

PMP 320: Making the Great Outdoors a Great RF Environment



Motorola's PMP 320 is the 802.16e fixed licensed broadband solution designed to excel in complex outdoor environments.

Situation: The need for a fixed wireless broadband solution that delivers high performance in multi-path environments

Outdoor environments present numerous challenges for wireless technology, even in the licensed spectrum. Signals must often travel distances measured in miles and kilometers, not feet. Near-line-of-sight (nLOS) and non-line-of-sight (NLOS) links are often the rule, not the exception. Tall trees and dense foliage challenge performance and reliability in rural and suburban networks. Tall buildings in dense urban canyons create challenging multi-path environments in city networks. Wireless operators need a broadband solution capable of delivering high performance in all types of environments. A solution that reliably transmits signals long distances and at the same time maximizes throughput in a variety of LOS, nLOS and NLOS environments.



Solution: The Motorola PMP 320 licensed outdoor wireless broadband solution

The Motorola PMP 320 is the solution built to overcome virtually every challenge an outdoor wireless network faces. Built to 802.16e standards, the PMP 320 provides maximum capacity while ensuring high throughput at long distances in licensed networks using the 3.3-3.4 GHz, 3.4-3.6 GHz and 3.6-3.8 GHz frequency bands. To help ensure optimum throughput in difficult multi-path environments, the PMP 320 features MIMO Matrix B technology.

Result: Proven performance in LOS, nLOS and NLOS locations

In a series of tests in urban and suburban environments, the PMP 320 system performed at high levels in LOS, nLOS and NLOS link scenarios. In the configurations tested, the solution delivered high levels of throughput at ranges up to five miles. In non-MIMO configurations, the solution delivered 25 Mbps. In MIMO Matrix B configurations, downlink throughput was 45 Mbps.

CUSTOMER PROFILE

Enterprise
Motorola

Industry
Wireless communications

Motorola solution

- PMP 320 fixed outdoor wireless broadband solutions

Solution features

- Up to 45 Mbps throughput
- Ranges up to 16 kilometers
- 802.16e interoperability
- MIMO Matrix B capability

Benefits

- High performance in multi-path environments
- Excellent performance in licensed spectrum
- Fast, easy deployment
- Exceptional cost-effectiveness

Proving PMP 320 Performance in the Real World



To showcase PMP 320 performance in a variety of complex RF environments, Motorola put the system through a series of stress tests. The testing was conducted in both urban and non-urban locations, in LOS, nLOS and NLOS scenarios.

Suburban Testing

Suburban tests were performed at Motorola's corporate offices in Schaumburg, Illinois. A PMP 320 access point (AP) was mounted on top of the corporate building, approximately 150 feet off the ground and facing west over a heavily forested area. The AP was connected to three subscriber modules (SM) installed in a van, each with a laptop client. Performance was tested at distances up to five miles.

Motorola tested the PMP 320 in forested locations because these environments are a dual source of interference. First, wireless signals are usually unable to penetrate wooded areas with many trees. Second, as foliage absorbs rain and dew from the atmosphere, leaves become saturated with moisture, contributing to signal degradation and exacerbating the problem.

In the tests, the PMP 320 with MIMO Matrix B capabilities provided exceptional range and high bandwidth performance.

Link Scenarios	Link Distance	AP Height	CPE Height	Throughput
nLOS, NLOS	5 miles	150 feet	78 feet	36.5 Mbps
LOS	3.8 miles	150 feet	78 feet	41 Mbps



Urban Testing

Similar tests were conducted in an urban area near downtown Chicago, with the AP situated on a top floor balcony of an eight-story condominium building and aimed directly west. The PMP 320 SMs were positioned directly west of the AP to test an LOS environment and aimed east for testing in an NLOS location. Numerous buildings, more than eight stories in height, which completely blocked line of sight, hindered signal paths.

Equipped with MIMO Matrix B technology (see sidebar), the PMP 320 is exceptionally effective in multi-path city locations. The system is uniquely adept at providing excellent performance even in dense downtown areas.

When tested in these typical urban environments, the PMP 320 with MIMO Matrix B capabilities provided exceptional range and throughput.

Link Scenarios	Link Distance	AP Height	CPE Height	Throughput
1 LOS	0.25 miles	90 feet	78 feet	43 Mbps
1 nLOS	0.25 miles	20 feet	78 feet	43 Mbps
2 NLOS	0.25 miles	90 feet	78 feet	43 Mbps
3 NLOS	0.3 miles	90 feet	20 feet	38 Mbps

Fast Deployment, Superior Cost-Effectiveness

In addition to excellent range and performance, the PMP 320 solution offers fast, easy and cost-effective deployment. Infrastructure costs are kept to a minimum, with no need for specialized gateways, routers or servers. The solution provides 802.16e interoperability for fixed outdoor applications and supports standard WiMAX QoS profiles and interoperability with WiMAX CPEs.

For more information on the Motorola PMP 320, contact your Motorola representative or visit our website at www.motorola.com/pmp.

MIMO MATRIX B TECHNOLOGY EXCELS IN MULTI-PATH ENVIRONMENTS

MIMO Matrix B (Multiple Input/Multiple Output) technology allows 802.16e radios to include multiple transmit antennas and paths. Multiple spatial data streams can be transmitted at the same time, on the same channel by different antennas. The data streams are then combined from the multiple receivers using advanced signal processing, yielding a significant jump in coverage and speed.



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