LINKRA Networks

Point-to-Point Solutions for High Capacity

Product Datasheet

WIDHOP 900 Series

The WIDHOP 900 Series is a new generation point-to-point MW Radio, designed to face growing needs for capacity as well as easy and efficient integration with new packet-based access technologies.

FULL ETHERNET approach together with complex Adaptive Modulation mechanism and configuration flexibility make WIDHOP 900 Series the ideal solution for a wide range of applications in the access and backhauling areas, ***covering all market segments from cost-sensitive applications to complex network*** with high capacity and reliability requirements, complex protection & auto-protection schemes and various typologies of interfaces.

Thanks to the widest range of modulation schemes implemented up to **1024 QAM** and **Adaptive Code Modulation**, WIDHOP 900 Series guarantees outstanding performances and allows the link unavailability to be reduced to **ZERO DOWNTIME**.

LINKRA patent pending algorithm for **Link Aggregation** with **L1 Load Balancing** is the most efficient way to double on air capacity. The algorithm allows also a new architectural approach for protected systems with increased capacity in normal conditions and minimum required capacity for privileged traffic saved in case of failure.

The WIDHOP 900 Series is composed of outdoor unit with antenna and GbE data interface, connected to the indoor unit through a cat.5e cable and RJ45 connector. The indoor unit is a small standard PoE adaptor in the simplest configuration, while a wide range of IDUs is available to provide more complex configurations and functionalities like **Hybrid traffic,** channel reuse, housekeeping alarms, link protection, ring protection and traffic aggregation.

The WIDHOP 900 Series in **FULL OUTDOOR** configuration provides a **ZERO FOOTPRINT** and **LOW POWER CONSUMPTION** solution that makes very simple the installation and maintenance of the link. These aspects, together with the **CAPACITY-LICENSE APPROACH**, may result to be key elements for **W**ireless **I**nternet **S**ervice **P**roviders facing the need of upgrading their backhauling capacity and suffering from a more and more crowded spectrum in the unlicensed frequency bands. **WISPs** will find WIDHOP 900 Series series the ideal solution which allows them minimizing network CAPEX and OPEX while deploying a state of the art technology.

WIDHOP 900 Series in the configuration with Nodal IDU, providing functionalities of Ring Protection and Traffic Aggregation together with Eth and Hybrid traffic interfaces.

HIGHLIGHTS

- Full Ethernet solution
- Adaptive Modulation up to 1024 QAM & channel reuse with XPIC
- Up to 500Mbit/s on air per carrier, 1 Gbit/s with channel reuse
- All licensed bands 6 to 42 GHz
- Unlicensed 17 & 24 GHz available
- Fully Outdoor
- Link & Ring Protection
- QoS Management and TDM legacy
- Low power consumption
- Low entry cost, capacity upgrade
- Simple Installation & Operation

APPLICATIONS

- WiMAX and LTE Backhauling
- 2G/3/4G Mobile Backhauling
- WISPs networks' backbone
- Broadcasting Backhauling
- Last Mile Fiber Extension
- Private and Enterprise Networks (WANs, LANs, etc.)
- Government & Emergency Services
- Utilities Network (Airport, Railways, Pipelines, etc.)
- Hyperlan, Tetra Backhauling
- Backhauling to WiFi and Videosurveillance networks

Key Features

Flexibility

Thanks to future-proof design and various solutions both for the indoor and the outdoor sections , depending on the required MW Network Architecture, WIDHOP 900 Series is capable to provide a wide range of system configurations among with the most appropriate can be deployed:

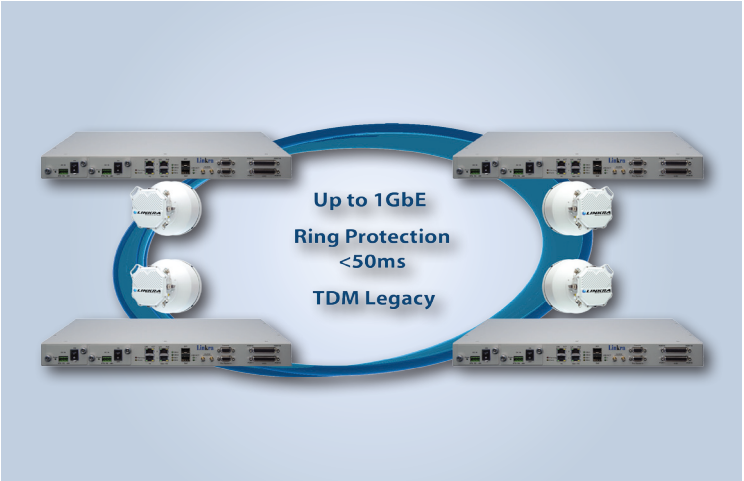
- 1+0 No protected Link
- 1+1 Hot Standby Link protection
- 2+0 Frequency Diversity / 2+0 Frequency Reuse with XPIC (aggregation & Load Balancing)
- 1+1 Space Diversity

Full Outdoor solution is available for all system configurations. TDM interfaces are available through optional indoor unit and legacy E1 traffic can be transported efficiently over the Ethernet .

Ring Protection

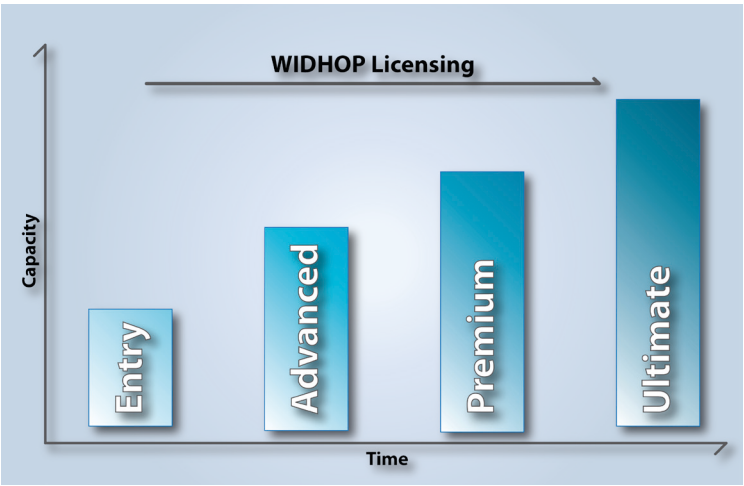
WIDHOP 900 Series family coupled with **N**odal-**IDU** allows Ring Topology configuration that guarantees advanced security in all applications that require rapid switch in case of fault.
Ring Protection allows:

- **<50ms switching time**
- **TDM/E1 Legacy**
- **Link Aggregation**



Fully software configurable

Like all Linkra radio systems, WIDHOP 900 Series radios are fully software configurable, easily scaling. License key upgrades are used to increase base Ethernet capacity within pay-as-you-grow approach. The software management is embedded in the ODU and there's no need of additional SW. Only a normal web browser to manage all system features. Both channel bandwidths (from 7 to 56 MHz) and capacity upgrading are configurable and manageable via SW interface.

