LigoWave

Product Overview

Content

Solutions

LigoWave has multiple product lines covering a variety of applications in different vertical segments. Many years of experience, unique proprietary technologies and professional product design make our wireless equipment ideal for anyone seeking quality, high performance and quick return on investment.

Enterprise

Powerful OS

The operating system embedded in LigoWave devices is straightforward and intuitive. Each device group has specifically chosen functionality that is necessary for a particular application. The fast and responsive HTML 5 user interface allows accessing wireless equipment not only with a laptop or regular PC, but also with smart phones and tablets.

Reliable security mechanisms

Hardware based AES 128 encryption, which is compatible with a FIPS-197 standard, allows protecting sensitive data and is suitable even for banking or governmental networks. Hidden SSID, HTTPS for secure user interface access, SSH for secure command line management and SNMP v3 for secure data collection and monitoring make LigoWave devices ideal for enterprise networks.

High capacity links

High throughput over long distances can be achieved with high output power coupled with high gain antennas, enabling the transmission of hundreds of megabits over 50+ KM (30+ mile) links. There are multiple models equipped with professional N-connectors that can be used with a variety of external, high gain antennas to achieve remarkable results.

Operators

Variety of devices

LigoWave's product line offers a wide variety of products designed to operate in point-to-point and point-to-multipoint scenarios for various distances, with differing capacities and at price levels that allow appropriate investment for each location. A choice of unique devices for different scenarios and applications provides end-users with the utmost flexibility.

Proprietary protocols

W-Jet and iPoll maximize the performance of LigoWave's PTP and PTMP devices even in RF intense environments, to ensure higher bandwidth, higher packet per second rate, and low, stable latency with no distance limitation. Automatic channel selection and automatic transmit power control mechanisms allow avoiding noisy channels and optimizing the RF output power to maximize performance and minimize undesirable noise emissions. The reliability and solid performance of these proprietary protocols ensure service provider success.

Advanced QoS

QoS allows prioritizing real time voice and video data and allows delivering triple play services to end users more effectively. Impressive performance results are achieved when QoS is combined with the high packet per second rate on LigoWave devices.
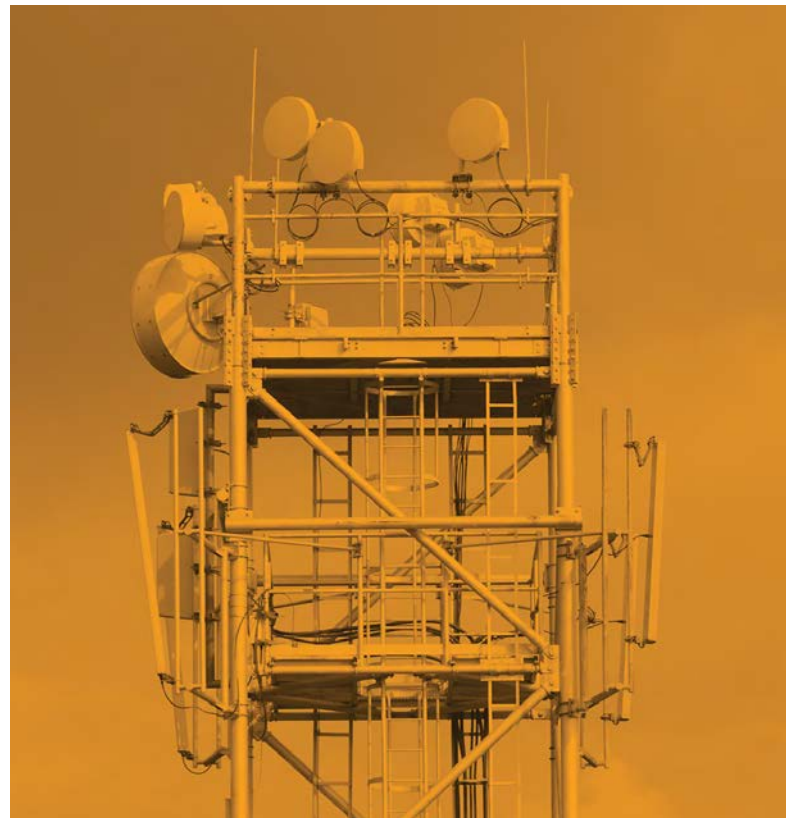
Industrial

Professional hardware design

LigoWave's hardware is designed according to specific standards that are critical for industrial applications (ATEX and others). IP-6x standard rated enclosures and professional mounting brackets make LigoWave devices the right choice for industrial applications. The integrated surge protection systems are designed to be two times higher than the top class IEC standard requirements in order to survive extreme voltage surges and lightning.

Reliable security mechanisms

Security is an important topic for enterprise networks. Hardware based AES 128 encryption, which is compatible with a FIPS-197 standard, allows protecting sensitive data and is suitable even for banking or governmental networks. Hidden SSID, HTTPS for secure user interface access, SSH for secure command line management and SNMP v3 for secure data collection and monitoring make LigoWave devices ideal for the industrial networks.

