



---

# BreezeMAX™: Delivering the Promise of WiMAX

---





## Milestones

July  
2005

Commercial availability of BreezeMAX PRO CPE with Intel® PRO/Wireless 5116 chip with voice, data and WiFi interfaces

June  
2005

Live showcase of BreezeMAX Si – self install CPE with Intel® PRO/Wireless 5116 chip

May  
2005

BreezeMAX: The most widely deployed WiMAX-ready platform in more than 30 countries and with over 100 operators

April  
2005

First vendor to showcase WiMAX-ready CPE with integrated Intel® PRO/Wireless 5116 chip in WiMAX Forum labs

June  
2004

BreezeMAX 3500 commercial launch

July  
2003

Announcement of Intel/Alvarion strategic collaboration for development of WiMAX chip (Intel) & system (Alvarion)



“ Alvarion was our first partner back in 2003 when we identified WiMAX as a key strategic objective for Intel as a company. Alvarion's BreezeMAX PRO CPE, using Intel's PRO/Wireless 5116 broadband interface system-on-chip, reflects our close relationship overall. Intel and Alvarion will continue to develop WiMAX technology to enable a mass market while moving towards a mobile, interoperable future. ”

**Scott Richardson**  
General Manager, Broadband Wireless, Intel®



“ Alvarion has been with the WiMAX Forum from the beginning as a major advocate of the technology and one of the key companies driving the standard. Its already numerous BreezeMAX deployments confirm Forum claims of service quality, capacity, coverage and economics and have generated substantial market interest in WiMAX. In addition, Alvarion's presence and leadership in key working groups of the organization have been invaluable. ”

**Ron Resnick**  
President, WiMAX Forum™



# Alvarion: A Legacy of Leadership

For over a decade, Alvarion has been developing and offering wireless broadband technologies integrated into carrier-quality platforms to operators, service providers, municipalities, enterprises and beyond.

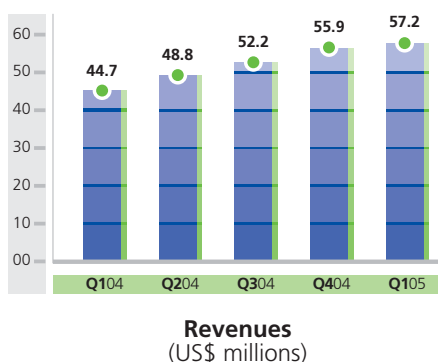
From the beginning of the industry, Alvarion has been a leader in the broadband wireless access (BWA) market. As the world's largest vendor of wireless broadband networking equipment infrastructure, the company has earned the respect and trust of over 2000 carriers worldwide, building that customer base into the leading market share position in the BWA market.

Financially strong and built for the long term, Alvarion's world class products and technology platforms address every major BWA market segment.

From providing high-performance, multi-service broadband access and data and voice services in the last-mile, facilitating cost-effective feeding for cellular networks and enabling building-to-building connectivity and public wireless LAN, Alvarion's products offer the full spectrum of wireless broadband applications.

Alvarion has played a significant and proactive role in every major wireless standards board that has cultivated the establishment of industry protocols. Forging the future direction of the BWA community since its inception by serving in leadership positions in global organizations, the company has also donated technology to advance standardization. Alvarion is proud to be a primary driver in enabling the increasing widespread acceptance of BWA technology and systems.

**Alvarion Quarterly Revenue Growth**



“ Once the Rosedale chip is launched and systems begin to be certified by the WiMAX Forum, the potential of WiMAX can be realized worldwide. Alvarion's BWA and OFDM experience continues to position the company as a strong WiMAX equipment vendor. The commercial deployments of Alvarion's BreezeMAX platform demonstrate the capacity and quality of service achievable with WiMAX, also helping to increase confidence in the technology. ”

