephones. Instead, mobility is the mantra – mobility that allows workers to be productive irrespective of their physical location. If mobility is the productivity mantra, agility is the success mantra. The most successful organizations are those that can adapt to a constantly changing ecosystem by responding quickly to new opportunities and changing conditions. Agility enables organizations to increase revenues, cut costs, enhance quality and improve service.

“A key benefit of the PTP 800 is that we can pay for the increased capacity as we grow and upgrade capacity as needed while protecting our initial infrastructure investment.”

– Michael Kriech, General Manager
MHO Networks, Denver, Colorado

Agility and Mobility

Achieving enterprise agility and mobility requires reliable, powerful wireless connectivity solutions that enable a seamless flow of indoor-and-outdoor communications and efficient worker collaboration. Motorola's Wireless Network Solutions portfolio is a suite of solutions that meets those precise requirements. The portfolio offers a comprehensive breadth of products to serve a wide variety of customer communication requirements. With an array of WLAN, outdoor Point-to-Point, Point-to-Multipoint, Mesh and voice-over-WLAN solutions as well as WiMAX solutions, Motorola can provide an entire end-to-end wireless communications network. This information focuses on the Point-to-Point solutions and how those solutions help you achieve enterprise agility and mobility.

Powerful Point-to-Point Portfolio

The Point-to-Point (PTP) family of products offers outdoor connectivity and backhaul solutions that close an assortment of communication gaps in both wired and wireless networks. Whether you need to establish connectivity in an obstructed or high-interference environment, want the exclusivity offered by licensed microwave, require a carrier-grade backhaul solution or have to connect facilities on a tight budget, there is a PTP system to meet your specific requirements.

PTP links can function independently, integrate with other Motorola Wireless Network Solutions, and combine with legacy and third-party systems. This extreme flexibility lets you configure the best possible system or combination of systems to achieve your wireless communications goals.

Connect the Un-connectable

Operating in a variety of radio frequency (RF) bands at Ethernet data rates from 7.5 Mbps to 368 Mbps (full duplex), PTP systems are Internet Protocol (IP) optimized Ethernet bridges which create a wireless link between two points. The systems are engineered to withstand severe weather conditions and wind speeds up to 202 miles per hour (325 kilometers per hour). For those organizations with constrained budgets, there are several extremely affordable models that deliver reliable, high-performance connectivity and backhaul capabilities.

Unlicensed and defined-use licensed models can provide reliable, high-speed performance in extremely challenging environments, including non-line-of-sight (NLOS), long-distance line-of-sight (LOS) and high-interference environments, as well as those over water and desert terrain. In fact, PTP links routinely operate in some of the most hostile environments on earth such as frigid and icy mountaintops, hot and dusty deserts, turbulent seas and congested cities. That is why PTP systems are often described as being able to “connect the un-connectable.”

MIMO and More

This unrivaled PTP performance is possible due to Motorola's unique combination of technologies which includes Multiple-Input, Multiple-Output (MIMO), *intelligent* Dynamic Frequency Selection (*i*-DFS) and Adaptive Modulation. These technologies work together to overcome obstacles, mitigate interference and enable long-distance communications with high spectral efficiency and up to five-nines of reliability.

PTP Models Support Licensed and Unlicensed RF Bands

Unlicensed Bands:
2.4, 5.2, 5.4, 5.8 and 5.9 GHz

Defined-Use Licenses:
2.5, 4.5, 4.8 and 4.9 GHz

Licensed Microwave:
6 to 38 GHz¹

¹ PTP systems operating in 6 to 38 GHz bands will be available in a series of product releases.

Connectivity and Backhaul for Virtually Any Organization, Environment and Budget

Capacity for Today and Tomorrow

Where licensed exclusivity is desired, IP-optimized PTP licensed Ethernet microwave solutions efficiently and affordably transport the data, voice and video that high-bandwidth applications require, while initiating a smooth migration to an all-IP-based network. PTP licensed microwave systems offer exceptional scalability with “capacity-as-you-grow” throughput that allows you to purchase only what you need today and increase capacity as your needs grow. This feature can substantially reduce your initial capital expenditure by not having to pay for tomorrow’s needs with today’s budget. In addition, the PTP unlicensed and defined-use licensed systems offer scalability via software upgrades that allow you to increase throughput as you need it.

