



ONE POINT WIRELESS SUITE

PTP LINKPlanner:

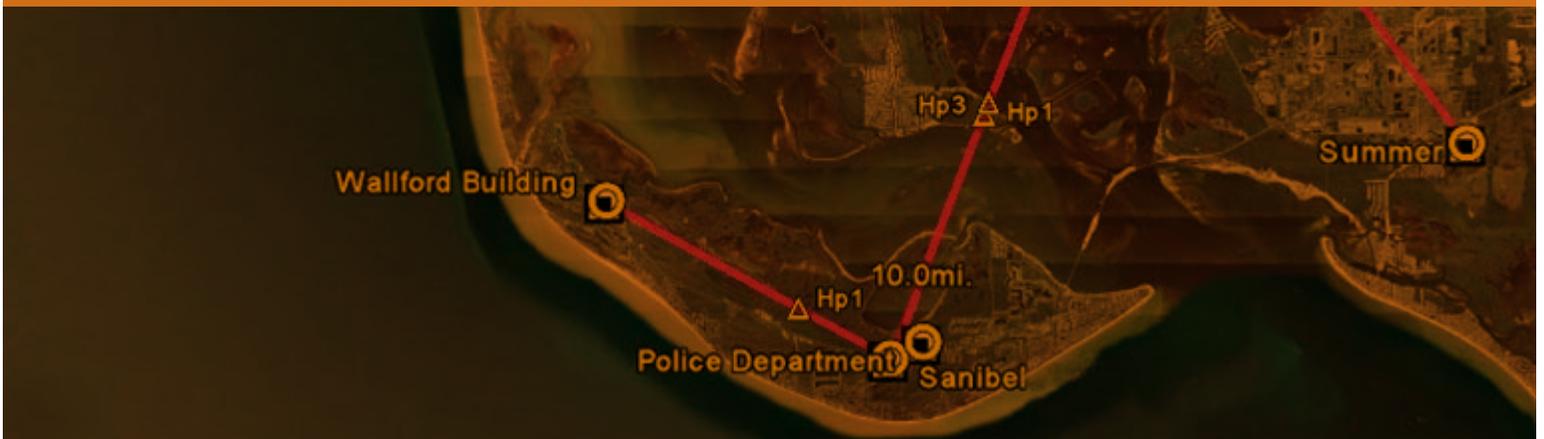
“No Surprises” Link Planning for PTP 800 Solutions





Prior Planning Prevents Poor Performance. The five-P's serve as a simple, yet indisputable, reminder that system planning is crucial to the successful deployment of licensed microwave solutions, and the PTP 800 is no exception. In fact, you can't even apply for a radio-frequency (RF) license without confirming that the system to be deployed will function adequately and in accordance with local regulatory guidelines. However, designing a licensed microwave system can be complicated and expensive, depending on your individual environmental and technical requirements and the link-planning tools available to you.

Ideally, link planning should be accurate, time-saving, easy and inexpensive. We agree, so our PTP LINKPlanner meets all those criteria. LINKPlanner is free and adds nothing to your system cost. It is easy to use with sophisticated, time-saving features that provide accurate performance information prior to purchase. Plus, thousands of successful point-to-point links have been planned and optimized using Motorola's PTP LINKPlanner, so you can have full confidence in the results.



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Included in Motorola's One Point Wireless Suite, PTP LINKPlanner is a customized tool for designing and configuring PTP 800 Licensed Ethernet Microwave solutions operating in any RF band between 6 and 38 GHz.¹ As with any link-planning tool, the accuracy of LINKPlanner's performance projections depends on receiving accurate and complete path data. All link calculations are performed in accordance with recommendations from the radio communications sector of the International Telecommunications Union (ITU-R). You can download LINKPlanner free and register for a live training session or a pre-recorded tutorial at www.motorola.com/ptp.