Quality of service (QoS)

QoS prioritizes mission critical data and LigoWave's hardware based QoS does not generate additional CPU load, thereby leaving the resources for other processes such as high speed packet handling.

Security

Professional software functionality

W-Jet and iPoll allow maximizing performance of LigoWave's PTP and PTMP devices even in RF intense environments, ensuring higher bandwidth, higher packet per second rate, and low and stable latency with no distance limitation. Automatic channel selection and automatic transmit power control mechanisms allow avoiding noisy channels and optimize the RF output power to maximize performance and minimize undesirable noise emissions.

Quality of service (QoS)

QoS prioritizes mission critical data. Security providers can set the highest priority to video data over other types of traffic to ensure the lowest possible latency and steady display of video signals.

Professional hardware design

IP-6x standard rated enclosures and professional mounting brackets allow LigoWave devices to be installed wherever security devices need wireless connectivity. The carrier grade surge protection systems are designed to be two times higher than the top class IEC standard requirements in order to survive extreme voltage surges and lightning.

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LigoDLB

This product line is dedicated for the last mile point-to-multipoint and light point-to-point applications in the unlicensed (2.4 and 5 GHz) band. A variety of models including base-stations and client devices make the products ideal for Internet service providers and operators running their networks in the open bands. Powerful software platform with proprietary communication protocol ensures smooth performance even in congested environments. Professional all integrated hardware design allows quick return on investment and minimizes operational cost.

High capacity (170 Mbps)

Scalability

Quick ROI

Large selection of devices

Product summary (2 GHz outdoor)

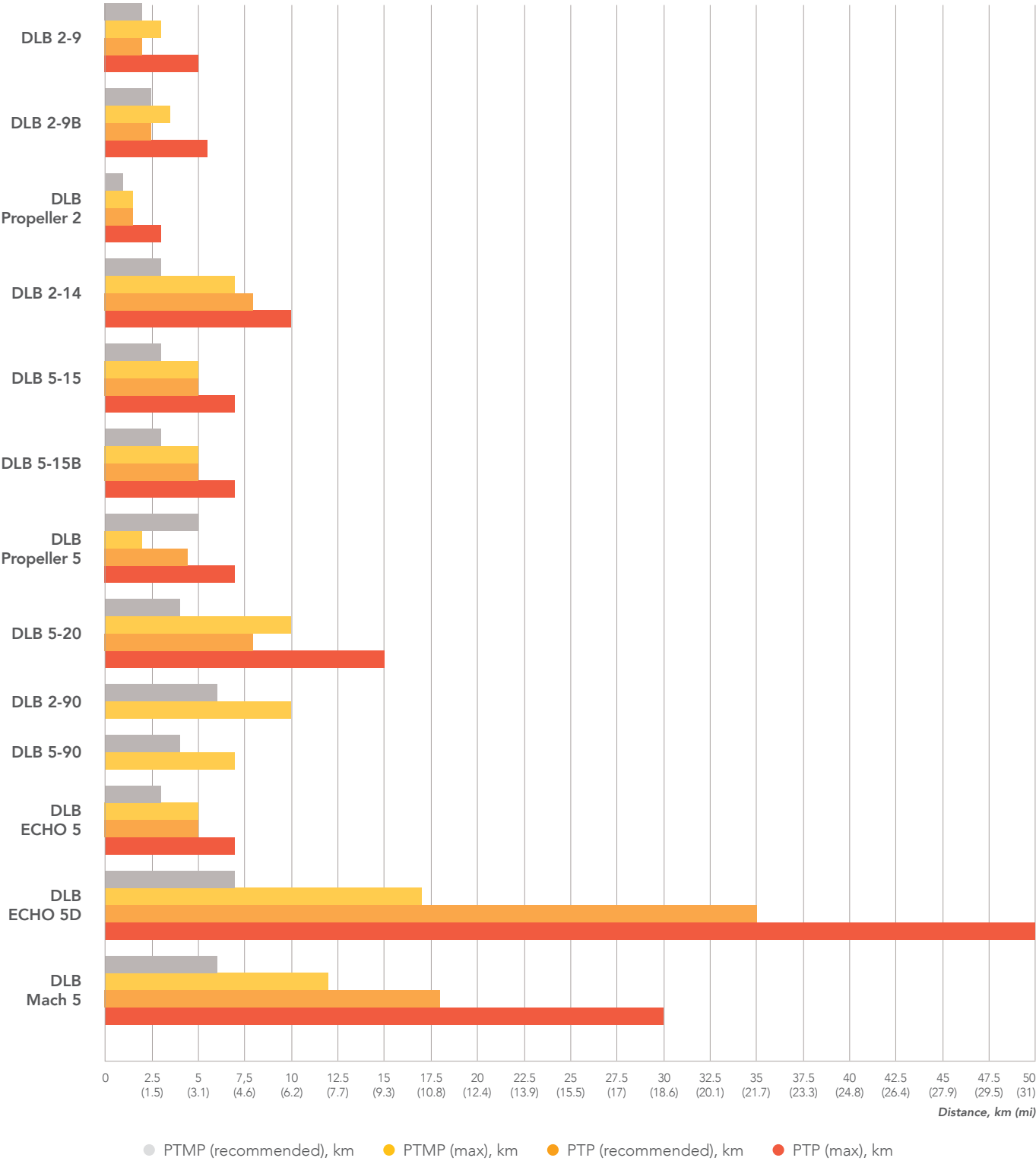| Product	DLB 2-90	DLB 2	DLB 2-14	DLB 2-9B	DLB Propeller 2	DLB 2-9
Role description	Extremely cost effective base station with an integrated high gain 90° sector antenna	High power multipurpose device with 2 external N-connectors	Powerful client device with an integrated high gain antenna for mid-range links	Small size client device for high capacity short distance links	Unique client device with a mechanical antenna characteristics switching mechanism	Smallest, but yet powerful and the most cost effective client device
Radio						
Frequency	2.402 – 2.492 GHz					
Channel size	5, 10, 20, 40 MHz					
Stream	MIMO 2x2					
Wireless protocol	Proprietary iPoll 3 or standard 802.11n					
Operating mode	Point to Multi Point					
Max output power	31 dBm*				28 dBm*	28 dBm*
Receive sensitivity at 20 MHz channel	-95 dBm +/-2 dB @BPSK -91 dBm+/-2 dB @QPSK -83 dBm +/-2 dB @16QAM -78 dBm +/- 2 dB @64QAM					
Network						
Ethernet interface	10/100 Base-T					
Aggregated data throughput	170 Mbps					
Antenna						
Gain	16 dBi (dual POL)	-	14 dBi (dual POL)	9 dBi (dual POL)	11 dBi (dual POL)	9 dBi (dual POL)
Beamwidth horizontal	100 deg.	-	34 deg.	55 deg.	70 or 35 deg.	55 deg.
Beamwidth vertical	30 deg.	-	36 deg.	62 deg.	35 or 70 deg.	62 deg.
Mounting						
Pole diameter	2.5 – 5 cm 1 – 2 in	3.5 – 6 cm 1.3 – 2.3 in	2 – 5 cm 0.8 – 2 in	3.5 – 6 cm 1.3 – 2.3 in	3 – 7 cm 1.2 – 2.7 in	2 – 7 cm 0.8 – 2.7 in
Tilting	+10 /- 30 degrees	-	+/- 40 degrees	-	-	-
Powering						
Method	Passive PoE; 4,5 pin (+) and 7,8 pin (-)					
Input voltage	12 – 24 V					
Power consumption	4.5 W					