Zero-Downtime Adaptive Modulation

You can choose to operate PTP licensed microwave radios in a Fixed Modulation mode or the Adaptive Coding and Modulation (ACM) mode. When ACM is selected, ACM will up-shift and down-shift modulation as path conditions change. This feature enables radio transmitters and receivers to negotiate the highest mutually sustainable data rate for the path conditions. Motorola’s “errorless and hitless” technology delivers exceptionally smooth step changes; so you will experience no service interruption as modulation steps from one level to another. Many comparable systems need several seconds to adjust the modulation which causes outages as the radios switch modes.

“No Surprises” Link Planning

PTP LINKPlanner reduces the amount of planning time from days to hours, while taking the stress and guesswork out of link planning. Available in Motorola’s One Point Wireless Suite or as a stand-alone tool, PTP LINKPlanner² is a sophisticated link planning

tool that can help you design and optimize your licensed and unlicensed PTP links prior to purchase. The easy-to-use tool lets you determine link performance characteristics based on geography, distance, antenna height, transmit power and other factors specific to your deployment. You can perform calculations on one link or multiple links simultaneously, conduct “what-if” scenarios and immediately see the effects of your changes. Once links are optimized to your requirements, the detailed performance report provides information to guide installers through a fast, no-hassle deployment.

Reassuring Multi-Level Security

Motorola has an ongoing commitment to providing robust, multi-layered security for its PTP solutions. Although PTP systems are engineered to be inherently secure, many PTP models have been enhanced with added security capabilities and compliance certifications, including, but not limited to:

- **AES** – Federal Information Processing Standard (FIPS) 197 compliant 128-bit and 256-bit Advanced Encryption Standard (AES) encryption, a system option
- **HTTPS/TLS** – The secure version of Hypertext Transfer Protocol (HTTP) to protect the management interface on certain PTP systems
- **SNMPv3** – Security and remote configuration enhancements via Simple Network Management Protocol (SNMP), Version 3
- **FIPS 140-2** – Support for FIPS 140-2³ Level 2 mode which meets regulatory requirements for cryptographic algorithms, key security and tamper evidence, a system option
- **UC-APL** – U.S. Department of Defense (DoD) United Capabilities Approved Product List (UC-APL)⁴ compliance for interoperability and information assurance

² PTP LINKPlanner may not provide link planning capabilities every PTP model.

³ FIPS 140-2 certification status may be confirmed at: <http://csrc.nist.gov/groups/STM/cmvp/inprocess.html>

⁴ UC-APL compliance testing is performed by Joint Interoperability Test Command (JITC). UC-APL certification status may be confirmed at: <http://jitic.fhu.disa.mil/apl/dsn.html>



PTP Product Family



Easy Installation and Operation

PTP systems include sophisticated deployment-assistance features that help installers complete a stress-free installation – typically in one or two days. All PTP systems are ruggedized for reliable outdoor use and are communication “work horses.” Plus, the systems share a common, intuitive graphical user interface to reduce your learning curve and simplify operations.

Flexible System Management

Network administrative staff can manage PTP systems remotely using the Internet and a standard Web browser, a third-party network management system, or Motorola’s Wireless Manager, Version 2.2 or higher. Wireless Manager (WM) helps organizations manage their wireless networks for maximum reliability and uptime. You can monitor and manage Mesh, Point-to-Multipoint, Point-to-Point, WLAN and other SNMP-enabled devices from one live Google™ map view. Real-time polled network performance metrics and alarms enable faster and more efficient issue response.