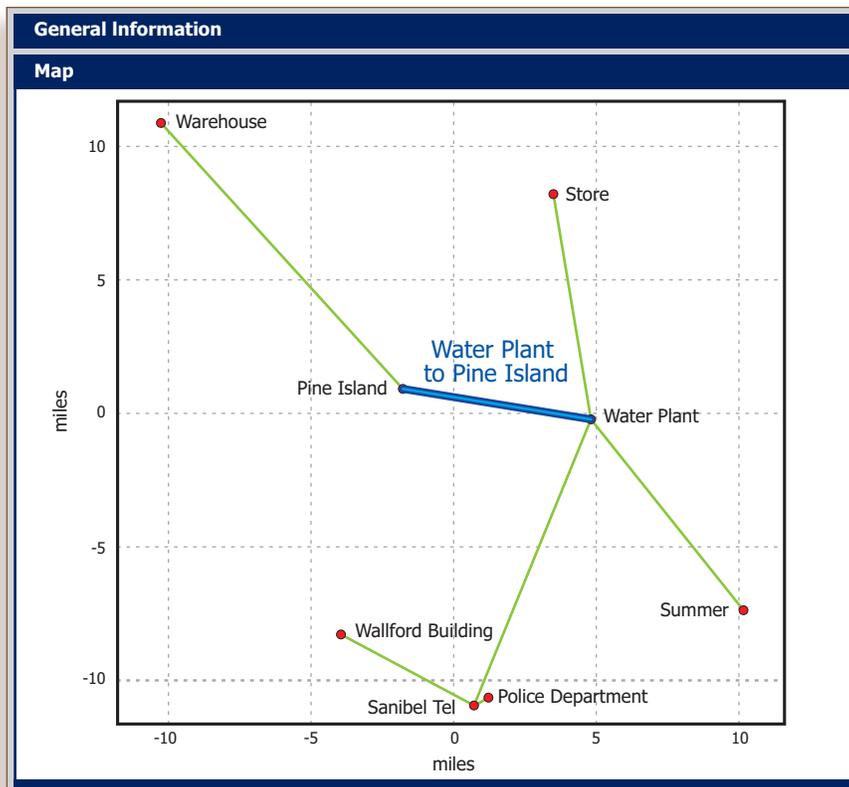
Easy, Elegant Link Design

PTP LINKPlanner is a comprehensive tool with advanced features that intuitively guide you through the planning process and automatically generate precise performance projections based on your path conditions. With LINKPlanner, you will find it easy to:

- Load path terrain profiles
- Engineer a reliable, high-capacity link over a line-of-sight (LOS) path
- Design single and multiple links simultaneously – a feature that is not available in many comparable link-planning tools
- Conduct "what if" scenarios and instantly see the effects of changes on performance
- Optimize functionality based on geography, distance, antennas and transmit power
- Generate reports that detail installation guidelines and system settings
- Receive information that helps you complete your licensing application
- Review your entire point-to-point wireless network via Google™ Earth
- Obtain a licensed-microwave bill-of-materials (BOM)

¹ PTP 800 models operating in the 6 to 38 GHz frequencies will be available in a series of product releases.

Sample PTP 800 Site Map



Site Surveys

While LINKPlanner is a very powerful planning tool, it does not eliminate the need for a site survey. A site survey still is necessary to determine the suitability of the PTP 800 system for your specific requirements. Both a physical and a radio frequency analysis of the area should be conducted to evaluate the availability and height of towers or other antenna-supporting structures; type, density and height of foliage and other obstructions; environmental conditions, including seasonal issues; spectrum analysis for the path at desired and alternate frequencies; and anticipated changes in path conditions.

Link Design Intelligence

After entering site information in PTP LINKPlanner, the planning process will give you valuable deployment and operational intelligence that will validate how the PTP 800 system will perform over your proposed LOS path. System calculations that are particularly applicable to a PTP 800 system include:

- System-reserved fade margin
- Distance per link based on the proposed licensed frequency
- Free space path loss projections
- Throughput and availability

When you enter specific link and path parameters, all information provided to you during the planning process will be specific to the PTP 800 and your proposed frequency. As an example, if you indicate that you want to optimize a system for 11 GHz, all the available planning options will be consistent with a deployment in the 11 GHz RF band. In addition, LINKPlanner understands PTP 800 configuration options, so it automatically accounts for issues such as waveguide losses and regulatory conditions. Let's consider some examples of how LINKPlanner can save you time while helping you determine key design considerations to optimize a PTP 800 system before deployment.

- **LOS Path:** A primary design issue that must be resolved is whether or not the proposed path will support LOS radio transmissions. After you plot your end points, enter site survey details and load path terrain profiles, PTP LINKPlanner will show you a path diagram and note any obstructions that may prohibit LOS performance. If obstructions are present, the tool will tell you how high your towers and antennas must be to get above the obstructions. In areas where antennas can be mounted only on rooftops or water towers, LINKPlanner shows how high those antenna-supporting structures must be to achieve LOS transmissions. In addition to tower or rooftop heights, the tool will also provide throughput and availability information based on the antenna type and size you have chosen for the link.

