# BreezeMAX™

## All the technology and experience of Alvarion.
## All the promise of WiMAX.

BreezeMAX is the industry's leading WiMAX solution, featuring advanced OFDM technology to support non-line-of-sight (NLOS) operation, adaptive modulation up to QAM64, and the highest spectral efficiency available. Operating in the 3.3, 3.5 and 3.6 GHz licensed frequency bands, BreezeMAX addresses the immediate customer demand for cost-effective, next generation BWA systems with a platform designed around the implementation of the IEEE 802.16 and HiperMAN standards by the WiMAX Forum™.

BreezeMAX is the ideal solution for operators offering high-bandwidth, IP-based voice and data services to evolve their networks to industry standard solutions with improved CPE economics. Now offering primary voice services by leveraging legacy infrastructure. The system's rich feature set and cost-effective and versatile CPEs make BreezeMAX the ultimate BWA solution for providers wanting to significantly boost their revenue potential.

# Product Highlights & Advantages

BreezeMAX delivers a comprehensive range of features, all of which make it the solution of choice for operators seeking to start building their WiMAX networks today. The system provides the following product features and benefits:

- **WiMAX architecture** - Based on the WIMAX Forum's standard implementation of the IEEE 802.16 and ETSI HiperMAN industry specifications for wireless access in Metropolitan Area Networks

- **Nomadic 'Plug and Play' Solution** - Easy and simple, self installable CPE for the non professional user delivering instant broadband anywhere

- **Addressing multiple markets** - Suitable for serving residential, business, MDU/MTU, hotspots, backhauls, and wireless home networking applications

- **Low cost ownership** - Supports simple installation and demand-based "pay-as-you-grow" build-outs of all Alvarion systems, BreezeMAX enables operators to penetrate new market segments rapidly and to build out their networks while minimizing CAPEX

- **Carrier class** - Meets the most demanding requirements of large service providers with high throughput and availability, component redundancy, and flexible Network Management System (NMS)

- **Scalable base station configurations** - High density base station suitable for large-scale deployments in both dense urban and suburban areas. The micro base station, is an ideal, cost-effective solution for providers seeking to penetrate rural and low-density areas

- **High capacity and throughput** - Base station full duplex and multi-channel functionality enables a single base station to support very large numbers of subscribers. Highly efficient and robust 802.16 air protocol provides high broadband rates up to 10 Mbps of net throughput per subscriber

- **NLOS coverage** - Advanced Orthogonal Frequency Division Multiplexing (OFDM) modulation enhances performance in non-line-of-sight (NLOS) conditions to ensure immunity to interference and multi-path conflicts typical of deployments in densely populated urban areas

- **End-to-end QoS** - Advanced QoS capabilities in the 802.16 MAC, 802.1P and DSCP classification and prioritization functions ensure true end-to-end QoS and support high quality data, voice and video services

- **Adaptive modulation technology** - maximizes the bandwidth throughput of the system over large distances by automatically adjusting modulation to respond to various signal qualities

- **AlvariSTAR management system** - Carrier class NMS platform that supports full FCAPS functionality, remote software upgrade to multiple devices and integration via standard interfaces to higher level network management systems

- **Legacy V5.2 / Primary Voice -** By leveraging existing infrastructure, specifically telephony switches supporting V5.2 interfaces, both new and established operators can deliver primary voice services through the integrated BreezeMAX voice and data indoor CPE

- **Multiple frequencies** - BreezeMAX supports frequencies from 3.3GHz to 3.8GHz

## BreezeMAX: Taking WiMAX to the MAX

Since its founding over 10 years ago, Alvarion has been actively involved in helping to create and proliferate new industry standards for broadband wireless applications. The Company's continual involvement with IEEE, ETSI, and the WiMAX Forum for the standardization of BWA systems is a direct extension of that work. BreezeMAX represents the sum total of the Company's advanced technology capabilities and long-term field experience. BreezeMAX is a future-proof solution that offers operators reliability, flexibility, and compelling economics, while migrating their networks to a standard WiMAX architecture.

Powered by Intel's® PRO / Wireless 5116 broadband interface chip, BreezeMAX is able to meet the requirements of a myriad of service environments, from sparsely populated rural areas to high-density urban areas. BreezeMAX delivers broadband access services to a wide range of customers, including residential, SOHO, SME, large enterprise and multi-tenant customers.