Award-Winning Technology

When you entrust your connectivity and backhaul requirements to Motorola’s PTP systems, you can have full confidence that your wireless communications will deliver exceptional range, capacity, reliability and throughput. More than 40,000 systems have been successfully deployed worldwide based on the unique combination of technologies that earned Motorola the market leadership position in the global unlicensed Ethernet market. This same technological innovation and product excellence extends to our licensed Ethernet microwave solutions as well as our newer Multiple-Point-to-Point (M-PTP) systems.



PTP at Work

PTP solutions are designed to deliver real value for a wide variety of business and government applications, including, but not limited to:

- Building-to-building connectivity, even in locations that were previously inaccessible
- Campus connectivity for a traditional college campus or corporate offices with multiple buildings in a campus setting
- High-speed wireless backhaul to remove network bottlenecks
- Leased-line replacement to eliminate or reduce recurring fees
- Video surveillance extensions beyond the constraints of a wired network
- Wired and wireless network redundancy
- Rapid deployment for disaster recovery, emergencies and special events
- Wire-line and wireless network extensions
- Connectivity to support Voice-over-IP, streaming video and multimedia
- Communications support for nomadic teams
- WiMAX and LTE backhaul

Specialized Communications

Many organizations have unique requirements and need wireless solutions that are designed to provide specialized capabilities to support vital, business-critical applications. Motorola offers several PTP models that are geared to serve the distinctive requirements of such enterprises.

- **U.S. Federal Government and NATO Countries:** PTP systems operating in the 4.5 and 4.8 GHz bands can enable battlefield communications; increase persistent awareness and tighten border security; increase the productivity and accessibility of training and simulation networks; establish connectivity from brigade to battalion and battalion to company; lower tower cost and lessen tower load for telemetry and Land Mobile Radio (LMR) backhaul; and provide hub-and-spoke backhaul at the network edge.

“We were in need of a solution that could provide us with high-bandwidth without compromising reliability. We are now able to maintain a watchful eye on the Port of Miami because of the reliability and security that Motorola’s PTP solution gives us, even in extremely high-interference paths.”

– Lieutenant Rhett Rothberg, U.S. Coast Guard

- **Public Safety Agencies:** Operating in the 4.9 GHz public safety band, PTP systems can provide police officers, firefighters, emergency medical teams and other public safety officials with timely, uninterrupted Internet and database access; backhaul from video cameras, point-to-multipoint nodes, mesh sites and command centers; ASTRO® 25 secondary links, connectivity between base sites, traffic backhaul and last-mile access.
- **Educational Organizations:** For educational organizations with 2.5 GHz licenses, PTP systems can support sophisticated applications such as distance learning, online work assignments, multimedia content for home-schooled and hospitalized students, online testing and performance tracking, virtual field trips, and individual tutoring.
- **Carriers and Service Providers:** From leased-line replacement and last-mile access to high-performance WiMAX and LTE backhaul and migration to an all-IP network, PTP solutions can help wireless carriers and service providers grow their subscriber networks, remove network bottlenecks and configure a high-capacity IP ring.
- **Utility Companies:** One step in the Smart Grid migration is to transition to an Advanced Metering Infrastructure (AMI) that provides remote monitoring as well as control of smart meters and their infrastructure. PTP systems provide the capacity, reliability, scalability and affordability that utility companies require for Smart Grid connectivity and backhaul.
- **Healthcare Providers:** As medical centers exchange information with clinics, billing centers, laboratories, doctors' offices and other healthcare agencies, PTP links can provide secure, high-performance connectivity and backhaul for patient records, insurance billings, medical images and other vital information. In addition, PTP bridges can facilitate remote backup and diagnostics, provide network redundancy, extend video surveillance and offer rapid deployment for disaster recovery.
- **State, County and Local Governments:** Building-to-building and campus connectivity, video surveillance extensions and backhaul, wired-network redundancy and T1/E1 replacement are examples of the many PTP-enabled applications that can help government agencies govern and serve citizens.
- **Transportation Organizations:** PTP systems can provide connectivity and backhaul to help control and re-route traffic, respond to incidents in a timely manner and support real-time communications between roadside equipment and traffic control centers.