Link: Water Plant to Pine Island

Link Description

Equipment

Region and Equipment Selection
 Band: 11 GHz | Regulation: FCC | Product: PTP800

PTP800 Configuration
 Bandwidth: 40 MHz | Modulation Mode: 256QAM 0.80 Sngl | Polarisation: Vertical

Profile: 6.6 miles, Line-of-Sight

Configuration at Each End

Water Plant	Pine Island
Motorola 6ft HP Antenna 85010089005 (43.85dBi)	Motorola 6ft HP Antenna 85010089005 (43.85dBi)
Antenna Height: 120 feet (Max height at site is 300.0 ft)	Antenna Height: 100 feet (Max height at site is 400.0 ft)
Maximum EIRP: 62.9 dBm <input type="checkbox"/> User limit	Maximum EIRP: 62.9 dBm <input type="checkbox"/> User limit
Maximum Power: 28.0 dBm <input type="checkbox"/> User limit	Maximum Power: 28.0 dBm <input type="checkbox"/> User limit
Transmit Frequency: 11680.00 MHz	Transmit Frequency: 11030.00 MHz
Tx Capacity Limit: No Limit Mbps	Tx Capacity Limit: No Limit Mbps
<input type="checkbox"/> Interference:	<input type="checkbox"/> Interference:

In some cases, the antenna-mounting structures may not be high enough to provide a valid LOS path. In those instances, you can use LINKPlanner to plot another LOS path or design a non-line-of-sight (NLOS) link using Motorola’s PTP 600 solution as an unlicensed or shared-license (2.5, 4.5, 4.8 or 4.9 GHz) link for that one obstructed connection. Because LINKPlanner performs calculations for Motorola’s licensed and unlicensed point-to-point systems, you can configure an unlicensed (or shared license) link at the same time as you design your PTP 800 licensed-microwave links.

- Modulation:** Adjusting modulation² allows you to optimize over-the-air transmissions to increase link throughput and availability while improving spectral efficiency, so you can achieve greater throughput over a given channel bandwidth. With PTP LINKPlanner, you can set fixed modulation values and perform “what-if” scenarios until you achieve the desired performance results. As you change modulations, you will see that increasing the modulation mode improves throughput but decreases link availability, if all other parameters remain the same. Conversely, decreasing the modulation mode typically decreases throughput while improving link availability.

It is important to note that the modulation mode that is ultimately chosen for the link must be the right modulation to meet the minimum payload requirement from your local regulatory agency. As an example, the modulation mode on certain bands of a 6 GHz frequency must be 64 QAM and above to meet the minimum payload regulatory requirement.

- Asymmetric Throughput Control:** A key advantage of PTP 800 systems is that links can be engineered with different download and upload throughput capacities. This is particularly useful for carriers and service providers whose customers download more information than they upload. In government and corporate enterprises, being able to adjust downstream versus upstream traffic is valuable for IP-based applications such as video surveillance, product demonstrations and executive briefings where users are primarily receiving information. LINKPlanner will allow you to model asymmetric data flow so you can formulate just the right throughput balance. In cases where throughput will be configured asymmetrically, you may be able to purchase a lower throughput capacity cap and reduce your PTP 800 capital expenditure.

² Adaptive Coding and Modulation (ACM) will be available in PTP 800 Release 2.

"There's big growth in licensed microwave systems over the next few years, and the PTP LINKPlanner makes it so much easier to present PTP 800 proposals to our customers with accurate performance predictions. It even creates a complete Bill-of-Materials, so I can just submit the order."

— Scott Elliott, Owner
Get Right Communications, LLC, Jackson, Michigan

Sample PTP 800 Performance Report

Link: Water Plant to Pine Island

Performance Summary

<p>Throughput to Water Plant</p> <p>Mean IP Predicted : 236.59 Mbps Mean IP Required : 0.5 Mbps % of Required IP : 47318 %</p> <hr/> <p>Min IP Required : 0.0 Mbps Min IP Availability Required : 99.9900 % Min IP Availability Predicted : 99.9992 %</p>	<p>Link Summary</p> <p>Aggregate IP Throughput : 473.18 Mbps Lowest Mode Availability : 99.9992 %</p> <hr/> <p>System Gain Margin : 36.41 dB Free Space Path Loss : 133.98 dB Excess Path Loss : 0.00 dB Total Path Loss : 133.98 dB</p>	<p>Throughput to Pine Island</p> <p>Mean IP Predicted : 236.59 Mbps Mean IP Required : 0.5 Mbps % of Required IP : 47318 %</p> <hr/> <p>Min IP Required : 0.0 Mbps Min IP Availability Required : 99.9900 % Min IP Availability Predicted : 99.9992 %</p>
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Performance Details

Common details

Mode : 256QAM
Code rate : 0.80
Max Aggregate IP Throughput (Mbps) : 473.18
Max IP Throughput Each Way (Mbps) : 236.59

