BreezeACCESS™ OFDM

Powering provider performance

Featuring the same field-proven and mature rich-feature set as the well-established and highly successful products in the BreezeACCESS portfolio, BreezeACCESS OFDM is the ideal point-to-multipoint broadband wireless access system for Operators offering high-bandwidth IP-based services. Leveraging the excellent multi-path resistance capabilities of OFDM technology, BreezeACCESS OFDM enables operation in near and non-line-of-site (NLOS) conditions, which enable Operators to reach a previously-inaccessible and broader segment of the subscriber population, with fewer Base Stations. These advanced capabilities radically reduce the initial cost of investment, installation costs and time to market while increasing Operator revenue potential.

Product Highlights

BreezeACCESS OFDM delivers a comprehensive range of product features, ensuring fast, consistent and reliable data and IP oriented services, including...

- Orthogonal Frequency Division Multiplexing (OFDM) technology ensures high data rates, high spectral efficiency and immunity to interference and multi-path conflicts.

- Near and non-line-of-sight (NLOS) capabilities.

- Demand-based build-out, easy installation and low cost of ownership enables rapid market penetration, increased subscription and enhanced value-added services.

- High capacity base station for large-scale deployments in dense urban and suburban areas.

- Micro base station for low entry cost, highly cost effective deployments in low-density rural areas.

- Packet switching technology optimized for IP-based applications and "always on" connectivity.

- Independent uplink/downlink transmission settings for CIR/MIR, enabling assured and differentiated SLA.

- Adaptive modulation - maximize throughput according to radio performance:
  - BPSK, QPSK, 16QAM, 64QAM sub-carrier modulation
  - Automatic multi-rate selection

- Advanced filtering capabilities, such as:
  - IP filtering
  - Protocol-based filtering
  - Broadcast filtering

- End to end QoS with 802.1p, IP ToS and DSCP

- VPN support with 802.1Q VLANs

- Carrier grade features including a rack mount chassis base station with redundancy, hot swap capability and UPS facilities.

- Highly cost effective infrastructure and customer premises equipment.

- Easy-to-use SNMP-based remote management system, enabling simple unit configuration and multiple simultaneous unit upgrading.

Operating in the licensed 3.5 GHz frequency band, BreezeACCESS OFDM leverages Orthogonal Frequency Division Multiplexing technology to deliver high data rates, high spectral efficiency and immunity to interference and multi-path conflicts. Delivering data burst rates of up to 12 Mbps, BreezeACCESS OFDM ensures always-on connectivity to a full range of IP-based services, including fast Internet, VPNs and VoIP.

BreezeACCESS OFDM provides an instant and independent infrastructure, which is immediately deployable with lower infrastructure construction and operating costs than any other solution on the market.

BreezeACCESS OFDM System Components
BreezeACCESS OFDM CPEs - Building bridges to BWA

The BreezeACCESS OFDM Subscriber Units provide a bridge between the wireless and wireline media, supporting up to 512 MAC addresses. The SUs connect to the subscriber's data equipment via a standard IEEE 802.3 Ethernet 10/100-BaseT (RJ 45) interface.

Indoor/Outdoor Units

The BreezeACCESS OFDM indoor/outdoor Subscriber Units include an indoor desktop or wall-mountable unit, containing the processor, modem, Ethernet interface and the IF radio component. The indoor unit is powered by a desktop Power Supply Unit, supplying 24 Volts.
The outdoor unit comprises a radio module with either an integrated flat panel antenna or a connector for an external antenna.

The indoor and outdoor units are connected via a 50-ohm coaxial Intermediate Frequency (IF), relaying 140 MHz IF signals between the units. Data, power, management and control signals are transmitted between the indoor unit and the outdoor unit via this coaxial cable.

BreezeACCESS OFDM Subscriber Unit

Product Name	Product Description
SU-A-4D-OF	Integrated vertical antenna - 4 data users
SU-A-BD-OF	Integrated vertical antenna - full bridge
SU-AH-4D-OF	Integrated horizontal antenna - 4 data users
SU-AH-BD-OF	Integrated horizontal antenna - full bridge
SU-E-4D-OF	Detached antenna - 4 data users
SU-E-BD-OF	Detached antenna - full bridge

BreezeACCESS OFDM Base Station Equipment - Reliability, Flexibility, Performance

Delivering superior flexibility in architecture and network deployment, BreezeACCESS ensures demand-based scalability combined with flexible modularity.

Base Station Shelf

The 19" 4U Base Station chassis (BS-SH-OF) provides 8 interface slots and two slots designated for power supply modules. The Base Station is powered by a -48 VDC power source, with a back-up module ensuring complete fail-safe redundancy. Up to eight AU modules can operate simultaneously.

