

LigoPTP UNITY



5 GHz high-end backhaul device



Product Overview

LigoWave unleashes its highest-end, license-free PTP device with the release of the LigoPTP UNITY series product line. Making use of ground breaking 2x2 MiMo technology, the LigoPTP 5-23/5-N UNITY delivers real aggregate throughput capability of up to **220 Mbps (110 Mbps full-duplex)** combined with high **packets-per-second performance (140000)** and at the same time a **link bonding option integrated on the device to double the capacity for up to 400 Mbps (200 Mbps Full-duplex)**. Link bonding is done using a powerful CPU and uses fair queuing mechanism. The throughput is not only doubled, but it also ensures radio link redundancy at the same time and works efficiently when traffic source is coming from a single MAC address.

Additionally, the new product is compatible with previous LigoPTP 5-23 MiMo, LigoPTP 5-N MiMo, LigoPTP 5-23 PRO and LigoPTP 5-N PRO models that can be used concurrently to double the throughput over the same link. This product enables carrier-class point-to-point capability, ideal for dedicated access or backhaul applications (including VOIP or other small packet applications). The Ligo PTP UNITY product family couples flexible channel width capability (20 or 40 MHz) and industry-leading proprietary software mechanisms to set the utmost standard in spectral efficiency.

The LigoPTP 5-23/5-N UNITY products feature either an integrated dual-polarized antenna or two N-type connectors. They are housed in rugged, cast aluminum enclosures. Combining digital signal processing, dual polarization antennas and proprietary W-Jet 2 MiMo protocol these bridges have a high spectral efficiency of 7.5bit/Hz.

The LigoPTP 5-23/5-N UNITY showcase an array of ad-

vanced software mechanisms that provide optimal point-to-point connectivity for high-throughput, long distance links. LigoWave's proprietary PTP mechanisms utilize techniques such as Dynamic Time Division Duplexing (TDD) to dynamically allocate bandwidth in the direction needed, thus increasing link efficiency and greatly decreasing the impact that distance has on throughput of the link.

The LigoWave point-to-point products also features selective repeat ARQ technology, an enhanced error-correction software mechanism that optimizes data traffic to provide very high throughput over high-bandwidth, long-range links even in the presence of interference.

Additionally, the new devices support **L2 and L3 QoS** (quality of service which allows prioritizing of mission critical data going on a wireless link.

The new UNITY series products have an **extremely powerful integrated 28 dBm (+/- 2 dBm)** radio which allows building solid long-distance links even with an integrated antenna. The output power on highest modulation (MCS 15) is 23 dBm (+/- 2 dBm) which is hard to find elsewhere in the market today.

Gigabit Ethernet port and **802.3 af** standard support makes the UNITY series product line even more flexible. Superior **SURGE and ESD protection** makes this product ideal for mission critical and harsh-weather condition installations. SURGE and ESD protection meets IEC 61000-4-2 (ESD) and IEC 61000-4-5 (SURGE) standards.

The LigoPTP 5-23/5-N UNITY is also compatible with LigoWave's online link calculator and WNMS, a centralized configuration, firmware, and statistics server offered by LigoWave for remote diagnostic and configuration.

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Key Features

- 5 GHz PTP bridge, ideal for:
 - Dedicated Access
 - Backhaul
 - Private networks
- Flexible center channel and channel width capability (20/40 MHz) for throughput optimization
- Radio rate of up to 300Mbps
- True aggregate throughput up to 220 Mbps
- Advanced proprietary W-jet MiMo 2 wireless protocol
- High packet-per-second (PPS) rate - ideal for VOIP backhaul applications (140000)
- Low packet latency (2ms)
- Great spectral efficiency (7.5 bit/ Hz)
- ARQ (Selective Repeat) for very high throughput
- Dynamic TDD for allocating bandwidth in real-time to the direction needed
- Integrated dual-polarized antenna (2 N-type connectors for the LigoPTP 5-N UNITY product)
- 2nd Ethernet port used to bond two links together
- L2 and L3 QoS support
- PoE built-in for single cable installation (802.3 af compatible)
- 2 x 1000 BaseT Ethernet ports
- 28 dBm (per chain) integrated radio
- Advanced security technologies
- Comprehensive management features
 - Web GUI
 - Command line management via SSH
 - WNMS server support for configuration
 - SNMP V1/2/3 with traps supporting MIBs:802.11, 802.1x, MIBII
 - Syslog support
 - Compatible with LigoWave link calculator
 - Real-time alerts
- Rugged articulating bracket solution for multi-facet mounting
- OLED screen for antenna alignment
- IP-67 compliant



