albentia Systems

EthairWave — 5 GHz unlicensed band

WiMAX point-to-point solution

Product Overview

Albentia Systems is proud to introduce *Ethairwave*, the industry's first 802.16 compliant (WiMAX) system for radio backhauling and bridging applications in the 5 GHz license-exempt band.

Ethairwave applies the advantages of the IEEE 802.16-2004 OFDM standard for Point-to-Point transmission in Non-line of Sight scenarios to achieve unprecedented link distances with high net throughput thanks to the advanced contention-free Medium Access Control layer.

This family of equipment is a cost-effective solution with carrier-class performance in the worst case scenarios.

High Ethernet throughput

Ethairwave equipment provides up to 30 Mbps aggregated Ethernet throughput. This throughput can be allocated in symmetric (15+15 Mbps) or asymmetric (20+10 Mbps) traffic configurations.

Throughput and latency are kept constant thanks to the use of a frame-based deterministic MAC layer. Throughput variation due to the type of traffic, packet size and link distance is negligible.

Non-Line of Sight operation in the 5 GHz unlicensed band

This system makes use of OFDM modulation as per 802.16 standard (WiMAX) to provide superior performance in Non-Line of Sight outdoor scenarios with the most adverse conditions characterized by strong multipath propagation.

Unprecedented Spectral-Efficiency

The *Ethairwave* family applies advanced physical and MAC layer techniques to achieve unprecedented spectral efficiency.

The use of a contention-free MAC layer maximizes the net spectral efficiency by avoiding packet collisions and unused idle time. This highly efficient use of the spectrum allows the use of more robust modulation schemes with lower Signal-to-Noise ratio requirements, enabling the use of smaller and less expensive antennas.

A net layer-2 capacity of 30Mbps can be achieved using a 10MHz channel with 64QAM-3/4 modulation, with a gross physical layer throughput of 34Mbps. This net capacity is obtained thanks to the use of techniques for deterministic access to the radio resources and the avoidance of statistical access techniques like in most 802.11-based wireless equipment.

Easy to install

The *Ethairwave* system uses a very simple architecture characterized by an indoor Power over Ethernet (PoE) supply injector and a weather-proof outdoor enclosure which contains the electronics and radio. Each *Ethairwave* can be provided with an integrated 22 dBi antenna, or with a coaxial N-connector for external antenna.

WiMAX FORUM

PRODUCT HIGHLIGHTS

- **Compliant with IEEE 802.16-2004 standard (WiMAX)**
- **Operation in the 5 GHz unlicensed band**
- **OFDM modulation for operation in non-line of sight scenarios**
- **30 Mbps aggregated Ethernet throughput**
- **Advanced contention-free MAC layer to provide unprecedented spectral efficiency and longer link distance**
- **Easy to install. Low power consumption**
- **Bridging and Routing Networking modes**

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System Specifications

RADIO PARAMETERS				Notes
Frequency Band	5470-5725 MHz (ETSI) or 5725-5875 MHz (FCC)			
Modulation	OFDM IEEE 802.16-2004 - 256 subcarriers			
Adaptive modulation	BPSK, QPSK, 16QAM and 64QAM			Dependant on maximum throughput
FEC code rate	1/2, 2/3 and 3/4			Concatenated Reed-Solomon and Viterbi
Cyclic Prefix	2.8us (1/8th of symbol time)			
Frame duration	8 ms			
Channel bandwidth	10 MHz			
Transmit power control	> 45 dB			
Duplexing method	TDD			50% division betweeen uplink and downlink
Maximum physical layer gross throughput	34,2 Mbps			Uplink+Downlink aggregated throughput
Maximum layer-2 net throughput	30 Mbps			Uplink+Downlink aggregated throughput
Integrated antenna gain	22 dBi			Also available without integrated antenna
Radio performance	**Sensitivity**	**Max Tx Power**	**Link budget**	Sensitivity and Tx power measured at antenna port
@ 3 Mbps net throughput (BPSK-1/2)	-89 dBm	21 dBm	154 dB	Sensitivity for BER<10e-6
@ 10 Mbps net throughput (QPSK-3/4)	-83.5 dBm	20 dBm	147.5 dB	Link budget includes integrated antenna gain
@ 20 Mbps net throughput (16QAM-3/4)	-77 dBm	18 dBm	139 dB	
@ 30 Mbps net throughput (64QAM-3/4)	-70.5 dBm	17 dBm	131.5 dB	
DATA TRAFFIC AND NETWORK INTERFACE				Notes
Network functionality	Layer-3 Routing, Layer-2 Bridging, VLAN			
Networking modes	Bridge mode, IP routing, NAT			
Data interface	10/100 Mbps Ethernet			
Management	Web, Command-Line Interface, XML, SNMP			
Encryption	AES and 3DES			
MECHANICAL AND ELECTRICAL				Notes
Size	305 x 305 x 75 mm			
Weight	4.3 kg			
Power Consumption	13 Watts			Full-traffic conditions

Link budget calculation and achievable link distance

The previous specifications indicate the available link budget for several net throughput conditions. This link budget information can be used to calculate the achievable link distance in Line-Of-Sight (LOS) conditions. Some example calculations are provided below:

Antenna	Net throughput	Available link budget (from table above)	Achievable link distance and fade margin
Integrated 22dBi	3 Mbps	157 dB	10 km @ 29 dB margin 100 km @ 9 dB margin
Integrated 22dBi	10 Mbps	149 dB	10 km @ 21 dB margin 40 km @ 9 dB margin
External Parabolic 60cm 28dBi	3 Mbps	169 dB	50 km @ 27 dB margin 400 km @ 9 dB margin
External Parabolic 60cm 28dBi	20 Mbps	153 dB	10 km @ 25 dB margin 50 km @ 11 dB margin

Note: The decision on whether the fade margin is sufficient for the required availability of the link is the engineer's responsibility.
Note: Link loss calculated based on Friis formula at 5.8 GHz (128 dB for 10 km, 142 dB for 50 km, 148 dB for 100 km)
Note: The previous table assumes maximum transmit power. Some countries have established e.i.r.p limitations that must be obeyed

ORDERING INFORMATION: EW-bba

bb - Frequency band: 56 for ETSI band (5470-5725MHz), 58 for FCC band (5725-5875MHz)

a - Antenna option: "A" for integrated antenna, "E" external antenna (not included)

Example: EW-58A (5725-5875 MHz FCC band, integrated antenna)

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