**Lindsay Schroth**  
Senior Analyst, Yankee Group

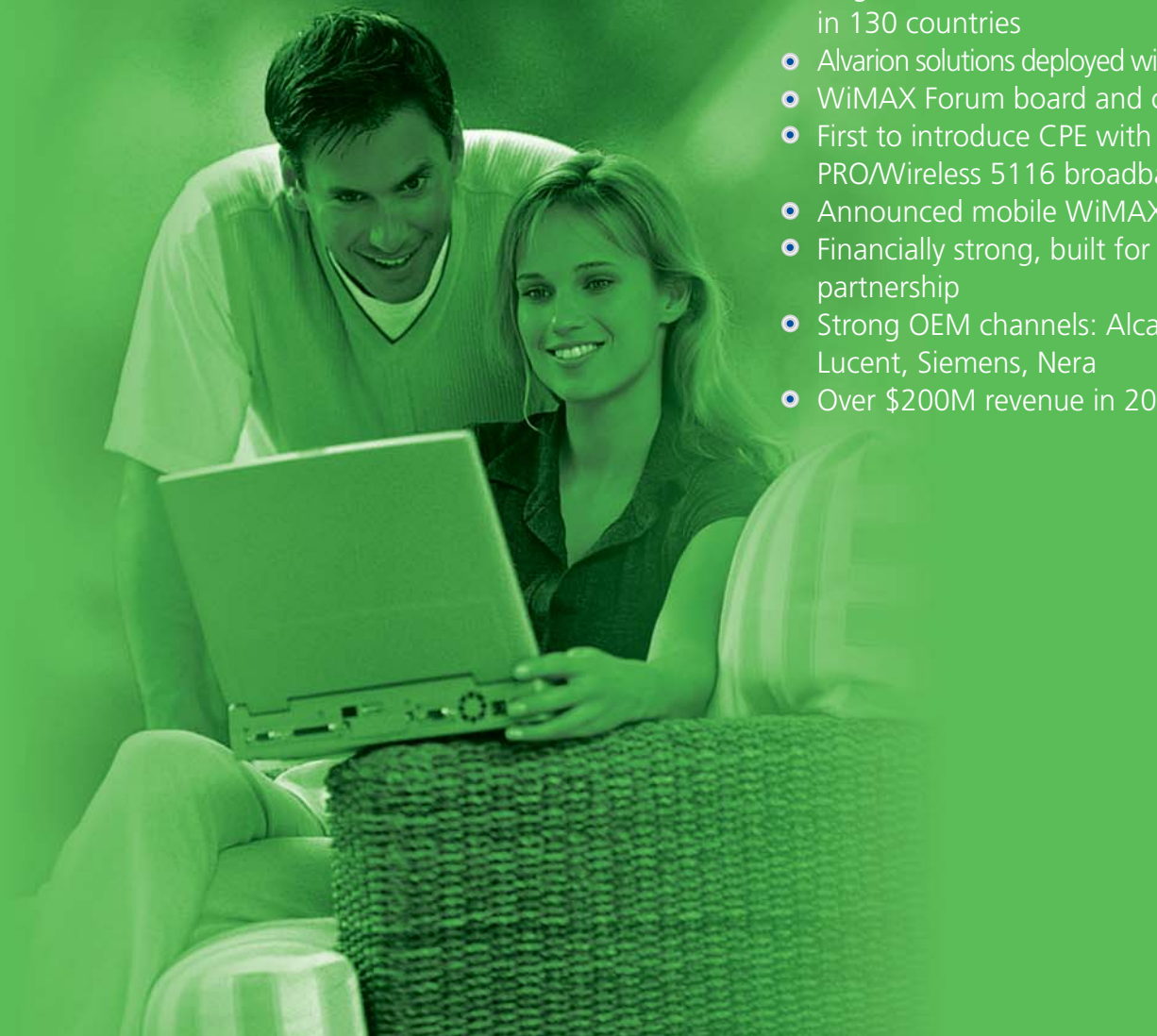


“ WiMAX clearly complements existing and emerging 3G mobile and wireline networks, and can play a significant role in helping our customers deliver converged service offerings that can be accessed using a broad range of devices on a wide variety of networks. We're very excited to work with Alvarion because they are the front-runners and thought leaders in the WiMAX arena and this relationship will enhance our product portfolio. ”

**John Marinho**  
VP Strategic Marketing, Lucent Technologies

# Highlights

- Largest BWA vendor
- Largest install base - over 2 million units installed in 130 countries
- Alvarion solutions deployed with over 2000 carriers
- WiMAX Forum board and charter member
- First to introduce CPE with integrated Intel PRO/Wireless 5116 broadband interface
- Announced mobile WiMAX product
- Financially strong, built for long-term partnership
- Strong OEM channels: Alcatel, Lucent, Siemens, Nera
- Over \$200M revenue in 2004



**With more than 2 million units deployed in 130 countries, Alvarion is the uncontested leader in the wireless broadband market. An extensive and proven product portfolio offers both fixed and mobile solutions, covering a wide range of frequency bands from 450 MHz to 28 GHz.**

Alvarion's worldwide installations are the result of a global sales force, several world-class OEM partners including Alcatel, Lucent, Siemens and Nera and more than 200 local partners. Alvarion's customers can offer the full complement of network applications, including:

- Broadband access
- Corporate VPNs
- Toll quality telephony
- Mobile base station feeding
- Hotspot backhaul
- Community interconnection
- Public safety communications
- Cellular network extensions
- Mobile voice and data

## Targeted for various user profiles including:

- Residential
- (SOHO) small office and home office
- (SME) small and medium enterprises
- (MTUs and MDUs) multi-tenant and multi-dwelling units
- Corporate businesses

Alvarion's products solve any carrier deployment challenge - whatever the population diversity or operating environment whether in rural, suburban or urban areas.

# WiMAX: Industry Conceived, Alvarion Delivered



An implementation of the IEEE 802.16 standard, WiMAX (Worldwide Interoperability for Microwave Access) is a standards-based wireless technology providing metropolitan area network connectivity of high-throughput, broadband data and toll-quality voice services in networks covering long distances and wide ranges. WiMAX enables scalable, carrier-class solutions to support thousands of users with a single base station, while providing differentiated service levels. A WiMAX Metropolitan Area Network (MAN) is configured in a cellular manner with base stations strategically located to provide metro-area coverage via point-to-multipoint (PMP) wireless connectivity with robust equipment fit for all climates and terrain.

Alvarion embraced the arrival of the WiMAX Forum from the very beginning. As a charter member of this prestigious organization and holding two vice-presidency chairs, Alvarion is helping to lead the industry towards the widespread adoption of standard WiMAX products.

## ...And Access for All

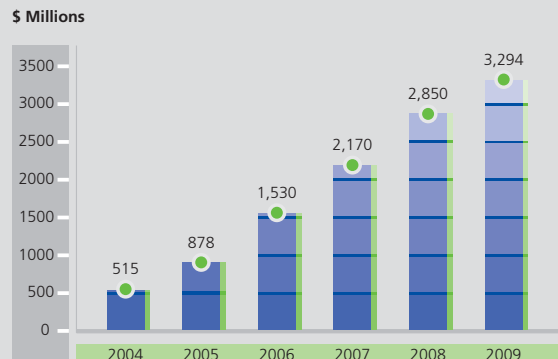
Driven by the WiMAX Forum, WiMAX certified products will mean standardized and interoperable systems, among various industry vendors, which will result in significant reductions in equipment costs and lower operator risk. Cost reductions will improve business cases, while enabling more affordable and widespread broadband access for business and residential users.



“ In terms of market share, Alvarion is the leading global supplier of broadband wireless networks. The company continues to strengthen its market position through acquisitions and new product development. The launch of Intel's PRO/Wireless 5116 broadband interface, which is embedded into Alvarion's new BreezeMAX CPE, will further strengthen their product line as the market embraces WiMAX. With market expectations of approximately \$1.5 billion in 2009, Alvarion will be a catalyst in achieving this market potential. ”

Emmy Johnson  
Principal Analyst, Skylight Research

Worldwide BWA Equipment Revenue 2004-2009



Skylight Research November 2004

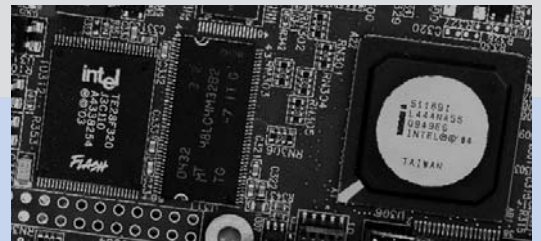


# Highlights

- WiMAX product certification planned to start in H2-2005
- WiMAX organization includes more than 250 members among them operators, vendors, system integrators, chip vendors
- WiMAX benefits:
  - End users: more broadband options, lower prices, fixed, portable and mobile services
  - Service providers: standard technology, lower risk, new markets, better ROI

## Partnership with Intel

Alvarion's industry leadership and foresight led to its selection by Intel as the first vendor to collaborate on the development of WiMAX products. By April 2005, Alvarion had another first, the incorporation of Intel's pioneering WiMAX chip into the BreezeMAX product line. In the same month, the BreezeMAX PRO CPE was showcased in front of numerous operators and media personnel at the WiMAX Forum's Face2Face Event in Malaga, Spain. Performing in a live demonstration, spectators gathered in the Cetecom lab, the official testing lab of the WiMAX Forum, and witnessed triple play (data, voice and video) services from a BreezeMAX CPE system, embedded with the Intel chip, PRO/Wireless 5116 broadband interface. All subsequent versions of BreezeMAX CPE, including the self install CPE model, will be embedded with Intel's PRO/Wireless 5116 broadband interface.



## Taking WiMAX to the MAX

The launch of Alvarion's BreezeMAX platform in mid-2004 was a key industry milestone and reinforced Alvarion's leading position in the development of WiMAX technology. Leveraging field proven OFDM technology and non-line-of-sight (NLOS) capabilities from the BreezeACCESS® product family, BreezeMAX was deployed commercially in numerous sites around the world within a few months of its launch.