W-Jet is LigoWave's proprietary wireless protocol that combines special techniques to achieve superior performance and reliability even over long distances. The W-Jet protocol is the result of years of development and gives LigoWave PTP products the ability to outperform higher cost products on the market while simultaneously reducing the return on investment.

LigoOS overview

Software running on the LigoPTP devices is extremely easy to use and designed with a point-to-point application in mind. The main functionality of the OS is outlined below:

WIRELESS MODES

- Master
- Slave

WIRELESS NETWORK CONFIGURATION

- W-Jet 2/3 transparent point-to-point
- SiSo/ MiMo radio modes
- Selectable channel width: 20/ 40 MHz
- Channel selection: automatic/ manual
- Data rate control: automatic/ manual
- Transmit power control: automatic/ manual
- SSID broadcast disabling
- Wireless security: AES 128-bit encryption
- Adjustable aggregation frames
- Dynamic Frequency selection

DEVICE CONFIGURATION AND SERVICES

- Administrator access
- Location: latitude and longitude
- OLED control
- HTTP/ HTTPS/ SSH/ SFTP access
- System alerts
- NTP client
- SNMP v1/ v2/ v3 support
- Local system log
- Statistical performance reporting on graphs NET

NETWORK MODES

- Switch
- Link Aggregation
- Link Failover
- 2nd Link Configuration

NETWORK CONFIGURATION

- Port speed control
- Separate VLAN for management
- Dot1q VLAN, Q-in-Q, ISL, MPLS, VPLS pass-through
- Static and dynamic management IP
- Wire speed QoS: L2 CoS and L3 DSCP
- Supported frame size: 3688 bytes

MANAGEMENT AND MAINTENANCE

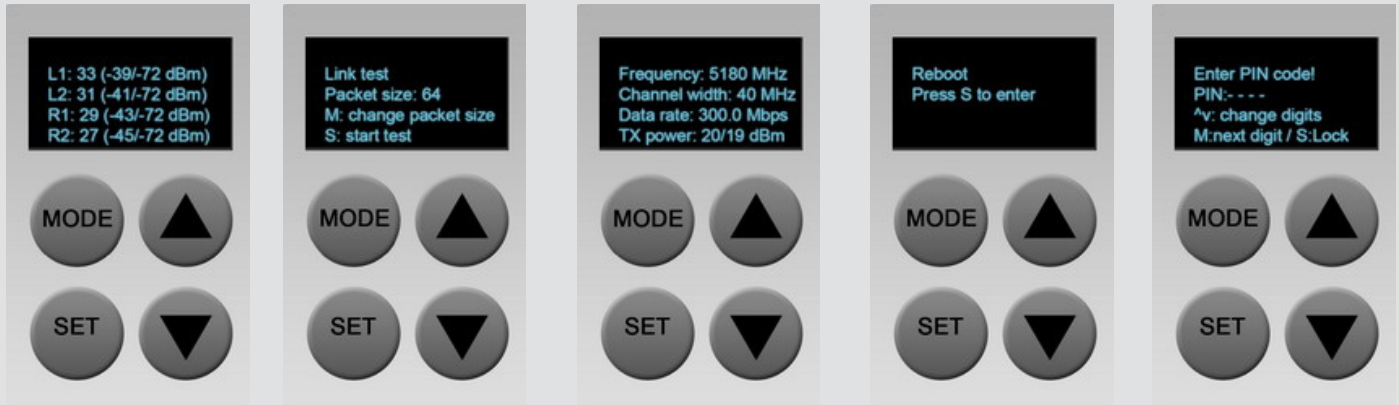
- WEB GUI
- Command line interface
- WNMS agent
- Reset to defaults
- Special troubleshooting file
- Configuration management: backup/ restore
- Dual boot firmware image
- Firmware recovery via TFTP

TOOLS

- Spectrum analyzer
- Site survey
- Link test
- Antenna alignment
- Delayed reboot

