

WIDHOP 900 IP

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

The WIDHOP 900 IP 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 IP 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 **Hitless Adaptive Modulation mechanism**, WIDHOP 900 IP guarantees outstanding performances and allows the link unavailability to be reduced to **ZERO DOWNTIME**.

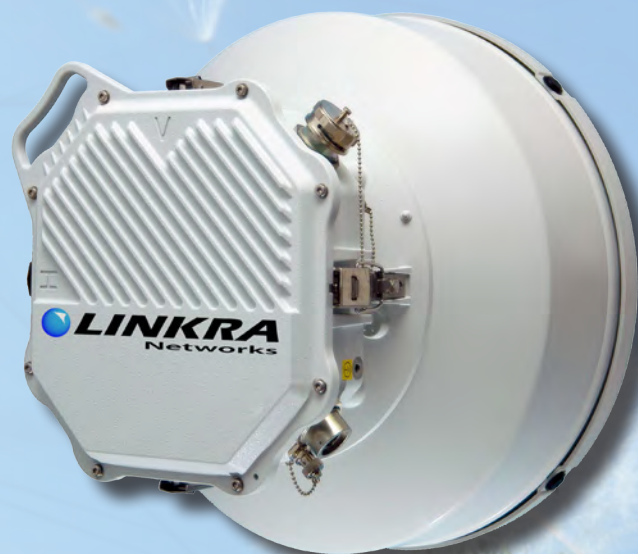
The WIDHOP 900 IP is composed of outdoor unit with antenna and GbE data interface, connected to the indoor unit through a cat.5e cable and RJ45 connector. The indoor unit is a small standard PoE adaptor in the simplest configuration, while a wide range of IDUs is available to provide more complex configurations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

The WIDHOP 900 IP 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 **Wireless Internet Service Providers** 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 IP series the ideal solution which allows them minimizing network CAPEX and OPEX while deploying a state of the art technology.

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

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 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 Link Aggregation (Frequency Diversity & Frequency Reuse with XPIC)
- » Nodal (Ring protection & Carrier Ethernet Access)

For all above configurations TDM interfaces are available and legacy E1 traffic can be transported efficiently over the Ethernet.

Ring Protection

WIDHOP family coupled with **Nodal-IDU** allows Ring Topology configuration that guarantees advanced security in all applications that require rapid switch in case of fault.

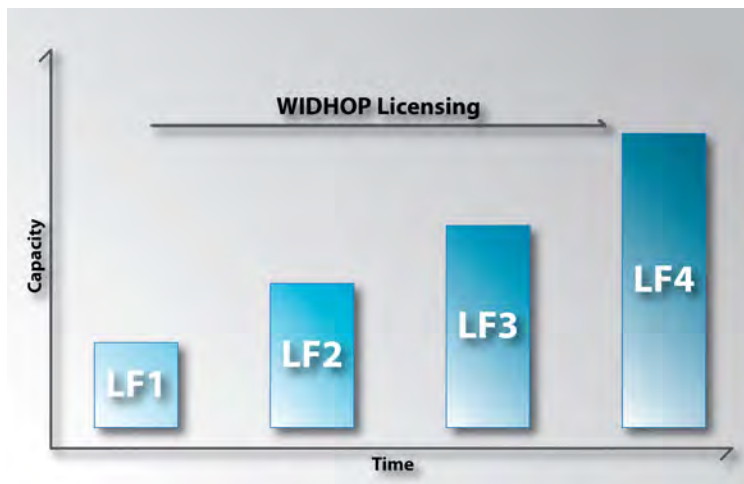
Ring Protection allows:

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



Fully software configurable

Like all Linkra radio systems, WIDHOP 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