Its deployment in over 30 countries since its introduction means that Alvarion has been instrumental in driving WiMAX to its current place of prominence with major operators. The results of all these efforts have been extremely satisfying, as WiMAX standards have succeeded in moving broadband wireless into a mainstream last mile solution alongside DSL and cable modems.

Soon the Forum will ratify the IEEE 802.16e standard to realize a mobile broadband version of WiMAX. With this action, the Forum will create an all IP mobile offering that will be capable of connecting users with broadband wherever in the world they may travel. The widespread deployment of mobile will be achieved through volume opportunities for silicon and system suppliers that will result in improved economics for carriers and the extensive deployment of fixed and mobile BWA networks.



“ Our business model is focused on providing broadband to rural and urban areas that are currently not reached and would be hard pressed to be served by DSL networks. Until now, we have been concentrating our efforts on delivering critical access to large enterprises– a strategy which has proved to be highly successful. With BreezeMAX, we can achieve the proper economics of WiMAX with smaller business customers and residential users. The BreezeMAX solution is the key element to rolling out broadband services to these types of users. ”

**Carlos Morrell**  
CEO, Iberbanda

# BreezeMAX: WiMAX and Beyond

BreezeMAX is Alvarion's WiMAX-ready platform leveraging the company's BWA industry leadership, proven field experience, and advanced core wireless and networking technologies including many years of experience with OFDM technology.

Powered by Intel's PRO/Wireless 5116 broadband interface, 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.

The system, with excellent sensitivity and market leading OFDM radio technology, is robust to operate in adverse channel conditions and non-line-of-sight links. With high power radios that support diversity and smart antenna techniques, BreezeMAX enables the use of indoor self-install CPEs in both dense urban and suburban environments.

BreezeMAX supports a wide range of network services, including Internet access, VPNs, Voice, E1/T1, video and multimedia applications. The advanced Quality of Service (QoS) capabilities enable operators to offer differentiated SLAs with committed QoS for each service.



“ WiMAX is essential to our future success and has provided us with a strong and profitable business model. BreezeMAX provides operators like us with the flexibility to serve a variety of business and residential customers, cost effectively – and profitably. ”

**Jean-Paul Rivière**  
Chairman & CEO, Altitude Telecom



“ We are investing heavily in our wireless broadband network and need to be sure that we have the most experienced vendor with the best equipment onboard. ”

**Bertrand Lebarbier**  
Assistant General Manager Back Office  
Development, Altitude Telecom





# Highlights

- WiMAX platform
- Field proven
- Deployed in over 30 countries
- Wide variety of frequencies: 1.5GHz - 6GHz
- FDD / TDD
- Modular & scalable architecture
- Self-install
- Multi-service with QoS
- Best NLOS and coverage performance
- Suitable for residential, business, MDU/MTU, hotspot, backhaul
- Fixed, portable and mobile services

## Path to Mobility

The upcoming mobile WiMAX standard promises to bridge the gap among various services that were previously unavailable to mobile users. Among Alvarion's series of "firsts" in penetrating the market with WiMAX-ready products is the introduction of a BreezeMAX application capable of delivering mobile wireless services over cellular networks. This is new and uncharted territory where a standard cellular phone or PDA equipped with new technology becomes an all-in-one communications center for voice, broadband Internet, email, video streaming and beyond. BreezeMAX platform has a clear upgrade path to support the emerging WiMAX mobile industry.

Mobile WiMAX opens the door to true broadband mobility and greater mass-market opportunity with standard based chips integrated into laptops and PDAs. It further reduces the burden on operators and increases opportunities for operators to make good on the promise of broadband access that is available anytime, anywhere.

## Complete Spectrum Solution

Alvarion's BreezeMAX platform supports a variety of frequencies in both licensed and license-exempt bands including 1.5GHz - 6GHz bands, and leverages both FDD and TDD technologies.



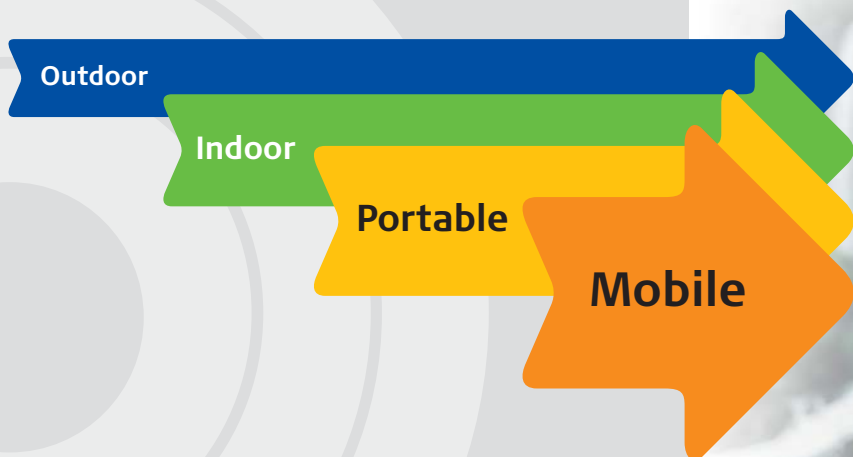
“ The WiMAX technology will enable real wireless mobility. In other words, it will give us the freedom to use our laptops or PDAs to access the Internet or transmit voice with greater capacity and better quality of service than other current options. It is fundamental to be at the forefront in the development of wireless access solutions. Working together with Intel and Alvarion, main providers of wireless solutions and WiMAX worldwide, guarantees our success and strengthens our position in the market. We will remain committed to our customer's needs, by developing the most ample and innovative national broadband wireless network in Argentina with presence in over 70 cities. ”

**Luis Galli**  
General Manager, Ertach (formerly Millicom Argentina)



“ As part of its user-centric vision, Alcatel is committed to providing end-users with a seamless broadband experience, whatever the access technology. Our agreement with Alvarion will allow us to offer service providers a fixed wireless broadband solution matching their customers' current needs. ”

**Marc Rouanne**  
COO of Mobile Activities, Alcatel



# BreezeMAX Base Station: The Heart of the Network

**The BreezeMAX base station is a highly modular and scalable base station, available in both micro and macro sizes to ensure maximum cost efficiency. Both base station types share the following key attributes:**

- WiMAX-ready design for future support of WiMAX-certified mode
- OFDM, OFDMA, smart antenna technology that enables indoor self install capabilities
- Flexible and modular design with unmatched sharing capacity of one line card on four radio sectors spiralling up to the capacity of four line cards on one radio sector enabling capacity from 4.5Mb up to 72Mb per sector
- Over 30km coverage
- SNMP central management using AlvariSTAR™



## **Macro Base Station**

The macro base station is an 8U high cPCI shelf that fits in standard 19" or ETSI racks. The base station contains a network and radio modules, power supply and power feeding modules. All the modules are hot swappable and high availability can be provided through multiple redundancy schemes. Support for smart antenna techniques, including space time coding (STC), polarization diversity and maximum ratio combining (MRC) together with high power radios enable the operation of indoor self-install CPEs in dense urban and suburban environments.