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OLED screen overview



During the antenna alignment procedure current RSSI level of the local and remote unit can be seen

After the link deployment it can be initially tested with a different packet sizes for additional performance optimization

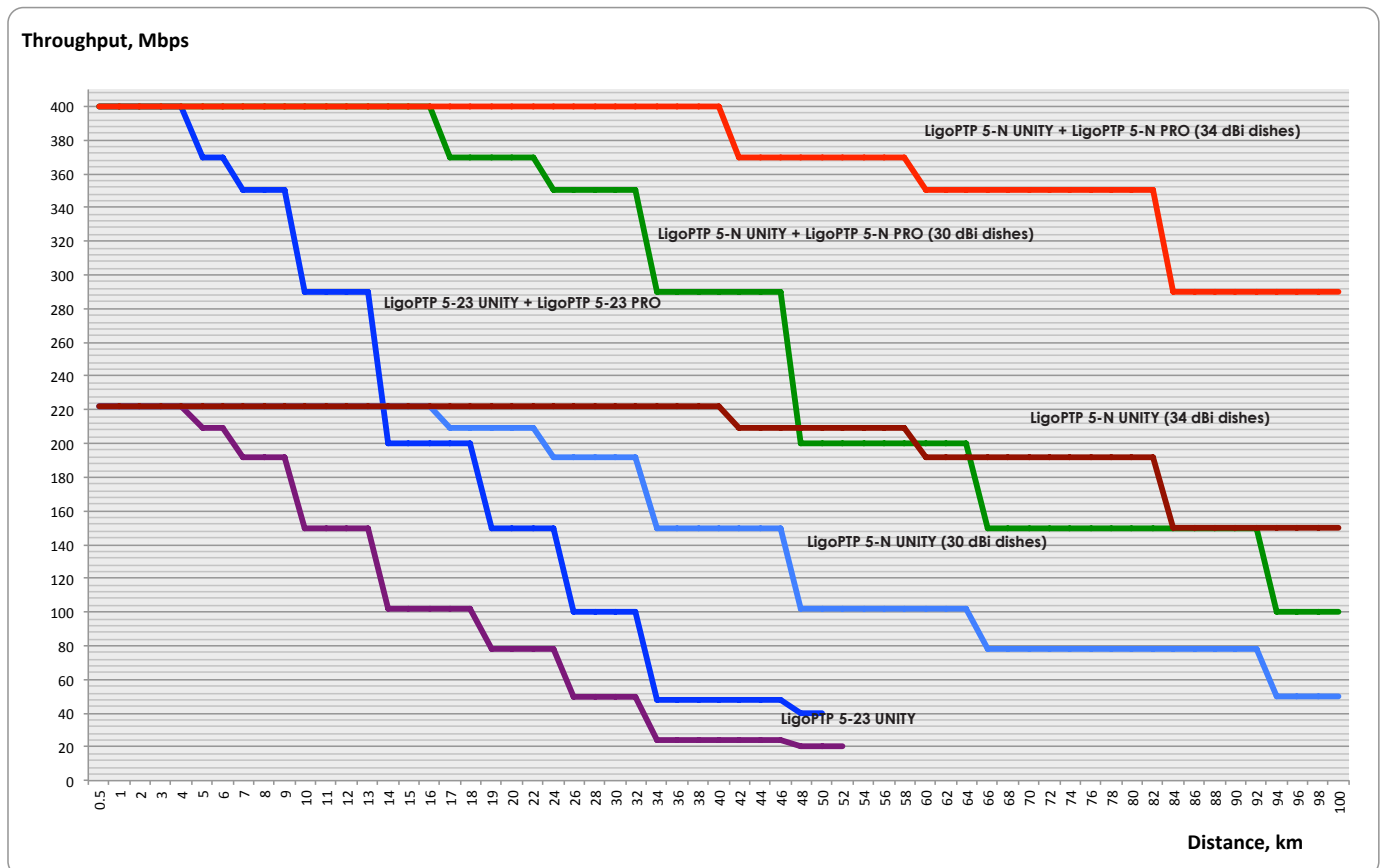
Various statistical information reviewing:

- Wireless settings
- TX/RX information
- Ethernet statistics
- Device information
- IP settings