* _Country dependent_

Product summary (5 GHz outdoor)

Product	DLB 5-90	DLB 5	DLB 5-20	DLB 5-15B	DLB 5-15	DLB Propeller 5	DLB Mach 5	DLB Echo 5	DLB Echo 5D
Role description	Extremely cost effective base station with an integrated high gain 90° sector antenna	High power multipurpose device with 2 external N-connectors	Powerful client device with an integrated high gain antenna for mid-range links	Small size device for high capacity short distance links	Smallest, but yet powerful and the most cost effective client device	Unique client device with a mechanical antenna	High capacity and high performance device ideal for mid to long range distance links	Professional wireless device suitable for short to medium distances	Long-range and high-gain wireless device suitable to use with any standard offset satellite dish antenna

Radio									
Frequency	5.150 - 5.850 GHz (FCC 5.150 - 5.250 and 5.725 - 5.850 GHz)								
Channel size	5, 10, 20, 40 MHz								
Stream	MIMO 2x2								
Wireless protocol	Proprietary iPoll 3 or standard 802.11n								
Operating mode	Point to Multi Point								
Max output power	29 dBm*								
Receive sensitivity at 20 MHz channel	-97 dBm +/-2 dB @BPSK -93 dBm+/-2 dB @QPSK -85 dBm +/-2 dB @16QAM -75 dBm +/- 2 dB @64QAM								

Network									
Ethernet interface	10/100 Base-T								
Aggregated data throughput	170 Mbps								

Antenna									
Gain	18 dBi (dual POL)	-	20 dBi (dual POL)	15 dBi (dual POL)	15 dBi (dual POL)	15 dBi (dual POL)	23 dBi (dual POL)	15 dBi (dual POL)	27 dBi (dual POL)
Beamwidth horizontal	90 deg.	-	10 deg.	30 deg.	30 deg.	60 or 15 deg.	7 deg.	30 deg.	6 deg.
Beamwidth vertical	20 deg.	-	10 deg.	30 deg.	30 deg.	15 or 60 deg.	9 deg.	30 deg.	6 deg.