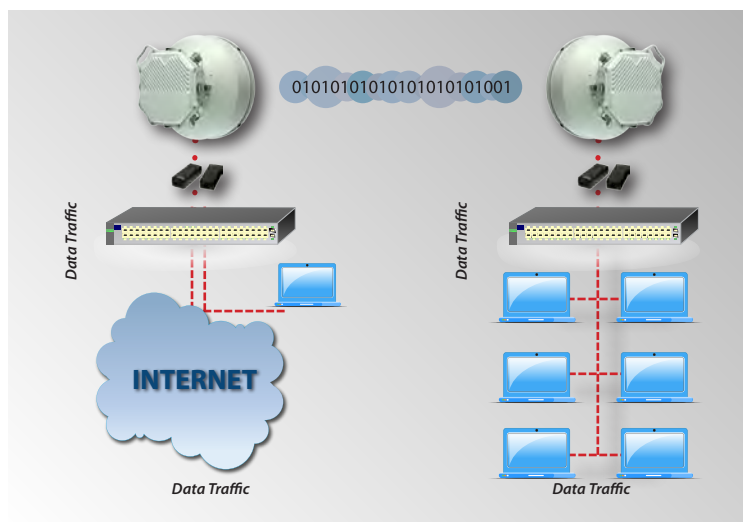
WIDHOP can be provided with integrated antenna up to 1.8 meters. In particular environmental conditions, if required a separated mounting installation is also possible.

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** 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 is likely to be the best-fit solution and allows a **ZERO FOOTPRINT** impact.

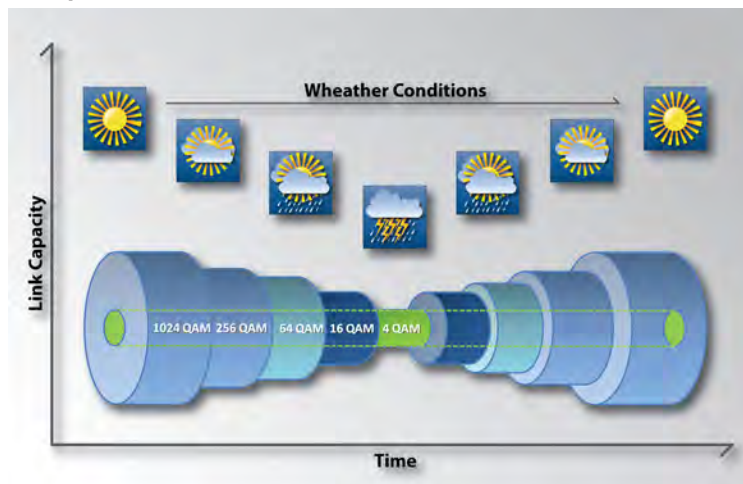


Unique full range Adaptive Modulation

WIDHOP 900 IP 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**





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



Power Supply Equipment (PSE) with 3 ports (2 Electric & 1 SFP) Giga Ethernet switch embedded, Housekeeping, visual indication alarm (LEDs), 1+1 Configuration (dim. 1U & half ETSI rack)



IDU-GE with 2 ports (2 Electric) Giga Ethernet switch embedded, Housekeeping, visual indication alarm (LEDs), 1+1 Configuration, TDM interface up to 16xE1 (dim. 1U & half ETSI rack)



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

System Terminal Configuration

| 1+0 | 1+1 HSTBY (*) | Nodal - Ring - LAG (**) |
|----------------|----------------|-------------------------|
| ODU + PoE inj. | - | 2 ODU + NIDU |
| ODU + PSE | 2 ODU + 2 PSE | |
| ODU + IDU-GE | 2 ODU+1 IDU-GE | |

(*) Antenna Coupler 3:3 or 1:10 available

(**) LAG: Link Aggregation

License

| License | Capacity | Max Throughput |
|---------|-------------------|-----------------|
| LF1 | 100 Mbit/s | 90 Mbit/s Low |
| LF2 | 200 Mbit/s | 180 Mbit/s Mid |
| LF3 | 400 Mbit/s | 360 Mbit/s High |
| LF4 | 500 Mbit/s (Full) | 450 Mbit/s Full |