External OLED screen allows easy rebooting and resetting the unit to defaults

PIN code functionality is available for additional security of the LigoPTP units

LigoPTP UNITY distance and throughput graphs

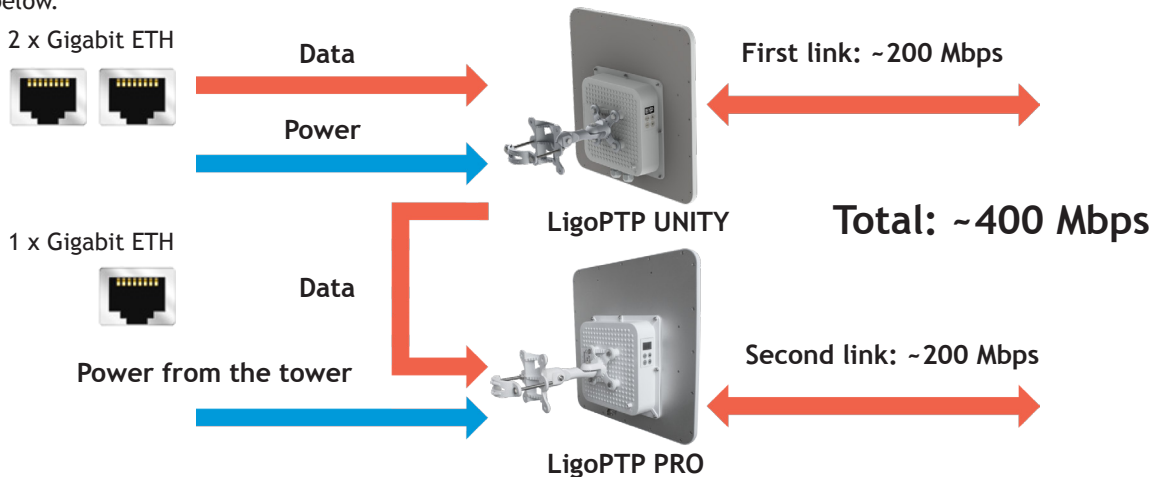


The graph above represents LigoPTP 5-23 UNITY, LigoPTP 5-N UNITY, LigoPTP 5-23 PRO and LigoPTP 5-N PRO capacity at different distances. The calculations were done with a 15 dB fade margin and no interference on