## New to BreezeMAX

Alvarion's WiMAX solution now offers toll quality voice services for both  ILECs through legacy V5.2 switches and CLECs through IP based networks. Supporting Class 5 supplementary services and battery back-up on the CPE side, the BreezeMAX delivers unmatched primary voice services.

## BreezeMAX System Components

The BreezeMAX product family includes the BreezeMAX 3300 for the 3.3GHz band, BreezeMAX 3500 for the 3.5GHz band and BreezeMAX 3600 for the 3.6GHZ band.

### Base Station Equipment

BreezeMAX 3500 base stations are available either as high density chassis configuration or a micro base station:

### High Density Base Station

The high density base station is a carrier class 8U high cPCI shelf that fits into standard 19" or 22" (ETSI) racks. The chassis contains a network processor unit, multiple access unit modules (up to 6 in a single chassis), power supply and power feeding modules.
All the modules are hot swappable, and high availability can be provided through multiple redundancy schemes.

## Network Processing Unit (NPU)

The NPU is the heart of the base station and serves as the central processing unit managing the base station components and all subscriber units it connects. Its main functions are:

- Traffic aggregation of all access units to/from the backbone via 100/1000 BaseT network interface
- Traffic classification and connection establishment initiation
- Policy based data switching
- Service Level Agreements management
- Base station overall management, operation control and alarms management

The BreezeMAX base station can host two NPU modules for redundancy support (1+1 redundancy scheme).

## Indoor/Outdoor Access Units

The BreezeMAX access unit is comprised of an indoor unit (IDU) and an outdoor unit (ODU). The access unit IDU module contains the wireless IEEE 802.16/HiperMAN Mac and modem and is responsible for the wireless network connection establishment and for bandwidth management. Each access unit IDU includes two 3.5/1.75 MHz PHY channels for support of RF diversity combining functionality and radio link redundancy.

The access unit ODU is a high power, multi-carrier radio unit that connects to an external antenna. The base station operates in full duplex, dramatically increasing system efficiency. It is designed to provide high system gain and interference robustness utilizing high transmit power and low noise figure.

## Micro Base Station

The micro base station provides cost-effective broadband services in low-density rural areas. It is comprised of a stand-alone module that connects to the same outdoor radio unit described above. The indoor unit is 1U high, fits into standard 19" or 22" (ETSI) rack, has a 10/100 BaseT  network interface to the backbone and is powered from the Mains with either AC or DC power.

## Base Station Equipment Components

| Product Type | Product Name | Product Description |
|---|---|---|
| High Density Base Station Equipment | BMAX-BST-SH | BreezeMAX base station shelf |
| | BMAX-BST-NPU | BreezeMAX base station network processor unit |
| | BMAX-BST-AU-IDU-2CH | BreezeMAX base station access unit interface module |
| | BMAX-BST-PSU | BreezeMAX base station power supply unit |
| | BMAX-BST-PIU | BreezeMAX base station power interface unit |
| Micro Base Station Equipment | BMAX-MBST-IDU-2CH-AC | BreezeMAX micro base station indoor unit, AC power |
| | BMAX-MBST-IDU-2CH-DC | BreezeMAX micro base station indoor unit, DC power |
| Base Station Radio Equipment | BMAX-BST-AU-ODU | BreezeMAX base station outdoor radio unit |

## Access Gateway

Available in both small and large form sizes factor offering from 2 to 48 E1s of capacity, the access gateway is a rack mounted, carrier-grade unit that supports toll quality telephony services using a V5.2 interconnection to legacy switches. Working with both a BreezeMAX micro or macro base station, the access gateway is typically located at the switch premises and directs voice traffic to one or more base stations over an IP connection. Alternatively, when only TDM backhaul is available, the access gateway can be co-located with the base station.