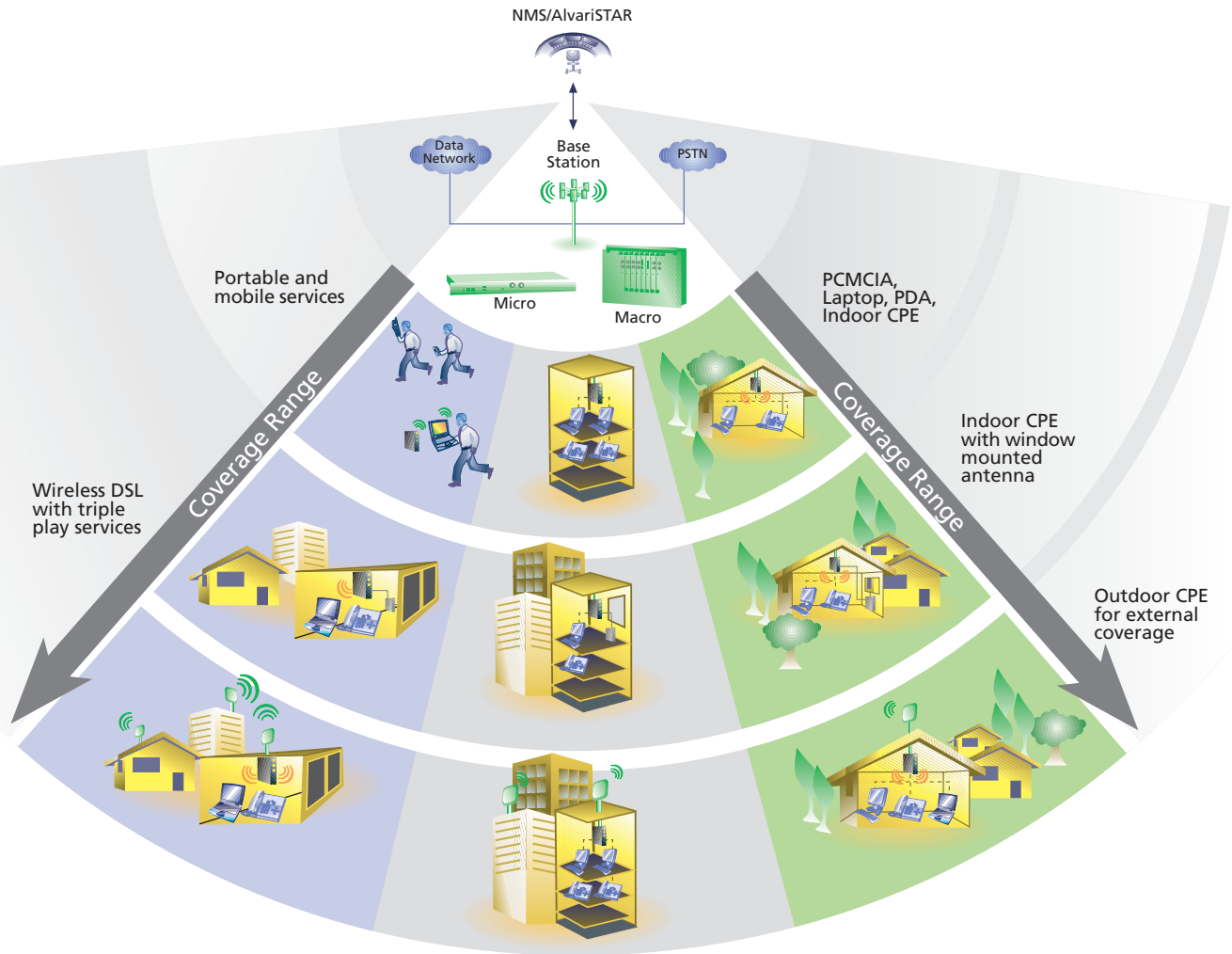
## **Micro Base Station**

The micro base station is ideal for operators needing a cost effective, scalable WiMAX-ready base station solution for maximum return from their network deployment, especially targeted for low-density or rural areas.

It is comprised of a stand-alone module (1U high 19") that connects to the same outdoor radio unit as the macro base station radio. With this common connection, operators have the ability to mix and match base station types according to deployment needs while enjoying the same feature set, provisioning and management functionality in both base stations.

# Highlights

- Carrier class, high availability, fully redundant design
- OFDM, OFDMA, smart antenna technology
- Best cost/performance
- WiMAX-ready
- Over 30km coverage
- Adaptive modulation: BPSK, QPSK, QAM 16 and QAM 64
- AlvariSTAR: Carrier class NMS
- Capacity up to 72Mbps per sector and 432 Mbps per base station



“ We specifically chose Alvarion’s BreezeMAX platform because we are looking to the future – we want a network which is economical and can be easily expanded. During the first stage, we plan to devote particular attention to the needs of enterprises so that they can contend with overseas competitors. However, our Alvarion network will be more than capable of serving the entire population of the island – businesses and residential customers. ”

**Pascal Bono**  
**Chairman of XTS Telecom Board, XTS Telecom**



# Subscriber Units: Customer-Centric For All Service Needs

The subscriber unit (SU) installed at the customer premises provides data connections to the access unit (AU). Extremely reliable, it serves as an efficient platform for a broad range of services, including high-speed access to IP based services at a net data rate up to 10 Mbps over a 3.5 MHz channel.

The BreezeMAX platform comes with several CPE types to provide operators with the ultimate flexibility to serve diverse range of business and residential customers cost effectively.

There are two primary types of CPE units, a self-install indoor CPE, and for longer range, an outdoor CPE. Both CPE types support the same rich set of features based on Alvarion's vast experience in development and deployment of broadband wireless networks that boast over 2 million deployed units, including:

- **Powered by Intel** PRO/Wireless 5116 broadband interface
- **WiMAX-ready**
- **Non-line-of-sight (NLOS) operation functionality** utilizing OFDM 256 FFT, OFDMA and AAS technology
- **Dynamic Adaptive Modulation** on a per burst basis to provide most reliable and robust wireless link availability in harsh environmental and radio conditions
- **Automatic Transmit Power Control (ATPC)** for quick and easy installation process that maximizes performance while minimizing interference
- **"Best BST"** feature that automatically scans and selects the best serving base station based on radio signal strength parameters as well as providing radio link redundancy functionality
- **Over the air remote software download functionality with dual flash "fail-safe" mechanism.** Automatic software download to multiple CPEs at a pre-scheduled time- saves on technician visits at customer locations
- **Comprehensive LED visual indication** for ease of installation and maintenance
- **Remote management support via SNMP.** The BreezeMAX CPEs are fully managed by AlvariSTAR NMS



“ Our vision is to create an out-of-the box wireless broadband solution for everyone. An access that is easy to set up and use, cost effective and available 24/7. By working together with Intel and Alvarion, we are turning this vision into reality, and since we've proven that this technology works not only in test labs but in a real world environment, cities throughout Scandinavia and Europe, especially those in remote areas underserved by wireline infrastructure can immediately benefit from MobileCity In-a-Box. This is the next step in Internet connectivity, and a business opportunity for cities and companies in general and for ISPs in particular. ”

**Göran Eriksson**  
CEO, MobileCity

## BreezeMAX PRO CPE: Professional and Long Distance Installations

### Reaching out across the miles

The BreezeMAX PRO CPE is comprised of an outdoor radio unit (ODU) and an indoor network interface unit (IDU). The CPE ODU contains the modem, radio and integral or external, high-gain flat antenna. The BreezeMAX CPE IDU is available in multiple network configurations to optimally serve the broad array 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.