Mounting									
Pole diameter	2.5 – 5 cm 1 – 2 in	3.5 – 6 cm 1.3 – 2.3 in	2 – 5 cm 1 – 2 in	3.5 – 6 cm 1.3 – 2.3 in	2 – 7 cm 0.8 – 2.7 in	3 – 7 cm 1.2 – 2.7 in	3 - 7 cm 1.2 – 2.7 in	5 – 7 cm 2 – 2.7 in	3 - 6 cm 1.2 – 2.3 in
Tilting	+10 /- 30 degrees	-	+/- 40 degrees	-	-	-	+45 /- 60 degrees	+/- 40 degrees	+30 / - 22 degrees

Powering									
Method	Passive PoE; 4,5 pin (+) and 7,8 pin (-)								
Input voltage	12 – 24 V								
Power consumption	4.5 W								

*   Country dependent

Product comparison

Product comparison bar chart showing distance in km (mi) for the following products:

Product	PTMP (recommended), km	PTMP (max), km	PTP (recommended), km	PTP (max), km
DLB 2-9				
DLB 2-9B				
DLB Propeller 2				
DLB 2-14				
DLB 5-15				
DLB 5-15B				
DLB Propeller 5				
DLB 5-20				
DLB 2-90				
DLB 5-90				
DLB ECHO 5				
DLB ECHO 5D				
DLB Mach 5				

Distance axis: 0, 2.5 (1.5), 5 (3.1), 7.5 (4.6), 10 (6.2), 12.5 (7.7), 15 (9.3), 17.5 (10.8), 20 (12.4), 22.5 (13.9), 25 (15.5), 27.5 (17), 30 (18.6), 32.5 (20.1), 35 (21.7), 37.5 (23.3), 40 (24.8), 42.5 (26.4), 45 (27.9), 47.5 (29.5), 50 (31)

Distance, km (mi)

● PTMP (recommended), km　● PTMP (max), km　● PTP (recommended), km　● PTP (max), km

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LigoDLB PRO

Base-stations made for resource demanding applications have an optimized hardware platform to allow better scalability by supporting higher number of clients. Integrated antenna design reduces risk of cabling failures and additional signal loss. Professional metal enclosure not only improves noise immunity, but also ensures smooth performance even in harshest weather conditions.

Powerful base-station oriented hardware

Zero loss design

Improved noise immunity

Professional mounting

Product summary

Product	LigoDLB PRO 2-90-16	LigoDLB PRO 2-90-19	LigoDLB PRO 5-90-17	LigoDLB PRO 5-90-20
Description	A powerful base-station with an integrated 90° sector antenna, weather proof enclosure, metal back-plate for improving noise immunity and a robust mounting bracket built for professionals			
Radio				
Frequency	2.402 - 2.492 GHz		5.150 - 5.850 GHz (FCC 5.150 - 5.250 and 5.725 - 5.850 GHz)	
Channel size	5, 10, 20, 40 MHz			
Stream	MIMO 2x2			
Wireless protocol	Proprietary iPoll 3 or standard 802.11n			
Operating mode	Point to Multi Point			
Max output power	30 dBm*			
Receive sensitivity at 20 MHz channel	-89 dBm +/-2dB@BPSK -87 dBm +/-2dB@QPSK -76 dBm +/-2dB@16QAM -77 dBm +/-2dB@64QAM		-97 dBm +/-2dB@BPSK -91 dBm +/-2dB@QPSK -79 dBm +/-2dB@16QAM -76 dBm +/-2dB@64QAM	
Network				
Ethernet interface	10/100/1000 Base-T			
Aggregated data throughput	180 Mbps			
Antenna				
Gain	16	19	17	20
Beamwidth horizontal	90 deg.	90 deg.	90 deg.	90 deg.
Beamwidth vertical	25 deg.	15 deg.	12 deg.	8 deg.
Mounting				
Pole diameter	2.5 - 7.5 cm (0.98 - 2.9 inch)			
Tilting	+15 degrees			
Powering				
Method	802.3af			
Input voltage	37 - 56 V			
Power consumption	10 W			

*   Country dependent

LigoDLB ac

Ultra high performance point-to-multipoint system delivering up to 500 Mbps capacity is an ideal upgrade for service providers seeking to deliver more reliable connectivity and higher subscriber capacity. Backwards compatibility with LigoDLB products simplifies the migration. Powerful and highly functional operating system with a user-friendly interface makes it easy to deploy and manage the network even for the new customers.