## BreezeMAX CPEs - MAXimizing service to customers with compelling economics

The BreezeMAX platform provides several CPE types to provide operators the ultimate flexibility to serve a variety of business and residential customers cost effectively. BreezeMAX PRO CPEs are powered by Intel's PRO/Wireless 5116 broadband interface.
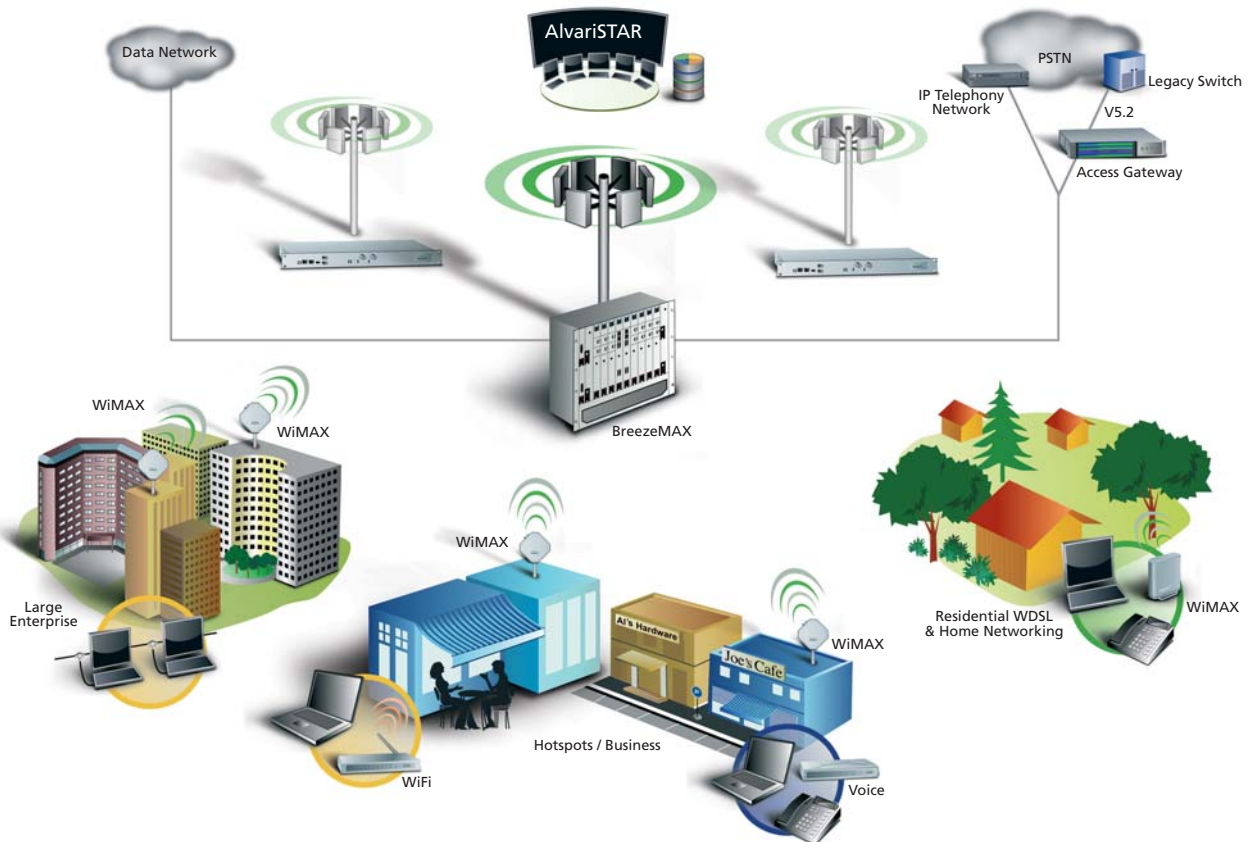
The BreezeMAX system is able to operate in various environments, from low populated rural areas to high density urban areas and provides subscribers with fast access at net data rates of up to 10Mbps over a 3.5MHz channel.

BreezeMAX PRO CPEs support the following key applications: broadband data + voice, advanced home networking and hotspot backhauling.

## BreezeMAX PRO CPE ODU

The BreezeMAX PRO CPE is comprised of an indoor unit (IDU) and an outdoor unit (ODU).
The BreezeMAX PRO CPE ODU contains the modem, radio, data processing and management components. It also contains an integral high-gain flat antenna with either vertical or horizontal polarization. An ODU with a connector to an external antenna is also available.

The BreezeMAX PRO CPE IDU is available in multiple network configurations that optimally serve a wide variety of market segments and applications. Each version of IDU connects directly to the ODU via a category 5 Ethernet cable that carries the data traffic, power and control signals between the IDU and ODU.