Indoor/Outdoor Access Units

The BreezeACCESS OFDM Access Unit includes an indoor module and outdoor unit. The AU-NI-BS-OF indoor unit is a network interface module that fits in the base station chassis, containing the processor, modem, Ethernet interface and IF radio module. The AUs connect to the network backbone via a standard IEEE 802.3 Ethernet 10/100-BaseT (RJ 45) interface. The indoor and outdoor units are connected via a 50-ohm coaxial Intermediate Frequency (IF), relaying 140 MHz IF signals between the units. Data, power, management and control signals are transmitted between the indoor unit and the outdoor unit via this coaxial cable.

BreezeACCESS OFDM

Advanced access in a world without wires.

The Access Unit is available in standard or high power versions, which provide extended coverage. The outdoor radio unit features two antenna configuration options: with integrated antenna or with RF connector for an external antenna.

Micro Base Station

The micro base station is the ideal solution for providing cost effective broadband services in low-density rural zones. It is comprised of a stand-alone module that connects to the same outdoor radio unit described in the Indoor/Outdoor Access Units configuration. The indoor unit is designed for desktop or wall mount installation and is powered from the Mains. Data, power, management and control signals are transmitted from the indoor to the outdoor unit via coaxial cable.
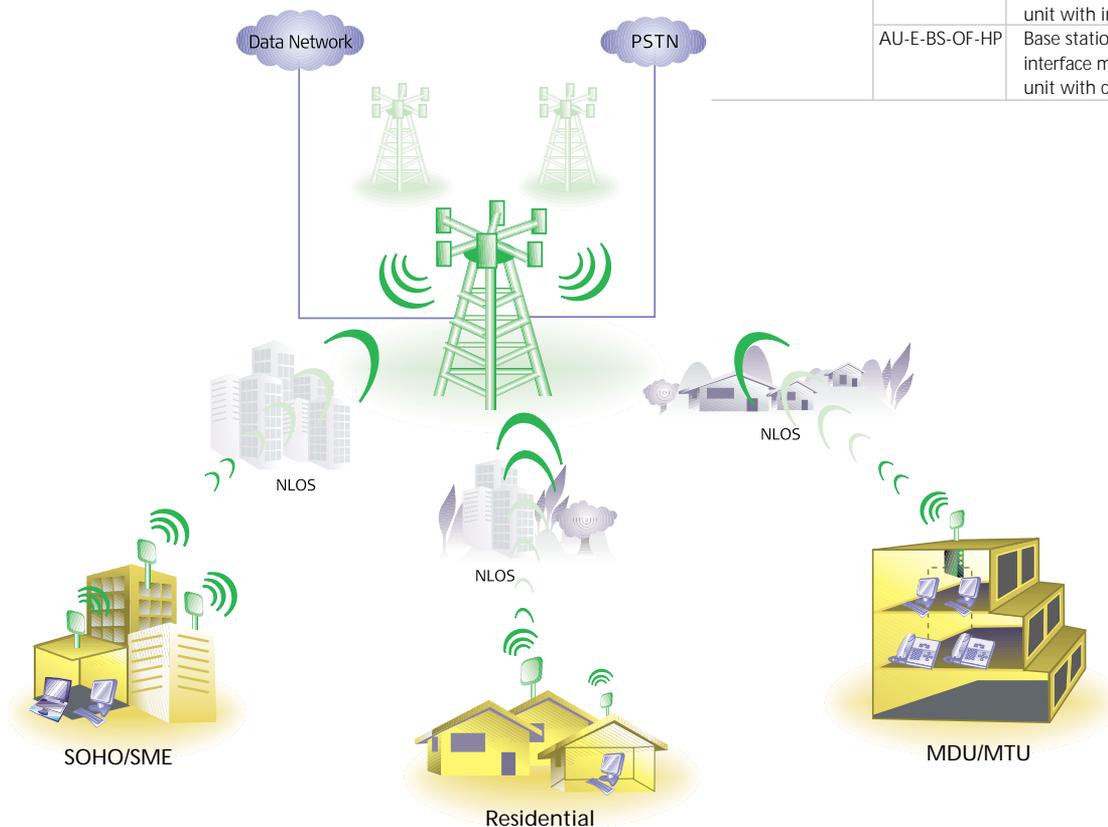
BreezeACCESS OFDM Base station equipment

Product Type	Product Name	Description
Micro Base Station	AU-E-SA-OF	Single sector base station comprised of indoor unit and outdoor radio unit with connectors for external antenna
Base Station Shelf	BS-SH-OF	Base station chassis with one DC power supply
Power Supply	BS-PS-OF	Base station DC power supply
Access Units	AU-A-BS-OF	Base station access unit comprised of indoor interface module and outdoor radio unit with integrated antenna
	AU-E-BS-OF	Base station access unit comprised of indoor interface module and outdoor radio unit with connector for external antenna
	AU-A-BS-OF-HP	Base station access unit comprised of indoor interface module and high power outdoor radio unit with integrated antenna
	AU-E-BS-OF-HP	Base station access unit comprised of indoor interface module and high power outdoor radio unit with connectors for external antenna