Ultra high performance (500+ Mbps)

Professional hardware design

Higher network scalability

Simple deployment and operation

Product summary

Product	LigoDLB PRO 5-90-17 ac	LigoDLB PRO 5-90-20 ac	LigoDLB 5-15 ac	LigoDLB 5-20 ac
Description	A powerful base-station with an integrated 90° sector antenna, weather proof enclosure, metal back-plate for improving noise immunity and a robust mounting bracket built for professionals		High capacity wireless bridge with a 15 dBi directional panel antenna	High capacity wireless bridge with a 20 dBi directional panel antenna
Radio				
Frequency	5.150 - 5.850 GHz (FCC 5.150 - 5.250 and 5.725 - 5.850 GHz)			
Channel size	5, 10, 20, 40, 80 MHz			
Stream	MIMO 2x2			
Wireless protocol	Proprietary iPoll 3 or standard 802.11n			
Operating mode	Point to Multi Point			
Max output power	30 dBm*			
Receive sensitivity at 40 MHz channel	-95 dBm +/-2dB@BPSK -92 dBm +/-2dB@QPSK -84 dBm +/-2dB@16QAM -78 dBm +/-2dB@64QAM -70 dBm +/-2dB@256QAM			
Network				
Ethernet interface	10/100/1000 Base-T			
Aggregated data throughput	500 Mbps			
Antenna				
Gain	17	20	15 dBi	20 dBi
Beamwidth horizontal	90 deg.	90 deg.	30 deg.	10 deg.
Beamwidth vertical	12 deg.	8 deg.	30 deg.	10 deg.
Mounting				
Pole diameter	2.5 - 7.5 cm (0.98 - 2.9 inch)		2 - 7 cm (0.8 - 2.7 inch)	3 - 6 cm (1.1 - 2.4 inch)
Tilting	+15 degrees		none	+20 / -20 degrees
Powering				
Method	802.3af/ at		Passive PoE; 4,5 pin (+) and 7,8 pin (-)	
Input voltage	37 - 56 V		24 V	
Power consumption	10 W			

*   Country dependent

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LigoDLB ac performance data

Channel size	Base station	CPE	Distance														
			0.5 km			1 km			2 km			5 km			8 km		
			CPE x10	CPE x20	CPE x30	CPE x10	CPE x20	CPE x30	CPE x10	CPE x20	CPE x30	CPE x10	CPE x20	CPE x30	CPE x10	CPE x20	CPE x30
40 MHz	LigoDLB 5-90-17ac PRO	LigoDLB 5-15ac	280	260	240	240	220	200	220	200	180	150	130	120	N/A	N/A	N/A
		LigoDLB 5-20ac	280	260	240	280	260	240	260	240	220	250	240	220	180	160	140
	LigoDLB 5-90-20ac PRO	LigoDLB 5-15ac	280	260	240	260	240	220	240	220	200	160	140	130	N/A	N/A	N/A
		LigoDLB 5-20ac	280	260	240	280	260	240	260	240	220	250	240	220	190	170	150
80 MHz	LigoDLB 5-90-17ac PRO	LigoDLB 5-15ac	400	380	360	360	340	320	340	320	300	180	160	140	N/A	N/A	N/A
		LigoDLB 5-20ac	400	380	360	390	370	350	380	360	340	340	320	300	280	260	240
	LigoDLB 5-90-20ac PRO	LigoDLB 5-15ac	400	380	360	370	350	330	360	330	310	180	160	140	N/A	N/A	N/A
		LigoDLB 5-20ac	400	380	360	400	380	360	390	370	350	340	320	300	280	260	240

Listed as true TCP values

This distance and throughput are an estimated based on a relatively low interference environment

The throughput is calculated theoretically, and may vary from the actual testing results due to packet size and the testing tool utilized

The throughput is the aggregate throughput of the concurrent CPEs connected

All throughputs listed are calculated throughputs, not the theoretical link speed.

The location of CPE is at the distance stated

NA = Not Applicable

LigoDLB ac protocol: iPoll 3

LigoPTP

The flagship product line, which has made LigoWave devices famous for quality and performance. High performance 5 GHz wireless bridges are deployed for the backhaul and last-mile applications even by Tier 1 operators worldwide requiring carrier grade performance and robustness for their links. W-Jet, being the best in class data transmission protocol, is developed specifically for point-to-point scenario and more efficient spectrum usage.