## BreezeMAX PRO CPE IDU types:

**BreezeMAX™ Si**
Keep it Simple!

BreezeMAX Si is Alvarion's self installable, nomadic WiMAX subscriber unit, which features a compact design ideal for residential and SOHO users and provides data services using either its 10/100 BaseT port or USB V1.1/2.0 interface. The BreezeMAX Si integrates multiple antennas with fast switching, best base station selection, high output power to the antenna port and much more.
BreezeMAX Si – Keep it Simple!
Just open the box and plug it in…

## Broadband Data CPE

The BreezeMAX broadband data CPE acts as a bridge between the wireless and wireline media, supporting up to 512 MAC Addresses.  It connects the subscriber's data equipment via a standard IEEE 802.3 Ethernet 10/100 BaseT (RJ 45) interface.

## Broadband Voice Gateway CPE

The broadband voice gateway CPE provides integrated voice and data services for residential and SOHO users and is available in two models:

front

back

- One 10/100 BaseT data port and one RJ-11 voice POTS port.
- One 10/100 BaseT data port and two RJ-11 voice POTS port.

Featuring advanced voice and data functions such as VLAN tagging, traffic prioritization by IP DiffServ, H.323 and SIP protocols support, Class voice services (3-Party conference, call waiting, call hold), integrated management and more, the broadband voice gateway CPE presents an ideal single box solution for operators seeking to serve combined broadband voice and data services.

## IDU Broadband Data & Voice - Gateway, Feeding and Backup in One Unit

Both the IDU-1D1V and 1D2V are wall mounted, compact and easy-to-install indoor units, providing a residential gateway and outdoor unit feeding functionality. Supporting broadband data with 1 or 2 POTS lines, the IDU, is also equipped with battery backup ensuring service continuity. Voice networking is achieved through either SIP or H.323 protocols supporting all CLASS services.

## Networking Gateway CPE

The BreezeMAX networking gateway CPE is the optimal networking solution for both home and small business users. It features an advanced integrated broadband router with comprehensive IP-sharing and security capabilities. The networking gateway CPE has

front

back

four 10/100 BaseT ports and an 802.11g wireless access point. The powerful networking solution not only enables comprehensive high-speed connection sharing for multiple users, but also brings the freedom of high-speed, wireless broadband connectivity to home and SOHO networks with integrated 802.11b/g wireless LAN functionality. With features such as static & dynamic routing, NAT functionality, built-in firewall and an indoor coverage range of 35-100m, the networking gateway presents operators with a compelling, high quality home networking solution.
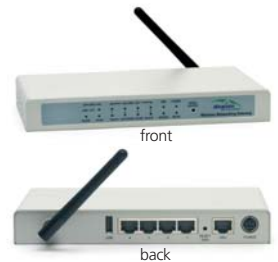
## Customer Premises Equipment Components

| Product Type | Product Name | Product Description |
|---|---|---|
| CPE Indoor Equipment | BMAX-CPE-Si | BreezeMAX self install indoor CPE unit with one 10/100 BaseT or USB 1.1/2.0 data port |
| | BMAX-CPE-IDU-1D | BreezeMAX broadband data CPE indoor module  with one 10/100 BaseT data port |
| | BMAX-CPE-IDU-VG-1D1V | BreezeMAX broadband voice gateway CPE indoor module with  one 10/100 BaseT data port + one RJ11 POTS Port |
| | BMAX-CPE-IDU-VG-1D2V | BreezeMAX broadband voice gateway CPE indoor module with one 10/100 BaseT data  ports + two RJ11 POTS Port |
| | BMAX-CPE-IDU-NG-4D1WLAN | BreezeMAX networking  gateway CPE indoor module with four 10/100 BaseT data ports + one 802.11b/g wireless interface |
| CPE Outdoor Equipment | BMAX-CPE-ODU-PRO-SA | BreezeMAX subscriber outdoor radio unit with integrated vertical antenna |
| | BMAX-CPE-ODU-PRO-SE | BreezeMAX subscriber outdoor Equipment radio unit with external antenna |