### Broadband Data IDU

The BreezeMAX broadband data IDU is the basic CPE providing wireless connectivity. It connects the subscriber's PC or network via a standard Ethernet 10/100 Base-T (RJ 45) interface.

# Highlights

- Integrated Intel® PRO / Wireless 5116 broadband interface
- Self-install and outdoor for extended coverage
- Integrated SIM smart card
- Data, voice, WiFi and E1 / T1 interfaces
- Full indoor NLOS deployment
- Multiple antenna options
- Dynamic resource allocation protocol (DRAP) for quality voice services
- 10 Mbps net throughput per CPE
- SNMP management



## Networking Gateway IDU

The BreezeMAX networking gateway IDU 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 IDU has four 10/100 Base-T ports and a wireless access point. This networking solution is so powerful that it can enable comprehensive high-speed connection sharing for multiple users, while providing 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 WiFi coverage, the networking gateway presents operators with a compelling high quality, home networking solution.

## Broadband Voice Gateway CPE IDU

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

- One 10/100 Base-T data port and ONE RJ-11 voice POTS port
  - One 10/100 Base-T 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 5 voice services (3-Party conference, call waiting, call hold), integrated management and more, the broadband voice gateway IDU presents an ideal solution for operators seeking to serve the combined services of broadband voice and data.



# BreezeMAX™ Si

Keep it Simple!



**BreezeMAX Indoor Self-Install CPE:  
All-in-One - Just open the box and plug it in....**

The BreezeMAX Si is a compact, portable, single box device that is deployed indoors, typically near the end user's PC. It is designed for plug and play operation, enabled either via a SIM card or by using a user-friendly application provided on a CD with the unit.

The BreezeMAX self-install CPE supports intelligent antenna steering functionality using six antenna elements with 9dBi gain. Services and interfaces supported include 10/100 Base-T for IP data, 802.11b/g for WiFi hotspots, 1 or 2 POTS (RJ11) ports for voice services and battery back up.







# Specifications

## System

### Standard Compliance

Air interface	IEEE 802.16-2004; Future upgrade to 802.16e
Data	IEEE 802.3 CSMA/CD
Radio	ETSI EN 301 021 V.1.4.1 ; ETSI EN 301 753 V.1.1.1
EMC	ETSI EN 301 489-1
Safety	EN 60950 (CE) 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

### Environmental

Operating temperature	Indoor: 0°C to 40°C Outdoor: -40°C to 55°C
Operating humidity	Indoor: 5%-95% non condensing Outdoor: 5%-95% non condensing, weather protected

## Base Station

### Radio and Modem

Frequency bands	1.5GHz; 2.3GHz WCS; 2.5GHz BRS ; 3.3 - 3.8GHz ; 5 GHz
PHY	OFDM 256 FFT with uplink OFDMA and future support of SOFDMA for mobile WiMAX
Duplex mode	FDD / TDD
Modulations supported	64QAM to BPSK (8 adaptive levels)
Channel bandwidth	1.75MHz, 3.5GHz, 5MHz, 7MHz, 10 MHz
Multi carrier bandwidth (via IF Mux)	14 MHz
Maximum output power	34dBm
Antenna type	60°, 90°, 120°, Omni
Antenna polarization	Vertical and Horizontal

### Data and Networking

Network interface	10/100/1000 Base-T, E1/T1
VLAN support	IEEE 802.1Q
Traffic classification	Layer 2 IEEE 802.1p, IP DiffServ Code Points DSCP
QoS	Best Effort, Non-Real-Time, Real-Time, Continuous Grant
Diversity Schemes	Downlink: 2 branch STC (space time coding) and polarization diversity Uplink: 2nd / 4th order diversity MRC (maximum ratio combining)
FEC	Concatenated convolution coding and Reed Solomon; Rate: 1/2, 2/3, 3/4



## Subscriber Units

### Radio and Modem

Frequency bands	1.5GHz; 2.3GHz WCS; 2.5GHz BRS ; 3.3 - 3.8GHz ; 5 GHz
PHY	OFDM 256 FFT with uplink OFDMA
Duplex mode	FDD and TDD
Modulations supported	QAM 64 to BPSK ( 8 adaptive levels)
Channel bandwidth	1.75MHz, 3.5GHz, 5MHz, 7MHz, 10 MHz
Maximum output power (At antenna port)	20 and 24 dBm
Antenna type	18 dBi integrated, 12 dBi window mount, 9 dBi 6 element steering antenna
Antenna polarization	Vertical and horizontal