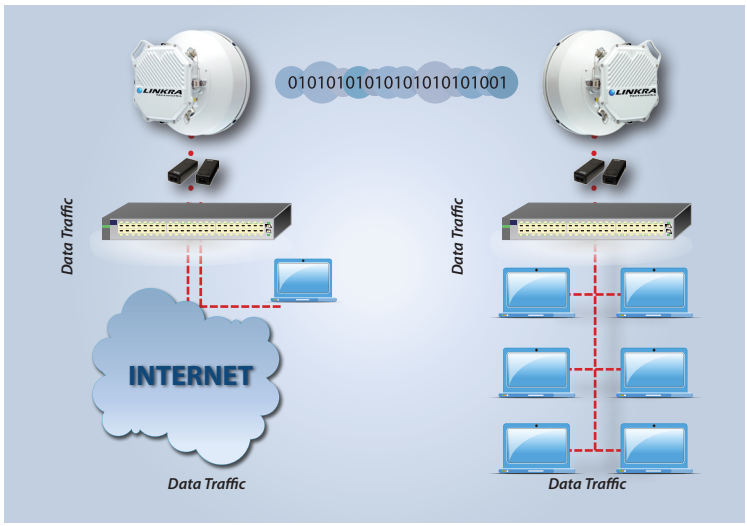


Modular Architecture

WIDHOP 900 Series can be provided with integrated antenna up to 1.8 meters. In particular environmental conditions, if required a separated mounting installation is also possible.
The wide range of Indoor Units allows to match requirements of all types of Network Architecture, to assure protected and reliable configuration, as well as smooth migration from old to New Generation Networks.
In configuration **2+0 with Xpic** and Load Balancing the capacity will be doubled and the privileged traffic will be **Always Protected.**

Simplest Architecture

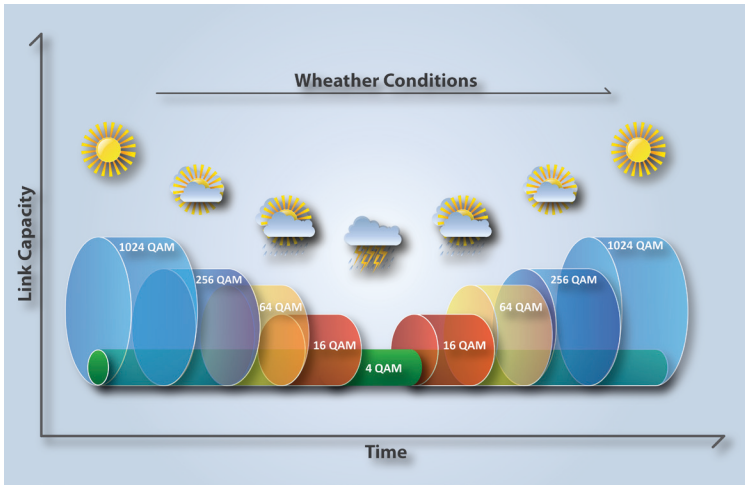
In all those scenarios where only Ethernet Connection is required (Building to Building or Fiber Backhauling e.g.) and fast and easy installation and maintenance are the key factors, as well as related costs, the WIDHOP 900 Series is likely to be the best-fit solution and allows a **ZERO FOOTPRINT** impact.
A variety of interfaces are available on ODU, allowing Optical or Electrical GE with PoE or separated port, for power supply.



Unique full range Adaptive Modulation

WIDHOP 900 Series provides the widest modulation range on the market from **4 QAM to 1024 QAM** with multi-level real-time modulation changing dynamically according to environmental conditions (rain, multipath, interference), making it possible to design MW radio link with satisfactory capacity and practically **Zero Downtime Connectivity**.
Adaptive modulation can provide important networking benefits, which include:

- **Increased capacity**
- **Improved availability**
- **Reduce spectrum usage, smaller antenna sizes, and expanded network cover**



System Components

Outdoor Unit available from 6 to 42 GHz in Licensed & Unlicensed (17 & 24 GHz) Bands with or without integrated antenna.
In the simplest configuration and for pure data connection with extra low latency <1 ms no IDUs is required (only PoE adapter)

Standard Power Injector compliant with 802.3at

IDU-GE (T) with 4 ports GE (2 PoE + 1 Electric + 1 Combo El/Optical)
TDM interface up to 16xE1 (optional) (dim. 1U & half ETSI rack)
switch embedded, Housekeeping, 2 ODUs supported, Synch i/f

Nodal-IDU (NIDU) Carrier Ethernet Access Solution, supporting link aggregation, Q-in-Q, and OAM(802.1ag, Y.1731), <50ms protection, Clock Synchronisation realize Timing over Packet based on IEEE 1588 v2, Synchronization Ethernet based on G.8261 and hybrid of them, TDM interface up to 16xE1 (optional) (dim. 1U ETSI rack)