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## Specifications

### Radio & Modem

| Parameter | Value |
|---|---|
| Frequency | 3.3GHz FDD: UL: 3366-3400MHz; DL: 3316-3350MHz and UL: 3300-3324MHz; DL: 3376-3400MHz 3.5GHz FDD: UL: 3399.5-3500MHz; DL: 3499.5-3600MHz 3.6GHz FDD: UL: 3600-3700MHz; DL: 3700-3800MHz |
| Radio Access Method | TDMA FDD |
| Modulation | OFDM 256 with adaptive sub-carrier modulation: BPSK, QPSK, QAM 16, QAM 64. |
| Channel bandwidth | 3.5MHz; 1.75MHz - software selectable |
| Duplexing Scheme | AU full duplex, SU half duplex |
| Central frequency resolution | 125KHz |
| Antenna (CPE) | 17 dBi typical, 18° AZ x 18° EL, vertical/horizontal polarization, compliant with EN 302 085, V1.2.2 Range 1 |
| Maximum Output power (At antenna port) | AU: 28dBm (+/-1dB) SU: 20dBm (+/-1dB) |
| Sensitivity Typical values | -82/85 dBm for highest modulation (QAM 64) @ 3.5/1.75 MHz -100/103 dBm for lowest modulation (BPSK) @ 3.5/1.75 MHz |

### Data Communications

| | |
|---|---|
| Data | IEEE 802.3 CSMA/CD |
| Air Interface | IEEE 802.16-2004 |
| VLAN support | IEEE 802.1Q |
| Traffic Classification | Layer 2 IEEE 802.1p, IP DiffServ Code Points DSCP |

### Networking Gateway CPE

**General Features**

| | |
|---|---|
| WAN Connection Types | Static IP, Dynamic IP (DHCP), PPPoE and PPTP client |
| Routing | Static Route, Dynamic Route (RIP1/2) |
| Firewall | NAT Firewall with SPI mode |
| NAT Functionality | NAT, Virtual Server, Special Application, DMZ Host |
| VPN | IPSec, PPTP & LT2P Pass-Through |
| DHCP | DHCP server for LAN and WLAN clients, DHCP client for WAN |

**Wireless Features** (supported only with wireless networking gateway)

| | |
|---|---|
| Standard | IEEE 802.11b / 802.11g |
| Range Coverage | Indoors - approx. 35-100 meters |
| Security | WEP encryption - 64 Bit, 128 Bit |

### Voice Gateway CPE

**Interfaces**

| | |
|---|---|
| Ethernet LAN | 1 10/100 Base-TX RJ45 port |
| Telephony | 1 or 2 RJ11 connectors for analog telephones |

**Security**

| | |
|---|---|
| PipeLock™ | Button for disconnection of the secure Ethernet LAN port |
| Packet Filter | Separates data, management and telephone traffic |
| VLAN | 802.1Q+p |
| Authentication Per Registration | H225.0.0 RAS |

**Telephony and fax services**

| | |
|---|---|
| VoIP Protocol | H.323, SIP |
| Internal Class 5 services | Call Waiting, 3-party call, call alteration, differentiated ringing tones |
| External Class 5 services | Activation of class 5 services supported by the IP-telephony system |
| G3 Fax | T.38 |
| Calling number identification | FSK, DTMF |
| DTMF | In-band and out-band using H245 and H225 bi-directional |
| Speech Codecs | G711, G729ab |
| DiffServ | Level 3 (IP) mechanism for handling QoS |

### Electrical

| | Subscriber Unit | Base Station |
|---|---|---|
| Power Source Power Consumption (max) | 100-240 VAC, 50-60 Hz | -36 to -72 VDC BST PS: 200W each, up to 4 PS |
| | CPE PRO ODU only: 16.5W | AU IDU 2 channels: 38 W AU ODU: 38 W |
| | CPE PRO IDU+ODU data: 22W | NPU: 70 W, PIU: 35 W, AVU: 24 W |

### Environmental

| | Indoor Unit | Outdoor Unit |
|---|---|---|
| Operating Temperature | 0°C to 40°C | -40°C to 55°C |
| Operating Humidity | 5%-95% non condensing | 5%-95% non condensing, weather protected |

### Standard Compliance

| Type | Standard |
|---|---|
| EMC | ETSI EN 301 489-1 |
| Safety | EN 60950 (CE), CB, IEC 60 950 US/C (TUV) |
| Environmental | ETS 300 019 part 2-1 T 1.2 & part 2-2 T 2.3 for indoor & outdoor part 2-3 T 3.2 for indoor, part 2-4 T 4.1E for outdoor |
| Radio | ETSI EN 301 021 V.1.4.1, ETSI EN 301 753 V.1.1.1 |

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