### Data and Networking

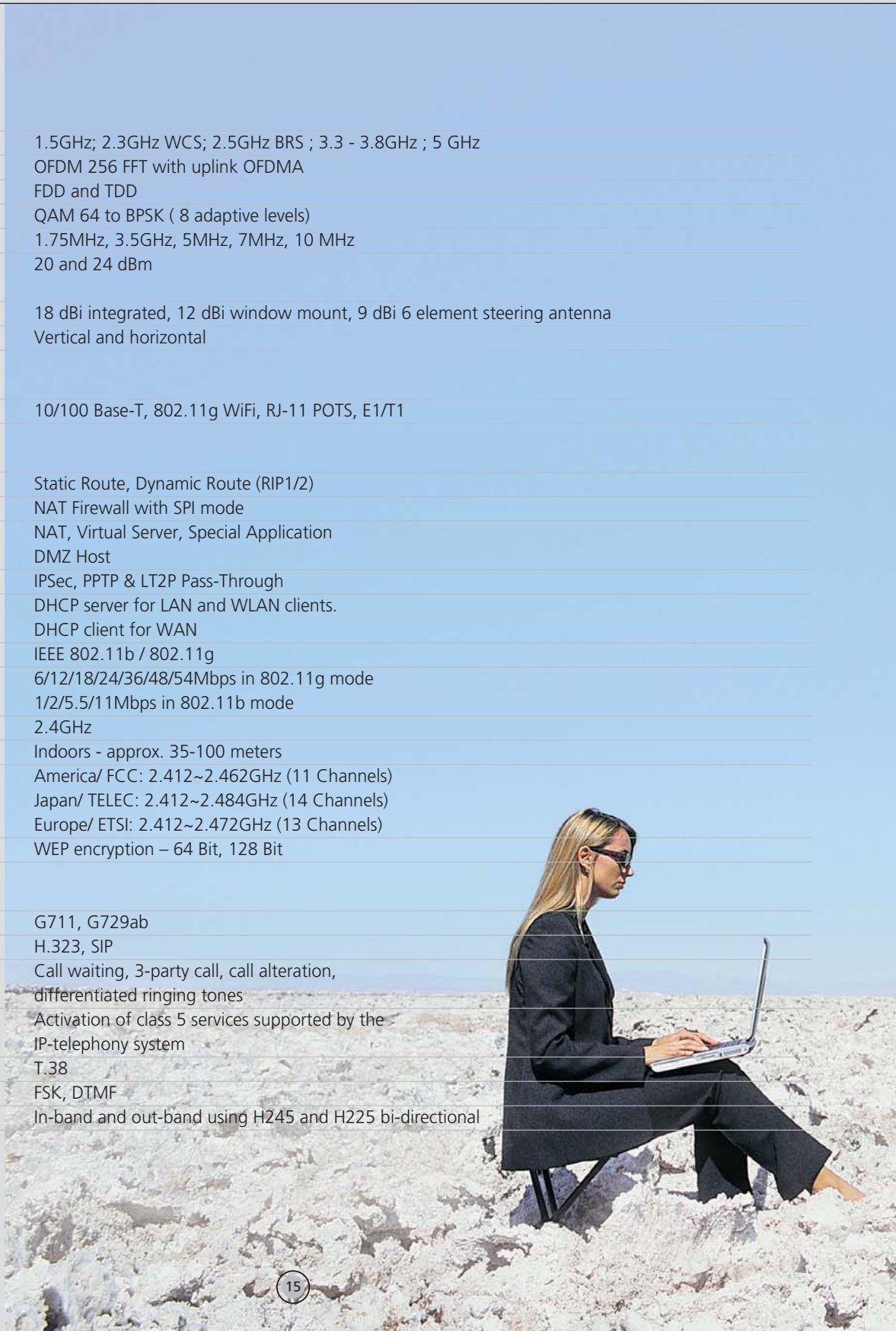
Network interface	10/100 Base-T, 802.11g WiFi, RJ-11 POTS, E1/T1
-------------------	--

### Networking Gateway CPE

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 LAN	IEEE 802.11b / 802.11g
Data Rates	6/12/18/24/36/48/54Mbps in 802.11g mode 1/2/5.5/11Mbps in 802.11b mode
Operating frequency	2.4GHz
Range coverage	Indoors - approx. 35-100 meters
Number of channels	America/ FCC: 2.412~2.462GHz (11 Channels) Japan/ TELEC: 2.412~2.484GHz (14 Channels) Europe/ ETSI: 2.412~2.472GHz (13 Channels)
Security	WEP encryption – 64 Bit, 128 Bit

### Voice Gateway CPE

Speech codecs	G711, G729ab
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





# Standard & Beyond

Progressing at a rapid pace, the WiMAX Forum has been working diligently to produce a set of standards that revolutionizes the potential for fixed and mobile broadband access. Standards establish a baseline for service capacity, coverage, and other operational features. With its years of experience in OFDM systems, Alvarion has engineered its BreezeMAX system beyond the WiMAX standard. As Alvarion uses the standards as a foundation, the BreezeMAX system maintains its ability to be integrated and interoperable with systems from other WiMAX vendors.

## Coverage is Key

Coverage is perhaps the most important indicator of a quality broadband wireless access system and a primary influence on cost - as good coverage performance requires fewer base stations. The extent of a BWA system's coverage is largely a factor of radio sensitivity, the specifications of which have been determined by the WiMAX and the IEEE 802.16-2004 standards. Alvarion's BreezeMAX system radio sensitivity, however, improves on this standard outperforming the specification by 8-10dBm as illustrated in the graph. Typically, 6dBm improvement in the link budget results in double the coverage.

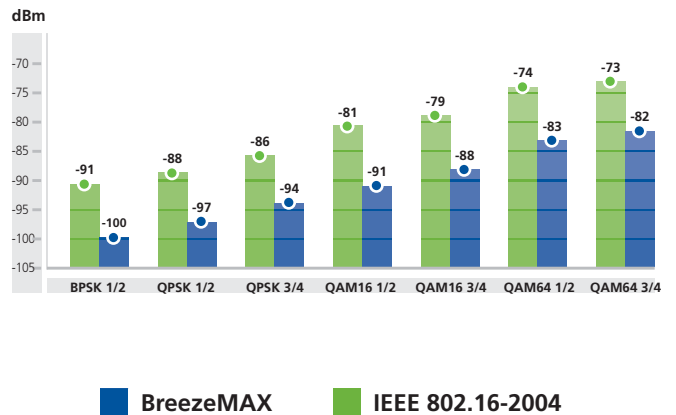
## Radio-Planning Translates to Profits

System coverage performance has a tremendous influence on cost. In the commercial example below, an area with the dimensions of 130km x 96 km is delineated. Compare the BreezeMAX system with typical competition base station requirements for this scenario.

The results favor BreezeMAX by far:

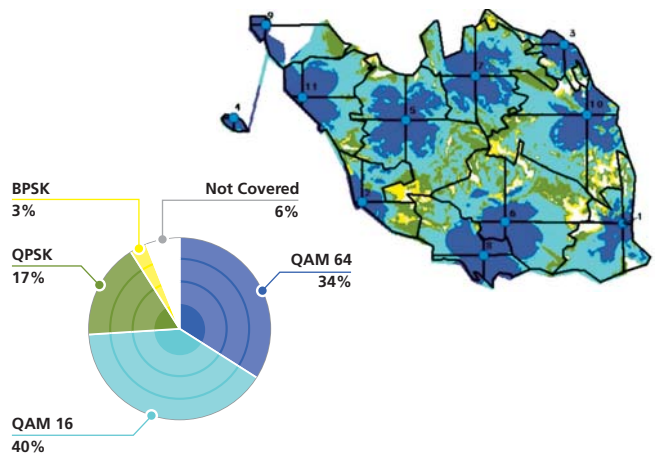
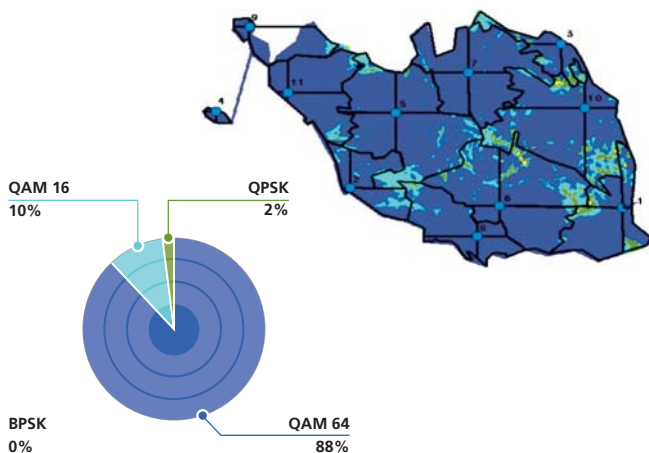
BreezeMAX provides 99.99% coverage with only 11 base stations in comparison with typical competition base station requiring 28 base stations for the same coverage performance. Furthermore, 98% of the area is covered by QAM 64 and QAM 16 modulations, resulting in spectral efficiency of 3.24 bit/sec/Hz.