System Terminal Configuration

		CONFIGURATION		
		1+0	1+1 / 2+0	Nodal - Ring
OPTIONS	Full Outdoor PoE	#1ODU + #1PoE inj.	#2 ODU + #2 PoE inj.	N.A.
	Full Outdoor Optical	#1 ODU with Optical i/f +Vdc (*)	#2 ODU with Optical i/f +Vdc (*)	N.A.
	IDU-ODU & TDM	#1 ODU + #1 IDU-GE (T)	#2 ODU+ #1IDU-GE (T)	#2 ODU + #1 NIDU (T)

(*) ODU equipped with optical interface is a product variant of WIDHOP 900 Series
(T) IDU-GE or NIDU are available also with a TDM i/f up to 16xE1 (120Ω)

License

License	Capacity	Max Throughput
Entry	100 Mbit/s	90 Mbit/s Low
Advanced	200 Mbit/s	180 Mbit/s Mid
Premium	400 Mbit/s	360 Mbit/s High
Ultimate	500 Mbit/s (Full)	450 Mbit/s Full

Technical Specifications

Radio Section

Licensed available bands: 6 -7-8-10.5-11-13-15-18-23-26-32-38-42 GHz (1)
Unlicensed available bands: 17- 24 GHz (1)
Modulation: 4-16-32-64-128-256-512-1024 QAM (fixed mode) & ACM
Channel Spacing: ETSI & ANSI supported
Transmitted Power: see Table 1 (2)
Sensitivity: see Table 2
Error correction: implemented by two levels of coding *Convolutional code & RS(252 241) code*
Power Consumption: <35W from 6 to 42 GHz
Power Feed: -48 Vdc ±20% or 110/220 Vac using PoE
IDU-ODU connection: According to IEEE 802.3 standard Ethernet cable, S-FTP 24 AWG Cat. 5E for outdoor application (temperature range –33° C to +55° C)
ODU i/f: data 2 GE port electrical or optical; PoE or dedicated power supply port; RSSI Voltage BNC conn. for link alignment; ODU to ODU interface for dual ODU full outdoor configurations
Antenna: 30, 60, 80, 120, 180 cm Integrated or Separated mounting
ODU dimension: 280H x 280W x 80D mm
ODU weight: <5Kg

Management

Network management: In-band
Protocol: SNMP v1/v2/v3
EMS: Embedded WEB GUI
NMS: Linkra NMS capable to manage over 4K NEs
Functionalities: Configuration, Alarms & Performances Monitoring, SW upgrade, Configuration Back-up & Recovery
Addressing: IPV4 & IPV6 for management port

Ethernet Section & Security

Protocol: IEEE 802.3
Frame Size: up to 9700 byte
User Data Throughput: from 10 to 450 Mbit/s (depend by license) Full Duplex
Latency: <110 µS @ full capacity with 64 byte; <1 ms for all other applications
User interface: 100/1000 Base-T, SFP (Optical or Electrical using optional PSE)
QoS: 802.1p/1Q; IP ToS/DiffServ support
Synchronization: Synch E (ITU-T G.8261, 8262, 8264)
Security and Encryption: Radius Client & Proprietary Encryption

Throughput

		CHANNEL SPACING				
	MOD	7Mhz	14Mhz	28 Mhz	40Mhz	56Mhz
THROUGHPUT	4QAM	9	19	37	54	74
	16QAM	20	40	82	119	167
	32 QAM	26	51	105	152	214
	64 QAM	31	62	128	185	261
	128 QAM	37	73	152	218	308
	256QAM	N.A.	85	175	250	360
	512 QAM	N.A.	N.A.	198	283	394
	1024 QAM	N.A.	N.A.	220	300	453