Performance to Water Plant

Fade Margin (dB) : 36.41
Mode Availability (%) : 99.9992
Receive time in Mode (%) : 99.9992

Performance to Pine Island

Fade Margin (dB) : 36.41
Mode Availability (%) : 99.9992
Receive time in Mode (%) : 99.9992

- Valuable Licensing Information:** After you have finished tweaking a PTP 800 link, the PTP LINKPlanner tool can generate a performance report that shows antenna and tower configurations, modulation settings, throughput, availability and range. The information on the performance report serves as an easy-to-follow deployment guide and helps to reduce installation man-hours. In addition, link design information, together with the licensee's contact information, is provided in a format that can be submitted to your licensing agent as input for your licensing application. This time-saving feature helps to speed up application submission to the appropriate regulatory agency.

- Effortless BOM:** LINKPlanner provides a licensed microwave bill-of-materials (BOM) which lists all the components and Motorola part numbers required for your planned link. The automated BOM is an enormous time-saver that takes the confusion out of the ordering process.

"No Surprises" Link Planning

A surprise such as the wrong antenna size, an inaccurate distance calculation or an overly-optimistic throughput projection is the last thing you want when applying for a license or deploying a link. That's why we refer to our PTP LINKPlanner as a "No Surprises" planning tool. Our unique link-planning technology makes it easy to optimize a PTP 800 solution to your requirements and provides precise performance projections based on the path data provided.

Sample PTP 800 Bill-of-Materials (BOM)

Bill of Materials for Link

P/N	Description	Qty
01010208005	ODU-A 11GHz. TR 490 & 500, Lo, B7 (11010.0 - 112000.0 MHz), Rectangular WG, Neg Pol	1
01010208006	ODU-A 11GHz. TR 490 & 500, Hi, B7 (11510.0 - 117000.0 MHz), Rectangular WG, Neg Pol	1
85010089005	6' HP Antenna, 10.70 ~ 11.70 GHz, Single Pol, Mot Interface	2
WB3480	PTP800 Modem 1000/100BaseT with Capacity CAP 10 Mbps	2
WB3546	PTP800 Modem Capacity CAP - Full Capacity (per Unit)	2
WB3616	Coaxial Cable Installation Assembly Kits (w/o Surge Arrestor)	2
WB3657	LPU END KIT PTP800 (1 kits required per Coaxial cable)	2



Planning for Peak Performance

Motorola's PTP LINKPlanner is the most complete, dependable and easy-to-use licensed microwave link design tool and a huge time-saver as compared with other alternatives. In a matter of minutes or a few hours, a PTP link can be configured and optimized to meet or exceed your communication requirements. You can change antenna heights, modulation, paths and even PTP product models and immediately see how those changes alter performance projections. The detailed performance report gives you configuration details to speed deployment, outputs information vital to the completion of your licensing application, and supplies a BOM that takes all the guesswork out of the ordering process.

If you had to perform these same activities manually, it could easily take days. As an alternative to using pad-and-pencil, you could purchase a link-planning tool. However, that tool would not be customized to Motorola's Point-to-Point portfolio, and such tools are often expensive, complicated and imprecise. PTP LINKPlanner is a proven, reliable, accurate, intuitive and completely free planning tool that can be used by Motorola's wireless broadband partners and system integrators, as well as businesses, government agencies, carriers and service providers.

Motorola Wireless Broadband

PTP 800 Licensed Microwave solutions are included in Motorola's comprehensive portfolio of reliable and cost-effective wireless broadband solutions which, together with our WLAN solutions, provide and extend coverage both indoors and outdoors. The Motorola Wireless Broadband portfolio offers high-speed Point-to-Point, Point-to-Multipoint, Mesh, Wi-Fi and WiMAX networks that support data, voice and video communications, enabling a broad range of fixed and mobile applications for public and private systems. With Motorola's innovative software solutions, customers can design, deploy and manage a broadband network, maximizing uptime and reliability while lowering installation costs.

One Point Wireless Suite

Motorola's One Point Wireless Suite is a comprehensive suite of software solutions that simplifies the design, deployment and management of wireless networks. From a single computer, you can plan, deploy, monitor and manage your Motorola wireless network from its inception through ongoing operations. The suite includes four powerful elements: PTP LINKPlanner, LANPlanner, MeshPlanner and Wireless Manager. A future release of Wireless Manager will support PTP 800 solutions.

Additional Information

For more information on Motorola's PTP 800 solutions, refer to the PTP 800 Brochure and Specification Sheet.



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