Point to Motorola Point-to-Point

The PTP portfolio offers a complete family of solutions that individually and together can help you achieve your mobility and agility objectives with wireless solutions which offer:

- Carrier-grade reliability even in challenging conditions
- Excellent scalability to meet the ever-increasing demand for more bandwidth
- Multi-level security to protect your information and PTP systems
- Ease of use and flexible network management to reduce administrative man-hours
- An excellent return on investment (ROI) – often one year or less
- Licensed microwave exclusivity – a slice of spectrum all to yourself
- A smooth migration path to tomorrow's all IP-based network
- An accurate link planning and optimization tool

In addition, PTP solutions are backed by Motorola, a Fortune 100 company with global reach and support. As a market leader in two-way radio communications and wireless broadband connectivity, our extensive experience and expertise can help you achieve your individual wireless networking goals.

Additional Information
For detailed information about specific PTP systems, visit www.motorola.com/ptp.

"The first two phases of our wireless deployment will save Polk County roughly a quarter of a million dollars a year in recurring fees. With a payoff of less than 18 months and a minimum of a five-year service life, the savings will be \$875,000."

– Ben Holycross, Radio Systems Manager, Polk County Department of Public Safety Emergency Management

Wireless Network Solutions

Motorola delivers seamless connectivity that puts real-time information in the hands of users, giving customers the agility they need to grow their business or better protect and serve the public. Working seamlessly together with its world-class devices, Motorola's unrivalled wireless network solutions include indoor WLAN, outdoor wireless mesh, point-to-multipoint, point-to-point networks and voice over WLAN solutions. Combined with powerful software for wireless network design, security, management and troubleshooting, Motorola's solutions deliver trusted networking and anywhere access to organizations across the globe.

PTP FAMILY OF PRODUCTS

Features	PTP 100	PTP 200	PTP 300	PTP 500	PTP 600	PTP 800
Radio Frequencies (GHz)	2.4, 5.2, 5.4, 5.8	4.9, 5.4	5.4, 5.8	5.4, 5.8	2.5, 4.5, 4.8, 4.9, 5.4, 5.8, 5.9	6 – 38
Maximum Throughput ⁵	14 Mbps	21 Mbps	25 Mbps 50 Mbps LOS Option	105 Mbps	300 Mbps	368 Mbps Full Duplex
Latency (One Way)	< 3.5 ms Ethernet	< 3.5 ms Ethernet	1.7 ms T1/E1 Modulation Dependent	1.7 ms T1/E1 Modulation Dependent	1.7 ms T1/E1 Modulation Dependent	115 μ s
Maximum LOS Range	35 mi (56 km)	5 mi (8 km) Integrated Antenna	155 mi (250 km)	155 mi (250 km)	124 mi (200 km)	NA
Maximum NLOS Range	NA	NA	6 mi (10 km)	6 mi (10 km)	5 mi (8 km)	NA
Channel Width	20 MHz	10 MHz	Selectable 5, 10, 15 MHz	Selectable 5, 10, 15 MHz	Selectable 5, 10, 15, 20, 30 MHz (Frequency Dependent)	7 to 56 MHz Variable (Frequency Dependent)
Maximum System Gain	125 dB (Frequency Dependent)	141 dB (Frequency Dependent)	167 dB	167 dB	168 dB (Frequency Dependent)	121 dB
Security	56-bit DES 128-bit AES	56-bit DES 128-bit AES	128-bit AES 256-bit AES	128-bit AES 256-bit AES	128-bit AES 256-bit AES FIPS 140-2	128-bit AES 256-bit AES
DFS	Y	Y	<i>Intelligent</i> DFS	<i>Intelligent</i> DFS	<i>Intelligent</i> DFS	NA
OFDM	N	Y	<i>Intelligent</i> OFDM	<i>Intelligent</i> OFDM	<i>Intelligent</i> OFDM	NA
MIMO	N	N	Y	Y	Y	NA

⁵ Data rates are dynamically variable based on channel size and modulation. Use the Motorola PTP LINKPlanner to provide accurate performance estimates for all systems.



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