700+ Mbps capacity

Carrier-grade hardware design

PTP scenario oriented protocol

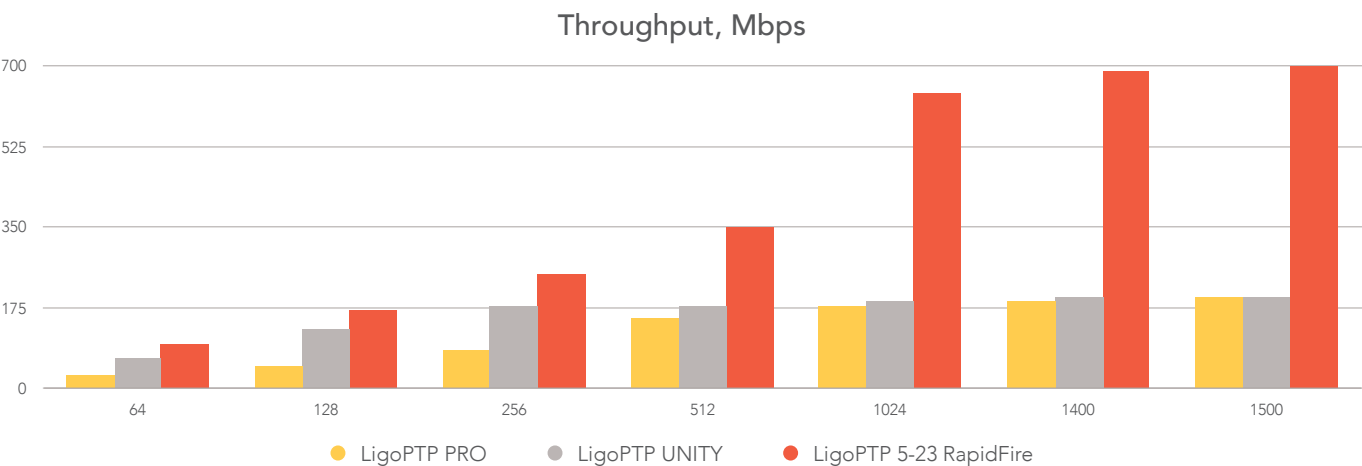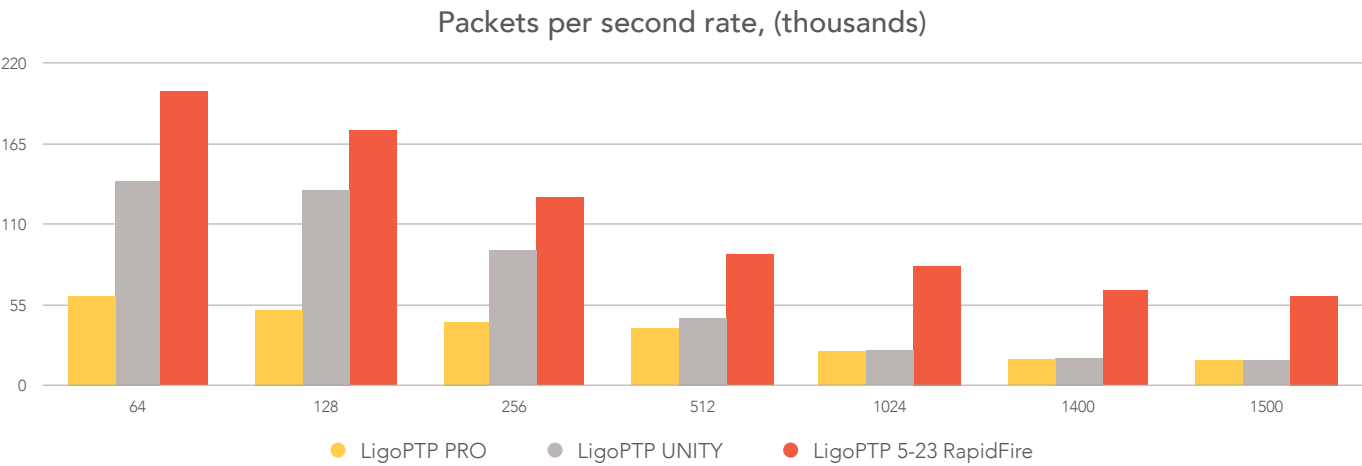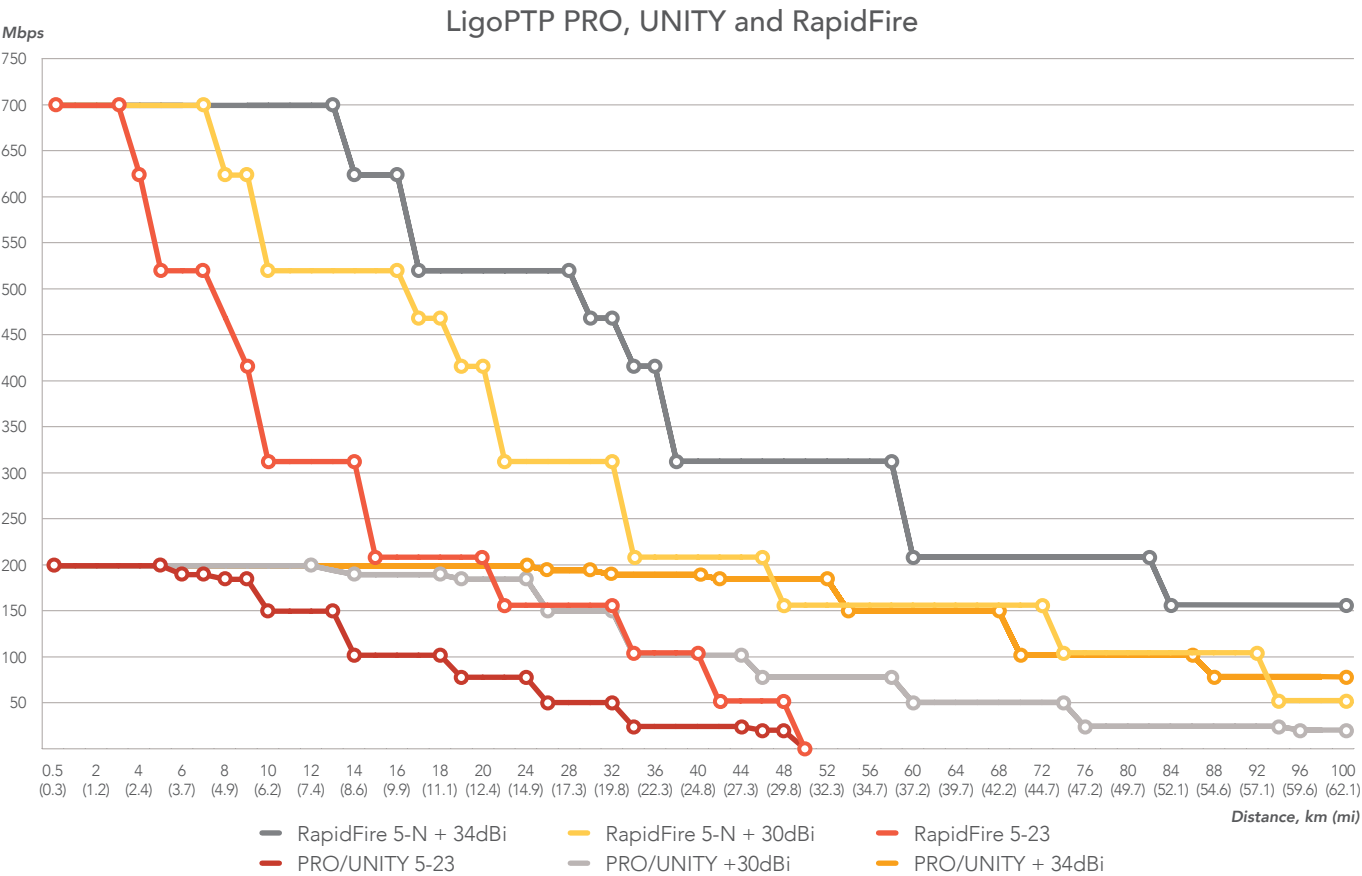**Very easy setup and management**