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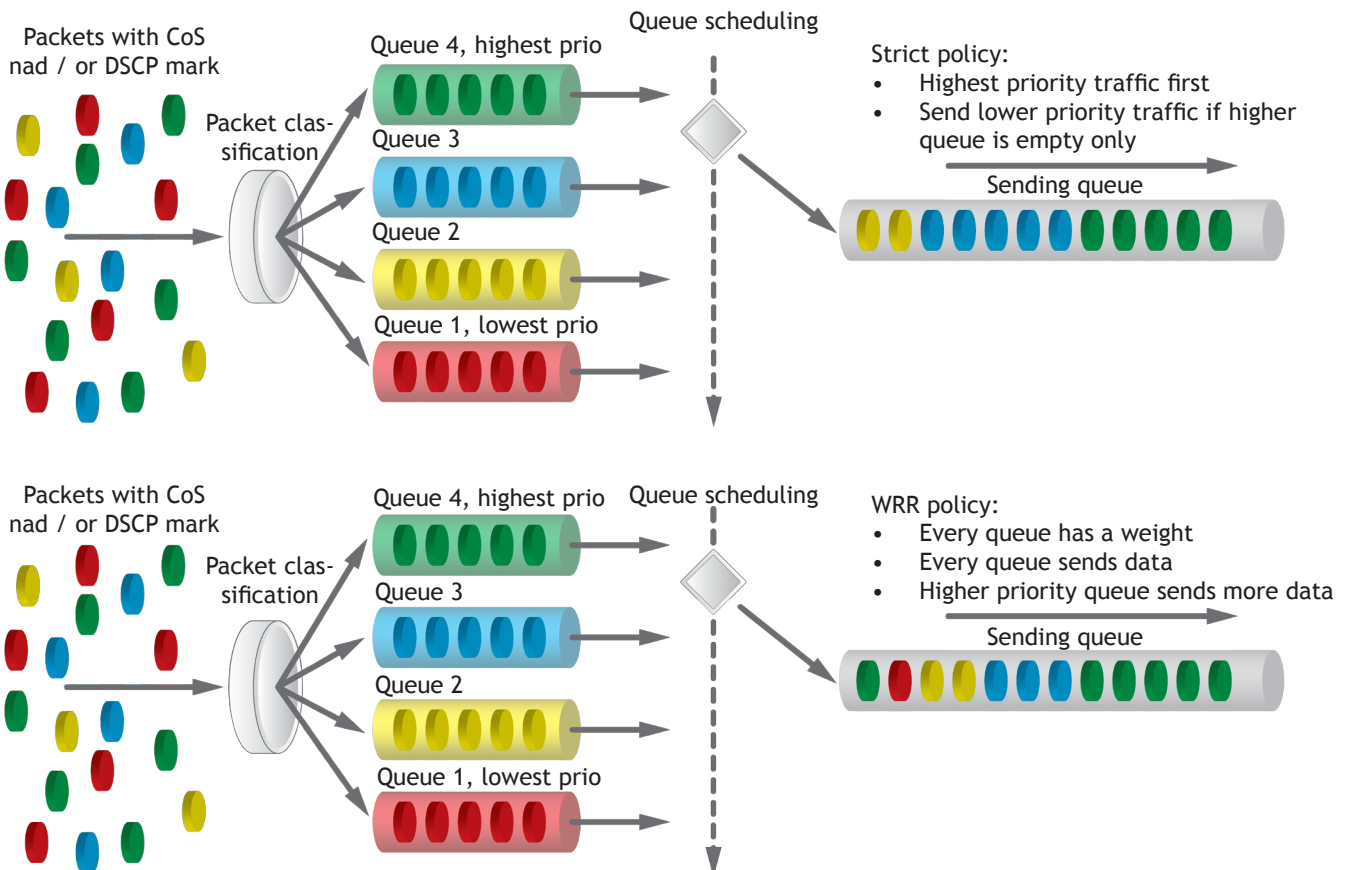
LigoPTP UNITY bonding

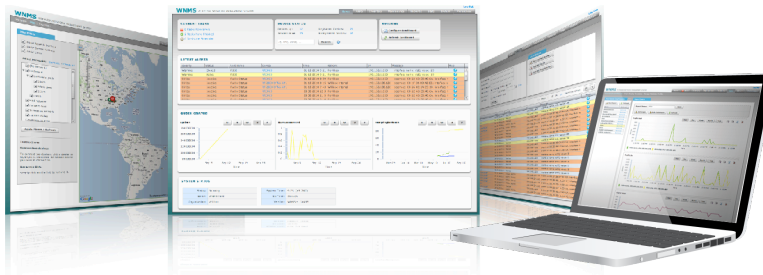
Link bonding is a new functionality available in LigoPTP UNITY devices. An extremely powerful CPU allows bonding LigoPTP UNITY together with LigoPTP MiMO or LigoPTP PRO series devices. The 2nd Ethernet port is where the additional device is connected. Fair queuing mechanism is used for bonding of two links operating simultaneously. Besides doubling the throughput over the same link (from 200 Mbps to 400 Mbps) it also provides redundancy for the wireless radios; if one of the radios fails the other link will continue to operate. As the bonding is done in the CPU it works efficiently even when the traffic is coming from one MAC address (for example router). The scheme of the bonded LigoPTP UNITY and LigoPTP PRO link can be seen below.



LigoPTP UNITY QoS

LigoPTP UNITY devices support L2 (802.1p) and L3 (DSCP) QoS. In layer 2 QoS data is prioritized according to VLANs while in layer 3 according to IP addresses. Both types of QoS can run together or independently and traffic can be mapped into 4 different queues for each type applying strict or WRR policies. Having QoS on your link allows you to prioritize mission critical data and real time data that requires more capacity and higher PPS rate. Max capacity for each of the queues is calculated according to the wireless link, dynamically.