Note: Throughput depends on frame size

Standards & Regulations

Product safety: EN 60950-1 (2006)
Spectral emission: ETSI EN 302 217-2-2, EN 301 893, EN 300 440
Safety: IEC 60950 -1, IEC 60215 EN 50385
Environmental conditions: Ref. [13] EN 300 019
Stationary Use (ODU): The operating range Class 4.1 (-33/+55° C), At -40° C the startup of the equipment must be guaranteed and a 15 min. warm-up is allowed Solar Shield is available.
Stationary Use (IDU): The operating range Class 3.2 (-5/+45 °C extended to +55 °C)
Cabinet degree of protection (ODU): compliant with IEC 529 or equivalent IEC 68-2-18, Dust and throw of water IP65
Specification of environmental tests
Stationary Use (ODU): EN 300 019-2-4 test T 4.1 (IEC Class 4M5 for vibrations), EN 300 019-2-4 test T4.1 (IEC Class 4M3 for shocks)
Stationary Use (IDU): EN 300 019-2-3 test T 3.2 , EN 300 019-2-3 test T 3.2
Cabinet Surface treatment: 96h salt mist *(IEC 60068-2-11 test KA)*
Ecological compatibility: 2002/95/EC (RoHS), 2002/96/EC (WEEE), EC 1907/2006 (REACh)
Battery interruption or variation according to: ETSI EN 300 132-2
EMI/EMC: EN 55022 Class B - IEC 60950 add.IV-Class III, ETSI EN 301 489-1/4 Class B
Surge: 5 kV - 10/700 microsec ITU-T k.45 for IDU-ODU Cable only

Note
(1) Regulation for RF bands (Licensed & Unlicensed both) may vary by geographic location
(2) Max transmit power for unlicensed bands depends on country specific regulations

Technical Specifications

		6L/6U GHz	7GHz	8GHz	10.5GHz	11GHz	13GHz	15GHz	17GHz	18GHz	23GHz	24GHz	26GHz	38GHz	42GHz
Frequency range (GHz)		5.925 7.125	7.1 7.9	7.9 8.5	10.15 10.7	10.7 11.7	12.75 13.25	14.5 15.35	17.1 17.3	17.7 19.7	21.2 23.6	24.0 24.25	24.5 26.5	37.0 39.5	42.5 43.5
Max. output power P_{Txmax} (dBm) @ antenna port	4 QAM	26	26	26	26	26	25	25	15	24	23	15	23	22	22
	16 QAM	23	23	23	23	23	22	22	15	21	20	15	19	19	19
	32 QAM	23	23	23	23	23	22	22	15	21	20	15	19	19	19
	64 QAM	23	23	23	23	23	22	22	15	21	20	15	19	19	19
	128 QAM	23	23	23	23	23	22	22	15	21	20	15	19	19	19
	256 QAM	23	23	23	23	23	22	22	15	21	20	15	19	19	19
	512 QAM	22	22	22	22	22	21	21	15	20	19	15	18	18	18
	1024 QAM	22	22	22	22	22	21	21	15	20	19	15	18	18	18
Tx power regulation range (ATPC)		0÷26	0÷26	0÷26	0÷26	0÷26	0÷25	0÷25	-25÷15	0÷24	0÷23	-25÷15	0÷23	-3÷22	-3÷22