Low maintenance

Product summary

Product	LigoPTP PRO	LigoPTP UNITY	LigoPTP 5-23 RapidFire	LigoPTP 620HP
Role description	Professional unlicensed band wireless PTP link for long range backhaul applications	Professional unlicensed band wireless PTP link for long range and high performance backhaul applications	Ultra high capacity (700 Mbps) new generation PTP equipment for the unlicensed band	Professional licensed band microwave PTP link for long range and high capacity backhaul applications
Radio				
Frequency	4.780 – 6.300 GHz*		4.9 - 6.1*	6, 7, 8, 10, 11, 13, 15, 18, 23, 26, 28, 32, 38 GHz
Channel size	20, 40 MHz		5, 10, 20, 40, 80	7, 14, 27.5, 28, 40, 56 MHz (ETSI/CEPT); 10, 20, 25, 30, 40, 50, 60 MHz (ANSI/FCC)
Duplexing	TDD		TDD	FDD
Stream	MIMO 2x2		MIMO 2x2	SISO 1x1
Wireless protocol	Proprietary W-Jet 2	Proprietary W-Jet 3	Proprietary W-Jet 5	Microwave radio relay
Protection	None	1+1, 2+0	1+1***	1+1, 2+0
Max output power	30 dBm**		31 dBm**	30 dBm
Modulation schemes	BPSK, QPSK, 16QAM, 64QAM		BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM	QPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM
Network				
Ethernet interface	10/100/1000 Base-T	2x 10/100/1000 Base-T	2x 10/100/1000 Base-T	3x 10/100/1000 Base-T; 2x gigabit SFP
Aggregated data throughput	220 Mbps		700 Mbps	730 Mbps
Antenna				
Type	Integrated dual pol directional panel; N-type connectors for external antenna			1, 2, 3, 4, 6 ft dishes
Gain	23 dBi			27 – 49 dBi
Mounting				
Pole diameter	3 - 7 cm 1.2 – 2.7 in		1 - 12.4 cm 0.39 - 4.88 in	5 - 11 cm 2 – 4.3 in
Tilting	+45 / -60 degrees		+25 / -45 degrees	+/- 30 degrees
Powering				
Method	PoE 802.3af		802.3af/at	DC terminal block
Input voltage	+/- 48 VDC	+48 VDC	+/- 42 - 57 VDC	-20 to -60 VDC
Power consumption	8 W	12 W	8.6 W	45 W (IDU + ODU)
Operating temperature	-40°C (-40 F) ~ +85°C (+185 F)	-40°C (-40 F) ~ +65°C (+150 F)	-40°C (-40 F) ~ +65°C (+149 F)	-