WIRELESS NETWORK MANAGEMENT SYSTEM

WNMS is a FREE enterprise grade Wireless Network Management system available for download at LigoWave's web-site. A single software solution simplifies a large number of management and monitoring tasks for network the administrator. Comprehensive network management software supports several thousand devices. Main WNMS tasks:

- Supporting LigoWave, Deliberant and 3rd party equipment*
- Multiple OS support (Windows, Virtual Machine, Linux)
- Network visualization on Google Maps
- Configuration and maintenance
- Monitoring and alerting
- Smart discovery and provisioning
- Statistical data collection and reporting

* For the control and monitoring of 3rd party equipment the SWEAP application is necessary



WNMS Cloud is a new mobile way to manage your network. The setup is as easy as 1-2-3 and you get your virtual WNMS server running online. With the current WNMS version LigoWave, Deliberant and 3rd party devices can be monitored and controlled remotely. (3rd party device monitoring and alerting requires additional hardware, working as a data collector).

Highlights:

- Easy and quick WNMS server setup
- World-wide availability
- High reliability (based on Amazon cloud)
- Strong security (HTTPS and OpenVPN)
- No hardware and maintenance costs - reduces CAPEX and OPEX
- Third party equipment monitoring through WNMS remote agent (SWEAP application)*

*Need additional hardware to run SWEAP application

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Available at: <http://www.ligowave.com/linkcalc>

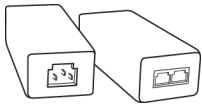
LinkCalc™

Link calculator is a link planning tool available online. The link calculator allows users to calculate link performance expectations taking into account geographical information, distance between the units, antenna height and gain, transmit power, and other factors in order to choose the most suitable product available from the LigoWave and Deliberant extensive product portfolios. In addition, custom calculations using other vendors' equipment specs can be used, making link calculator the ultimate link planning tool.

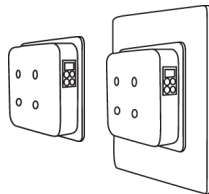


- 
 Maps integration
- 
 Downloadable PDF reports
- 
 PTP and PTMP mode support
- 
 Online storage for saved calculations

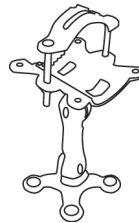
Package contents:



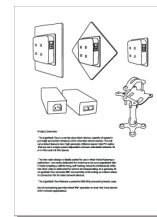
48 V 802.3 af PoE with grounding and lightning protection



LigoPTP 5-23/5-N UNITY outdoor unit



Professional mounting kit



Quick install guide

Antenna patterns (only for LigoPTP 5-23 UNITY product):

RF patterns (vertical)

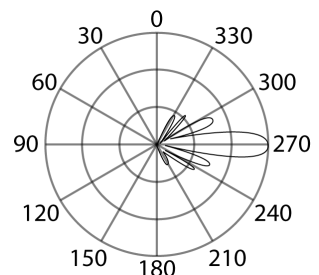
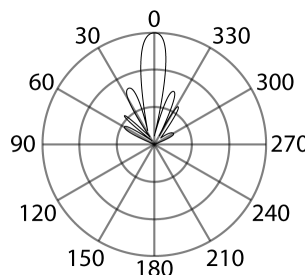
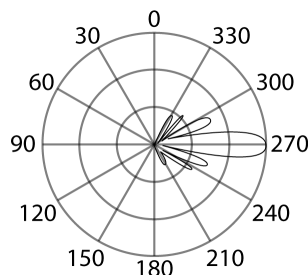
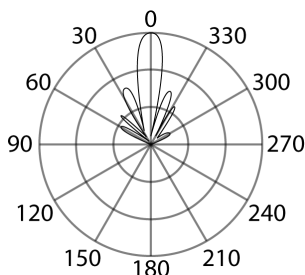
RF pattern (horizontal)

Vertical cut

Horizontal cut

Vertical cut

Horizontal cut



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Sales offices:

EMEA:

Veiveriu 150-IIIa. Kaunas,
LT-46931, Lithuania

Sauletekio al. 15-610, Vilnius, LT-
20000, Lithuania

Americas:

138 Mountain Brook Dr.
Canton, GA 30115, USA

984 Shetland Ave. Winter Springs, FL
32708 USA

Asia Pacific:

China-Beijing

Room 602, Everlast Plaza, No. 39,
Anding Road, Chaoyang District, Bei-
jing, China 100029