Table 1 - Transmitted power

		Sensitivity (dBm) BER 10^{-6} @ antenna port													
Channel spacing	**MOD**	**6L/6U GHz**	**7 GHz**	**8 GHz**	**10,5 GHz**	**11 GHz**	**13 GHz**	**15 GHz**	**17 GHz**	**18 GHz**	**23 GHz**	**24 GHz**	**26 Ghz**	**38 Ghz**	**42 Ghz**
7 MHz	4 QAM	-94	-93	-92,5	-92,5	-92,5	-92	-90	-90	-90	-89,5	-89,5	-89	-88,5	-88
	16 QAM	-86	-86	-86	-85,5	-85,5	-85	-84	-84	-84	-83,5	-83,5	-83	-82,5	-82
	32 QAM	-83	-83	-83	-82,5	-82,5	-82	-81	-81	-81	-80,5	-80,5	-80	-79,5	-79
	64 QAM	-80	-79	-79	-78,5	-78,5	-78	-78	-78	-78	-77,5	-77,5	-77	-76,5	-76
	128 QAM	-77	-76	-76	-75,5	-75,5	-75	-75	-75	-75	-74,5	-74,5	-74	-73,5	-73
	256 QAM	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	512 QAM	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1024 QAM	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14 MHz	4 QAM	-92	-92	-92	-91,5	-91,5	-91	-87,5	-87,5	-87,5	-87	-87	-86,5	-85,5	-85
	16 QAM	-84	-84	-84	-83,5	-83,5	-83	-81,5	-81,5	-81,5	-81	-81	-80,5	-79,5	-79
	32 QAM	-81	-80	-80	-79,5	-79,5	-79	-78,5	-78,5	-78,5	-78	-78	-77,5	-76,5	-76
	64 QAM	-77	-77	-77	-76,5	-76,5	-76	-75,5	-75,5	-75,5	-75	-75	-74,5	-73,5	-73
	128 QAM	-74	-74	-74	-73,5	-73,5	-73	-72,5	-72,5	-72,5	-72	-72	-71,5	-70,5	-70
	256 QAM	-70	-70	-70	-69,5	-69,5	-69	-69,5	-69,5	-69,5	-69	-69	-68,5	-67,5	-67
	512 QAM	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1024 QAM	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28 MHz	4 QAM	-89	-87	-87	-88	-88	-87,5	-84,5	-84,5	-84,5	-84	-84	-83,5	-82,5	-82
	16 QAM	-81	-80,5	-80,5	-80	-80	-79,5	-78,5	-78,5	-78,5	-78	-78	-77,5	-76,5	-76
	32 QAM	-78	-77	-77	-76,5	-76,5	-76	-75,5	-75,5	-75,5	-75	-75	-74,5	-73,5	-73
	64 QAM	-74	-74	-74	-73,5	-73,5	-73	-72,5	-72,5	-72,5	-72	-72	-71,5	-70,5	-70
	128 QAM	-71	-71	-71	-70	-70	-69,5	-69,5	-69,5	-69,5	-69	-69	-68,5	-67,5	-67
	256 QAM	-66,5	-67	-67	-67	-67	-66,5	-66,5	-66,5	-66,5	-66	-66	-65,5	-64,5	-64
	512 QAM	-63,5	-63,5	-63,5	-63	63	-62,5	-63,5	-63,5	-63,5	-63	-63	-62,5	-61,5	-61
	1024 QAM	-62	-61,5	-61,5	-61	-61	-60,5	-61,5	-61,5	-61,5	-61	-61	-60,5	-58,5	-58
56 MHz	4 QAM	-85,5	-85,5	-85,5	-85	-85	-84,5	-81,5	-81,5	-81,5	-81	-81	-80,5	-79,5	-79
	16 QAM	-78	-77,5	-77,5	-77	-77	-76,5	-75,5	-75,5	-75,5	-75	-75	-74,5	-73,5	-73
	32 QAM	-75	-74	-74	-73,5	-73,5	-73	-72,5	-72,5	-72,5	-72	-72	-71,5	-70,5	-70
	64 QAM	-71	-71	-71	-70,5	-70,5	-70	-69,5	-69,5	-69,5	-69	-69	-68,5	-67,5	-67
	128 QAM	-68	-67,5	-67,5	-67	-67	-66,5	-66,5	-66,5	-66,5	-66	-66	-65,5	-64,5	-64
	256 QAM	-63,5	-64,5	-64,5	-64	-64	-63,5	-63,5	-63,5	-63,5	-63	-63	-62,5	-61,5	-61
	512 QAM	-60,5	-60,5	-60,5	-60	-60	-59,5	-60,5	-60,5	-60,5	-60	-60	-59,5	-58,5	-58
	1024 QAM	-59	-59	-59	-59	-59	-58,5	-58,5	-58	-58	-57	-57	-56,5	-55,5	-55

For 6L/6U & 11 GHz bands, 40 MHz channel spacing is available

Table 2 - Sensitivity

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