Data Network

PSTN

NLOS

NLOS

NLOS

SOHO/SME

Residential

MDU/MTU

Specifications

Radio

Frequency	Band	3.5a1	3.5b
	Uplink (GHz)	3.3995-3.4535	3.449-3.500
	Downlink (GHz)	3.4995-3.5535	3.549-3.600

Radio Access Method	TDMA FDD
Standard Compliance	ETSI EN 301 021
Channel Spacing	1.75 MHz/3.5 MHz
Central Frequency Resolution	125 KHz @ Channel Spacing 1.75 MHz
	250 KHz @ Channel Spacing 3.5 MHz
Antenna (SU-RA)	17dBi, 20°, vertical and horizontal polarization, compliant with EN 302 085 Class, TS 2
Antenna (AU-RA)	16.5dBi, 60°, vertical polarization, ETSI CS3 compliant (3.4-3.7 GHz)
Antenna Port (SU-RE, AU-RE)	50 ohm

Output Power (at antenna port)		Max. Nominal Average Power (dBm)	Max. Peak Power (dBm)	Control Range (dB)
	SU	20+/-1	30+/-1	47
	AU	20+/-1	30+/-1	12
	AU-HP	25+/-1	35+/-1	12

Sensitivity, typical (dBm at antenna port, BER 10E-6)	@ 3.5MHz Channel spacing		@ 1.75MHz Channel spacing	
	2 Mbps	-94	1 Mbps	-97
	4 Mbps	-91	2 Mbps	-94
	8 Mbps	-85	4 Mbps	-88
	12 Mbps	-79	6 Mbps	-82

Data Rate	@ 3.5MHz Channel spacing	@ 1.75MHz Channel spacing
	2, 4, 8, 12 Mbps	1, 2, 4, 6 Mbps

Modulation	OFDM modulation, 64 FFT points, BPSK, QPSK, 16QAM, 64QAM
OFDM symbol rate	55.5 Ksymbol/sec @ Channel Spacing 3.5MHz
	22.8 Ksymbol/sec @ Channel Spacing 1.75MHz
Error Correction	Convolutional encoder, Viterbi decoder, Coding rate: 3/4

Data Communication

Standard Compliance	IEEE 802.3 CSMA/CD
VLAN support	IEEE 802.1Q
Layer-2 Traffic Prioritization	IEEE 802.1p
Layer-3 Traffic Prioritization	IP ToS and DSCP

Outdoor Unit to Indoor Unit Communication

IF Frequency	140 MHz
IF Cable Impedance	50 ohm
Maximum IF Cable Attenuation	10dB
Maximum IF Cable DC Resistance	2.7 ohm, 2.0 ohm for AU HP

Configuration and Management

Local Management	Via MON port, Monitor program using terminal emulation
Remote Management	SNMP, Telnet
Remote Management Access	From the wired LAN or from the wireless link
SNMP agents	SNMP ver 1 client, MIB II, Bridge MIB, Private BreezeACCESS OFDM MIB
Security	RC4 Authentication and filtering
Software upgrade	TFTP download

Interfaces	Outdoor Unit	Indoor Unit
IF	TNC jack, lightning protected	TNC jack, lightning protected
ANT (AU-RE, SU-RE)	N-Type jack, lightning protected	
Ethernet		10/100Base-T (RJ-45) with 2 embedded LEDs
Monitor		3-pin low profile
Power	24 VDC from indoor unit via the IF cable	SU-NI: 3-pins DC jack for the SU-PS power supply, KYCON KPJ-3S-S
		BS-PS: D-Type 3 Power pin male Amphenol 717TWA3W3PHP2V4RRM6

Electrical, Mechanical and Environmental

Power	Outdoor Unit	Indoor Unit
	24 VDC from indoor unit via the IF cable	SU: 38W max. SU-NI: 24VDC/2A from SU-PS SU-PS: 100 - 240 VAC, 50-60 Hz BS: -48 VDC, 420W max. AU: 35W max. for each AU (indoor + outdoor). 45W max. for each AU-HP (indoor + outdoor)
Mechanical	SU-RA: 306x306x72 mm, 2.5 kg SU-RE: 306x117x55 mm, 1.7 kg AU-RE: 306x117x55 mm, 1.7 kg AU-RA: 500x117x70 mm, 2.9 kg	SU-NI: 305x182x54 mm, 1.6 kg SU-PS: 110x60x35 mm, 0.4 kg BS-SH: 19″, 4U, 483x177x265 mm, 4 kg AU-NI-BS: 260x129x36 mm, 0.28 kg BS-PS: 257x129x71 mm, 1.12 kg
Operating temp.	-40°C to 55°C	0°C to 40°C
Operating Humidity	5%-95% non condensing Weather protected	5%-95% non condensing

Standards Compliance, General

Type	Standard
EMC	ETS 300 385
Safety	EN 60950 (CE), IEC 60 950 US/C(TUV)
Environmental	ETS 300 019 part 1-3 class 3.1 for indoor units, ETS 300 019 part 1-4 class 4.1E for outdoor units
Radio	ETSI EN 301 021 V.1.4.1, ETSI EN 301 753 V.1.1.1

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