Technical Specifications

Radio Section

Licensed available bands: 6-7-8-10.5-11-13-15-18-23-26-38-42 GHz (1)

Unlicensed available bands: 17- 24 GHz (1)

Modulation: 4-16-32-64-128-256-512-1024 QAM (fixed mode) & ACM (2)

Channel Spacing: 7-14-28-56 MHz (SW configurable)

Max transmitted Power: see Table 1 (2)

Max sensitivity: see Table 2

Error correction: implemented by two levels of coding *Convolutional code* & *RS(252 241) code*

Power Consumption: <35W

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 GbE RJ45 conn. ; RSSI Voltage BNC conn. for link alignment

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

EMS: Embedded WEB GUI

NMS: Linkra NMS capable to manage over 4K NEs

Functionalities: Configuration, Alarms & Performances Monitoring, SW upgrade, Configuration Back-up & Recovery

Ethernet Section & Security

Protocol: IEEE 802.3

Frame Size: up to 1522 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

Security and Encryption: Proprietary Encryption

Protection: Storm/Flood & Password

Throughput

| MOD | CHANNEL SPACING | | | |
|----------|-----------------|-------|--------|-------|
| | 7Mhz | 14Mhz | 28 Mhz | 56Mhz |
| 4QAM | 9 | 19 | 37 | 74 |
| 16QAM | 20 | 40 | 82 | 167 |
| 32 QAM | 25 | 51 | 105 | 213 |
| 64 QAM | 31 | 62 | 128 | 260 |
| 128 QAM | 37 | 73 | 151 | 307 |
| 256QAM | 42 | 84 | 174 | 358 |
| 512 QAM | N.A. | N.A. | 197 | 405 |
| 1024 QAM | N.A. | N.A. | 220 | 450 |

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 IP45, Best target IP55

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)

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) Regulatory for RF bands (Licensed & Unlicensed both) may vary by geographic location

(2) Transmit power depends on frequency, modulation and geographic 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 |
| | 16 QAM | 23 | 23 | 23 | 23 | 23 | 22 | 22 | 15 | 21 | 20 | 15 | 20 | 19 | 19 |
| | 32 QAM | 22 | 22 | 22 | 22 | 22 | 21 | 21 | 15 | 20 | 19 | 15 | 19 | 18 | 18 |
| | 64 QAM | 20 | 20 | 20 | 20 | 20 | 19 | 19 | 15 | 18 | 17 | 15 | 17 | 16 | 16 |
| | 128 QAM | 19 | 19 | 19 | 19 | 19 | 18 | 18 | 15 | 17 | 16 | 15 | 16 | 15 | 15 |
| | 256 QAM | 18 | 18 | 18 | 18 | 18 | 17 | 17 | 14 | 16 | 15 | 14 | 15 | 14 | 14 |
| | 512 QAM | 17 | 17 | 17 | 17 | 17 | 16 | 16 | 14 | 15 | 14 | 14 | 14 | 13 | 13 |
| | 1024 QAM | 16 | 16 | 16 | 16 | 16 | 15 | 15 | 13 | 14 | 13 | 13 | 13 | 12 | 12 |
| Tx power regulation range (ATPC) | | 0÷26 | 0÷26 | 0÷26 | 0÷26 | 0÷26 | 0÷25 | 0÷25 | -12÷15 | 0÷24 | 0÷23 | -12÷15 | 0÷23 | -3÷22 | -3÷22 |

Table 1 - Max transmitting power

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

Table 2 - Sensitivity

For further information contact:
 LINKRA s.r.l
 Strada Provinciale per Monza, 33
 20863 Concorezzo (MB)
 Tel.+39 039 6117 405/304
 Fax +39 039 6117 480
 E-mail sales-linkra@linkra.it

visit www.linkra.it
 © Linkra s.r.l All right reserved. Content
 subject to change without any notice.
 Datasheet WIDHOP v.1.1 issued August 2011