### BreezeMAX Sensitivity



With the same 11 base station locations, the typical solution from competitor products provides only 94% coverage, with 77% of the area covered by QAM modulations and an average spectral efficiency of only 2.1 bit/sec/Hz.

## BreezeMAX Coverage VS. Competitor System Coverage



To achieve similar performance of BreezeMAX with a typical competition solution requires 28 base stations, which means much more investment in equipment, backhaul transmission and site acquisition and operational costs.

## Operator Key Benefits

- ✓ Extended Coverage
- ✓ Highly Scaleable
- ✓ QoS
- ✓ Carrier Class NMS
- ✓ Voice over WiMAX

## Build-As-You-Grow

An operator's investment in base station infrastructure is a primary part of their CAPEX and occurs at the early stages of deployment.

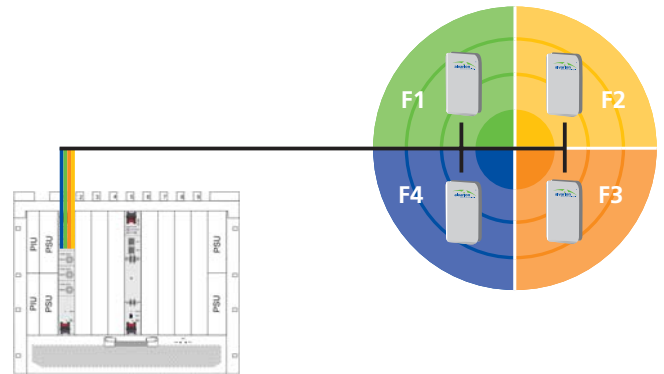
### An ideal solution needs to:

- Minimize initial base station CAPEX
- Maintain its initial radio planning and other operational aspects when growing the network
- Scale up incrementally using standard building blocks as more users join the network

### And BreezeMAX provides:

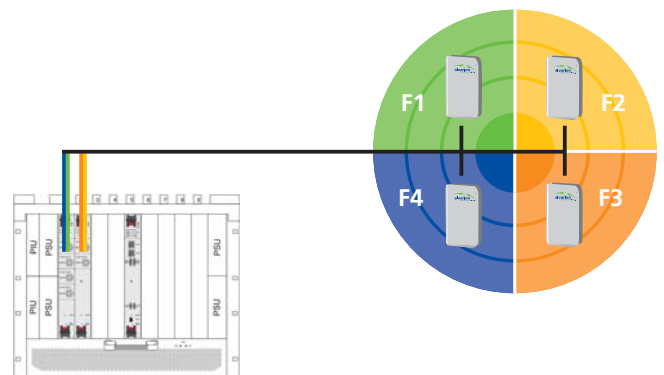
- Modem multi channel (MMC) functionality
- Connection of a single base station line card to multiple radios, thus splitting the capacity of a single modem among several base station sectors
- Increased capacity of the base station as more users join the network by simply adding more line cards

The diagram below illustrates how operators can start with minimal investment in their base station equipment, and easily scale up capacity as subscribers join the network.



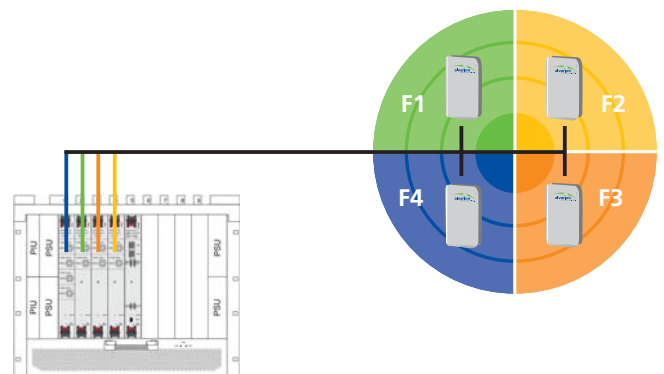
### Stage 1

Four radios connected to a single line card providing 18 Mbps capacity



### Stage 2

Four radios connected to two line cards providing 36 Mbps capacity



### Stage 3

Four radios connected to four line cards providing 72 Mbps capacity

## Quality of Service

Quality of service (QoS) is essential for the successful implementation of multi-service functionality in broadband wireless networks, especially for voice and other delay sensitive applications. The BreezeMAX system provides different levels of QoS according to the IEEE 802.16-2004 and WiMAX standards. As part of its "standards plus" policy, BreezeMAX implements a dynamic resource allocation protocol (DRAP) that provides admission & congestion control within the wireless domain of the network. DRAP is an innovative, solution providing efficient mapping of the voice and signaling traffic in a VoIP network to proper QoS levels over the air in the wireless network.





---

## Alvarion's Voice over WiMAX Benefits

- Maintain telephony toll-quality over the wireless network - dynamically allocate continuous grant (CG) service for active calls maintaining the QoS and low jitter needed for toll-quality voice services
- Dynamic efficient use of the air resources for voice traffic with proper QoS:
  - Air resources for voice calls are allocated only for the duration of the call
  - Automatic support of codec changing in a VoIP call - the DRAP messages update the BreezeMAX equipment on any codec change or subsequent bandwidth allocation change during the call, hence the exact required bandwidth is always provided. This is essential in fax transmissions where the call may begin with one codec and switch to another to accommodate the fax transmission
- Admission and congestion control for each wireless sector:
  - The operator can control and limit the maximum number of concurrent calls per wireless sector and per end user voice gateway
  - The operator can prevent callers from placing calls if a sector is overloaded
- Deterministic capacity planning between data and voice - controlling the maximum number of calls per sector allows the operator to deterministically plan the maximum capacity allocated for the voice service and subsequently plan the minimal capacity allocated for data service
- Combined provisioning and management of the wireless and voice gateways equipment

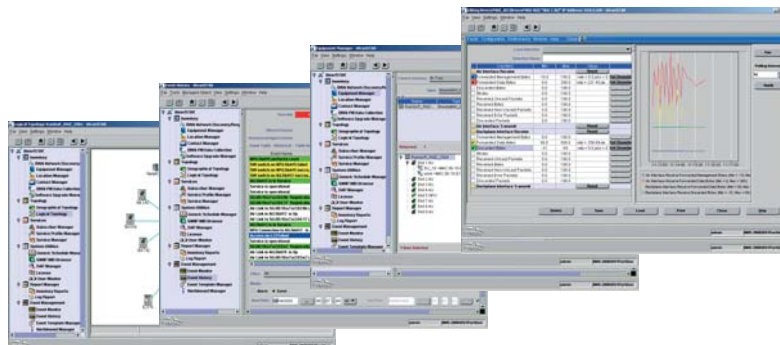
## Carrier Class NMS - AlvariSTAR

AlvariSTAR is a comprehensive carrier-class network management system for Alvarion's BWA products-based networks. AlvariSTAR is designed for today's most advanced service providers' network operation centers (NOCs), providing the network OA&M staff and managers with all the network surveillance, monitoring and configuration capabilities required to manage their networks effectively and cost-efficiently.