*   *Power is lower at frequency edges*

** *Country dependent*

*** *Available in future software release*

Product comparison

LigoPTP PRO, UNITY and RapidFire

Legend:
- RapidFire 5-N + 34dBi
- RapidFire 5-N + 30dBi
- RapidFire 5-23
- PRO/UNITY 5-23
- PRO/UNITY +30dBi
- PRO/UNITY + 34dBi

Distance, km (mi)

Packets per second rate, (thousands)

Legend:
- LigoPTP PRO
- LigoPTP UNITY
- LigoPTP 5-23 RapidFire

Throughput, Mbps

Legend:
- LigoPTP PRO
- LigoPTP UNITY
- LigoPTP 5-23 RapidFire

Infinity

A dedicated Wi-Fi access product line with a good selection of devices for indoor and outdoor deployments. A flexible controller makes to setup, management and monitoring your network simple and straightforward. Based on the deployment size and requirements Infinity products an support controller-less and controller based setup with a cloud version available to use for free when installing less than 50 devices.

Professional product range

Ideal for indoor and outdoor installations

Controller-less scenario for smaller networks

Cloud based controller with extended functionality

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Product summary

Product	NFT 1Ni	NFT 1N	NFT 1N AF	NFT 2ac	NFT 3ac	NFT 2ac outdoor
Role description	High power 2.4 GHz indoor AP with two Ethernet ports and PoE pass-through	2.4 GHz indoor AP with three Ethernet ports	2.4 GHz indoor AP with 3 Ethernet ports and 802.3af power	Dual-band, dual-radio (2x2) indoor AP with three Ethernet ports	High performance dual-band, dual-radio (3x3) indoor AP with two Ethernet ports	High performance dual-band, dual-radio (2x2) outdoor AP with one Ethernet port
Radio						
Frequency	2.402 – 2.484 GHz			2.402 – 2.484 GHz; 5.170 – 5.875 GHz		
Channel size	20, 40 MHz			20, 40, 80 MHz		
Stream	MIMO 2x2			DUAL MIMO 2x2	DUAL MIMO 3x3	DUAL MIMO 2x2
Wireless protocol	802.11b/g/n			802.11 a/b/g/n/ac		
Max output power	31 dBm*	28 dBm*		27 dBm*	29 dBm*	
Receive sensitivity at 20 MHz channel	-93 dBm +/-2 dB @BPSK -87 dBm+/-2 dB @QPSK -82 dBm +/-2 dB @16QAM -76 dBm +/- 2 dB @64QAM	-90 dBm +/-2dB@BPSK -87 dBm +/-2dB@QPSK -82 dBm +/-2dB@16QAM -76 dBm +/-2dB@64QAM		-93 dBm +/-2 dB @BPSK -87 dBm+/-2 dB @QPSK -82 dBm +/-2 dB @16QAM -76 dBm +/- 2 dB @64QAM	-93 dBm +/-2 dB @BPSK -87 dBm+/-2 dB @QPSK -82 dBm +/-2 dB @16QAM -76 dBm +/- 2 dB @64QAM	
Antenna gain	3 dBi	3 dBi	3 dBi	3 dBi (2.4 and 5 GHz)	5 dBi (2.4 and 5 GHz)	N - connectors for external antenna
Powering						
Method	Passive PoE; 4,5 pin (+) and 7,8 pin (-)		802.3af	802.3af/ at		
Input voltage	12 – 24 V		48V	37-56V		
Power consumption	4.5 W	6.24 W		14 W	19 W	

*   Country dependent

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Infinity controller

A universal software platform to deploy, monitor and manage Infinity series Wi-Fi access points.
It can run on two different platforms: Linux or VM VirtualBox

Cloud based version is available at *https://controller.ligowave.com* and allows connecting up to 50 devices using a free account. Additionally, the new NFT v7.54 firmware version will support controller-less network architecture. Which means no external hardware is needed to mange and control smaller size networks (up to 50 devices). This will extend LigoWave offering to new verticals like education, hospitality, governmental organisations or small to medium enterprises. Customers will have 3 different ways to setup and manage LigoWave's Wi-Fi access products.

3 ways to manage your network

Standalone

Infinity series access points are configured individually via the web interface. This traditional scenario is suitable for small networks that do not require centralized management and maintenance. Infinity OS is a highly functional and easy to use operating system.

Integrated

Each Infinity series access point supports controller-less architecture (software version NFT 7.54), which is ideal for small to medium size deployments (up to 50 access points). An Integrated setup wizard allows quick and easy setup. Master access point works as a controller and shares the configuration with managed access points at the same time collecting statistical information. This unique architecture allows secure, scalable, cost-effective and simple deployments in any industry.

External

Infinity controller is a software platform to configure and manage Wi-Fi networks based on LigoWave devices. It can run on Linux and Windows servers. Software image is free and available in downloads section. The controller supports unlimited amount of devices (assuming sufficient hardware resources are available) and is ideal for large networks that can be remotely located across the country and even different continents. Cloud based version is available at *https://controller.ligowave.com* and allows connecting up to 50 devices using a free account.

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