China-Shanghai

4H, No. 92, Guiping Road, Zuhui Dis-
trict, Shanghai, China 200233

China-Huizhou

No. 6, Huifeng East 2 Road, Zhongkai
Hi-Tech Industrial Development Zone
Huizhou, Guangdong, China

China-Shenzhen

No. 9, Dragon Jade Industrial District,
Bantian Village Buji Town Longgang
District, Shenzhen, China

Hong-Kong

Unit A, 25/F., MG Tower
133 Hoi Bun Road, Kwun Tong
Kowloon, Hong Kong

Singapore

60 Kaki Bukit Place, #08-04/05 Eunos
Tech Park, Singapore 415979

Indonesia

Gedung Starpage Jl. Salemba Tengah
No. 5 Lt. 3, Jakarta Pusat, Indonesia

Taiwan

12F., No.33 Sec. 2, Roosevelt Road,
Taipei, Taiwan

Malaysia

No. 17 Jalan P2/12, Bandar Teknologi
Kajang, 43500 Semenyih, Selangor,
Malaysia

Philippines

3rd Floor. ETPI Bldg. #2161 Soler St,
Conner Calero St. Sta Cruz, Manila
City, Philippines

Thailand

169 Soi Sirindhorn 7, Charansanitwong
Road, Bangbamru, Bangplad, Bangkok
10700, Thailand

India

New No. 6, Old No. 16, Rajagopalan
Street, Valmiki Nagar, Thiruvaniyur,
Chennai 600041, India

Radio specifications

Wireless technology	Proprietary W-Jet protocol, 2x2 MIMO
Operating mode	Point-to-point
Radio frequency band	5.150 - 5.915 GHz (country dependent - FCC 5.745 to 5.825 GHz)
Channel size	Configurable 20, 40 MHz
Max transmit power	28 (+/- 2) dBm*
Modulation schemes	BPSK, QPSK, 16QAM, 64QAM
Receive sensitivity	Varying between -94 and -72 dBm depending on modulation and channel size
Error correction	FEC, Selective ARQ
Duplexing scheme	Dynamic time division duplex

Antenna

Type	Integrated directional panel (LigoPTP 5-23 UNITY) or 2 N-Type connectors (LigoPTP 5-N UNITY)
Polarization	Dual (LigoPTP 5-23 UNITY)
Gain V/H	23/23 dBi (LigoPTP 5-23 UNITY)
3dB Beam-width V/H	8/8 degrees (LigoPTP 5-23 UNITY)

Data Interface

Physical interface	2 x 10/100/1000 BaseT
Protocol	Ethernet IEEE 802.3
Connector type	RJ45
Surge protection	Built-in (IEC 61000-4-2 (ESD) and IEC 61000-4-5 (SURGE))

Link performance

Single link throughput	220 Mbps aggregate (110 Mbps full-duplex)
Bonded link throughput	400 Mbps aggregate (200 Mbps full-duplex)
Max packets per second	140,000
Packet latency	2 ms (64 bytes packet)
Recommended link distance**	More than 100 km (62,17 mi)

Security

Data encryption	Hardware based AES
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Physical

Dimensions (PTP 5-N UNITY)	Width 218 mm (8.5 "), height 218 mm (8.5 "), depth 70 mm (2.7 ")
Dimensions (PTP 5-23 UNITY)	Width 335 mm (13 "), height 335 mm (13 "), depth 90 mm (3.5 ")
Weight (PTP 5-N UNITY)	2.1 kg (4.6 lb) (mount included)
Weight (PTP 5-23 UNITY)	3.4 kg (7.5 lb) (mount included)
Power supply	48 VDC, active PoE (802.3af)
Power source	100 - 240 VAC via included adapter
Power consumption	12 W

Environmental

Operating temperature	-40°C (-40 F) ~ +65°C (+150 F)
Humidity	0 ~ 90 % (non-condensing)

Management

Installation assistant	OLED screen
System configuration interfaces	User-friendly web GUI, SSH CLI, SNMP v1/2c/3 with traps, centralized Remote
Management system	WNMS, WNMS Cloud

Regulatory

Certification	FCC/IC/CE
Ingress protection	IP-67
RoHS	Compliant

* Country dependent

** Link distance recommendation with an external antenna