alvarion®
Your Open WiMAX Choice

Carrier-class Broadband Wireless Access Platform

# BreezeMAX® Macro Indoor

**BreezeMAX Macro Indoor, is a carrier-class WiMAX 802.16e certified platform for fixed, nomadic and mobile wireless access, and is the foundation of Alvarion's 4Motion® solution. Leveraging years of experience and industry leadership, BreezeMAX Macro Indoor incorporates Alvarion's SentieM technologies for optimized air link coverage and capacity providing best value for operators.**

*Indoor Unit*

## BreezeMAX Macro Indoor System Components

### Indoor Unit (IDU)

The IDU is the main chassis of the BreezeMAX base station, which establishes wireless network connections and manages bandwidth in compliance with the IEEE 802.16e-2005 wireless standard. The IDU is designed for diversity, provides high throughput and is built according to the Software Defined Radio (SDR) approach. This creates a highly flexible platform that supports beamforming (BF) and allows for seven access unit (AU) cards and two network processing unit (NPU) cards to be hosted for redundancy support. The IDU is comprised of two main units in addition to power and management components:

**Access Unit (AU):** is a programmable, cutting-edge WiMAX modem card, which ensures maximum resource utilization for both personal and primary broadband access. The AU implements four transmit/receive channels, supports BF and MIMO Matrix A and B technologies and is connected directly to remote radio outdoor units (ODUs).

**Network Processing Unit (NPU):** is a central processing unit managing the base station components and all connected subscriber units.

The NPU can operate in either of the following two modes:

**Transparent mode:** which includes traffic aggregation of all access units to and from the backbone via 100/1000 Mbps network interface

**ASN-GW mode:** which includes the following functions:

- Traffic classification and connection establishment initiation
- Policy-based data switching
- Service level agreement management
- Overall base station, operation control and alarm management
- Distributed or centralized architecture

### Outdoor Access Unit (ODU)

A high-power remote radio unit that connects to an external antenna, the ODU provides high system gain and interference robustness utilizing high transmit power and low noise figure. Supporting up to 20 MHz bandwidth, the ODU is scalable for future options such as increased capacity through carrier multiplexing or wider frequency bandwidths. The BreezeMAX Macro Indoor base station offers a range of ODUs featuring diverse configurations and streamlining 2nd and 4th order diversity.

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215106 rev.b


# Specifications

## Radio & Modem

**Frequency**

| | |
|---|---|
| 2.3 GHz band | 2,300 - 2,360 MHz |
| 2.3 GHz band | 2,300 - 2,400 MHz * |
| 2.5 GHz band | 2,496 - 2,690 MHz |
| 3.3 GHz band | 3,300 - 3,400 MHz * |
| 3.5 GHz band | 3,400 - 3,600 MHz |
| 3.6 GHz band | 3,600 - 3,800 MHz * |

**Access Method** SOFDMA

| **Channel bandwidth** | 5 MHz | 10 MHz | 7 MHz |
|---|---|---|---|
| FFT Size | 512 | 1024 | 1024 |
| Sampling frequency | 5.6 MHz | 11.2 MHz | 8 MHz |
| Subcarrier frequency spacing | 10.9375 KHz | 10.9375 KHz | 7.8125 KHz |
| Total symbol duration | 102.8571429 µs | 102.8571429 µs | 144 µs |
| Useful symbol duration | 91.42857143 µs | 91.42857143 µs | 128 µs |
| Guard interval duration | 11.42857143 µs | 11.42857143 µs | 16 µs |

Flexible DL/UL ratio for all channel bandwidths 3:1, 2:1, 1:1, 1:2*, 1:3*

**Central Frequency Resolution** 0.125 MHz

**Modulation** OFDMA modulation, 1024/512 FFT points; QPSK, QAM16, QAM64

| **Radio units** | **ODU Type** | **ODU Tx Power** | **ODU Bandwidth** |
|---|---|---|---|
| 2.3-2.4 GHz | 1 Tx + 1 Rx | 36dBm | Up to 10 MHz |
| 2.496-2.69 GHz | 1 Tx + 1 Rx | 36dBm | Up to 10 MHz |
| | 2 Tx + 4 Rx | 38dBm / 38dbm | Up to 20 MHz |
| 3.4-3.6 GHz | 1 Tx + 1 Rx | 34dBm | Up to 14 MHz |
| | 2 Tx + 2 Rx | 38dBm | Up to 20 MHz |
| | 2 Tx + 4 Rx | 37dBm / 37dbm | Up to 20 MHz |

* Future

## Data Communication

| **Parameter** | **Indoor Unit** | |
|---|---|---|
| Standard compliance | IEEE 802.3 CSMA/CD | |
| Speed | Data Interface | 100/1000 Mbps, Full Duplex with Auto Negotiation |
| | Management Interface | 10/100 Mbps, Half/Full Duplex with Auto Negotiation |
| | Cascade Interface | 100/1000 Mbps, Full Duplex with Auto Negotiation |
| | ACU Interface | 10/100 Mbps, Half/Full Duplex with Auto Negotiation |

## Electrical

| **Parameter** | **Dimensions** | **Weight (kg)** |
|---|---|---|
| BST-SH | 8U 19''/ETSI type shelf, 8U x 43.19 x 24 | 6.9 (excluding AVU) |
| PIU | 3U x 5HP x 16 | 0.35 |
| PSU | 3U x 8HP x 16 | 0.7 |
| NPU | 6U x 7HP x 16 | 0.7 |
| AU | 6U x 7HP x 16 | 0.6 |
| AVU | 2U x 84HP x 16 | 1.7 |
| ODU 1 Tx + 1 Rx | 329 x 157 x 169 mm | 6.1 |
| ODU 1 Tx + 2 Rx | 420 x 340 x 155 mm | 10.5 |
| ODU 2 Tx + 2 Rx | 420 x 340 x 270 mm | 14 |
| ODU 2 Tx + 4 Rx | 420 x 340 x 270 mm | 15 |

## AU to ODU Communication

| **Item** | **Description** |
|---|---|
| IF frequency | Tx: 240 MHz<br>Rx: 140 MHz |
| Reference synchronization frequency | 64 MHz |
| Bidirectional control frequency | 14 MHz |
| IF cable impedance | 50 ohm |
| Maximum IF cable attenuation | 10 dB @ 240 MHz<br>7.5 dB @ 140 MHz<br>8 dB @ 64 MHz |

## Environmental

Operating temperature
**IDU** 0°C to 40°C
**ODU**-40°C to 55°C for all ODU types
Operating humidity
**IDU** 5%-95% non condensing
**ODU** 8%-100% (optional BreezeSHIELD for external use)

## Standard Compliance

| **Type** | **Standard** |
|---|---|
| EMC | ETSI EN 301 489-1 |
| Safety | EN 60950 (CE)<br>IEC 60 950 US/C (TUV) |
| Environmental | ETSI 300 019:<br>Part 2-1 T 1.2 & part 2-2 T 2.3 for indoor & outdoor<br>Part 2-3 T 3.2 for indoor<br>Part 2-4 T 4.1E for outdoor |
| Radio | ETSI EN 302 326<br>FCC part 15, part 27 |

### About Alvarion

Alvarion is the largest WiMAX pure player, ensuring customer long-term success with fixed and mobile solutions for the full range of frequency bands. Based on its OPEN™ WiMAX strategy, the company offers superior wireless broadband infrastructure and an all-IP best-of-breed ecosystem in cooperation with its strategic partners. Alvarion has delivered over 200 commercial WiMAX deployments worldwide.