AlvariSTAR provides the following BWA network management functionality:

- Device discovery
- Device inventory
- Topology
- Fault management
- Configuration management
- Service management
- Performance monitoring
- Device embedded software upgrade
- Security Management
- Northbound interface to other network management systems
- Reporting system

Embedded with the entire knowledge base of BWA network operations, AlvariSTAR is a unique state-of-the-art power multiplier in the hands of the service provider that enables the provisioning of satisfied customers.



# Why Alvarion



## Towards an Interoperable Future

Throughout the past decade, Alvarion has maintained a vigorously stable and clear agenda. Our vision has been consistently accurate and we have emerged as the industry's foremost leader, confidently and gracefully poised at the pinnacle of the BWA pyramid.

The opportunities presented by the establishment of the WiMAX Forum, advocating the widespread compliance with the 802.16-2004 Wireless MAN standard and the establishment of guidelines for system and component interoperability, presents the telecom industry with compelling advantages in integrating WiMAX into their future agenda.

Alvarion is proud to be the first BWA vendor to work in conjunction with Intel on producing a product line that integrates WiMAX-based technology. By merging our respective, industry leading strengths, we intend to live up to the promise of a stable, interoperable standard as set forth in the WiMAX mission.



“ In 2002 we set out to build an alternative nationwide IP network, Alvarion have helped us achieve this goal and today consumers throughout Ireland can get access to differentiated, high quality broadband services at the most competitive price points.”

“Alvarion equipment has enabled us to add more customers at higher speeds and more quickly, an advantage that has undoubtedly contributed to our fast growth. Our network is complete in all our major cities and towns and we are now building on this to provide near nationwide coverage by the end of 2005.

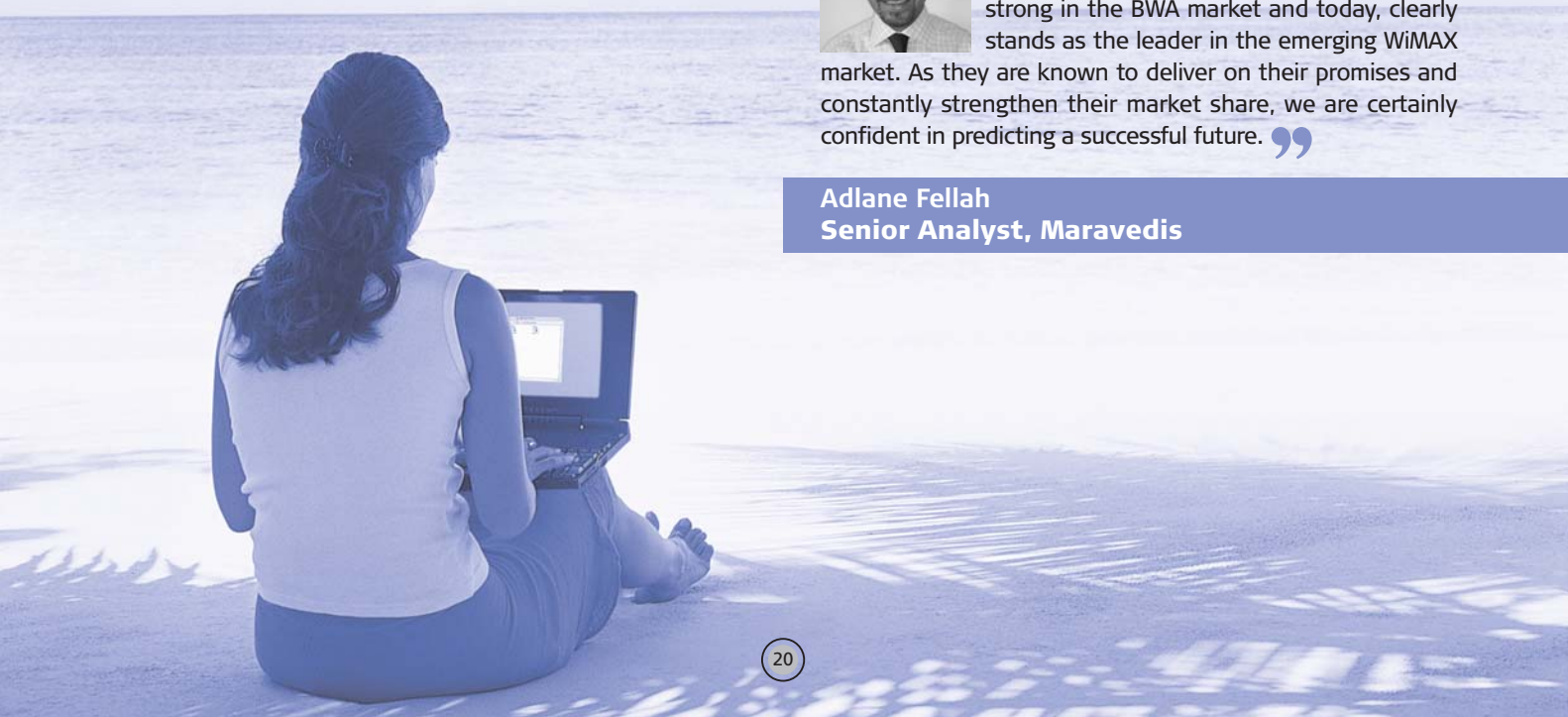
Upon the acquisition of our 3.5GHz license, we chose to work with Alvarion to roll-out a WiMAX-ready network to take advantage of the advanced functionality and future cost reductions expected to result from standard wireless broadband products. ”

**Paul Doody**  
Managing Director, Irish Broadband



“ We have been watching Alvarion carefully over the last few years and the company has selected the right strategy for coming out strong in the BWA market and today, clearly stands as the leader in the emerging WiMAX market. As they are known to deliver on their promises and constantly strengthen their market share, we are certainly confident in predicting a successful future. ”

**Adlane Fellah**  
Senior Analyst, Maravedis



# We take pride in our leading wireless broadband operators







## Alvarion Sales Contacts

### International Corporate Headquarters

Tel: +972 3 6456262

Email: [corporate-sales@alvarion.com](mailto:corporate-sales@alvarion.com)

### North America Headquarters

Tel: +1 650 314 2500

Email: [n.america-sales@alvarion.com](mailto:n.america-sales@alvarion.com)



© Copyright 2005 Alvarion Ltd. All rights reserved.

Alvarion® and all product and service names referenced here in are either registered trademarks, trademarks, tradenames or service marks of Alvarion Ltd. All other names are or may be the trademarks of their respective owners. The content herein is subject to change without further notice.