



# Advanced Technology for Fixed and Mobile WiMAX

Solution Brief

## Evolution of WiMAX Standard

WiMAX supports fixed, nomadic, portable, and mobile broadband wireless access. To meet the requirements of different types of access, two versions of WiMAX have been defined. The first is based on the 802.16-2004 standard and is optimized for fixed and nomadic access. Carriers and ISPs alike have already rolled out premium voice, as well as Internet and multimedia data services to enterprise, small business and residential customers based on this standard. The second is designed to support portability and mobility, and is based on the 802.16e-2005 amendment to the 802.16-2004 standard. Mobile WiMAX services will be built on the amended standard and some fixed networks will evolve to include mobile WiMAX.

Aperto's PacketMAX architecture accommodates the standards evolution and makes the introduction of mobile WiMAX transparent to the end user. PacketMAX encompasses a wide range of solutions for operators deploying fixed WiMAX today and developing mobile WiMAX adoption strategies.

## PacketMAX for Fixed and Mobile WiMAX

Operators around the world are developing business cases and deploying broadband services based on fixed or mobile WiMAX. In some cases, they have a hybrid network strategy. While the decision is unique to each operator, PacketMAX flexible design allows each to exploit its full business potential. These scenarios are examined below.

### PacketMAX Enabled Solutions

Service Plan	Recommended Standard	PacketMAX Enabled?
Fixed WiMAX Services	All 802.16-2004	✓
Fixed and Mobile WiMAX Coexistence	Mixed 802.16d and 802.16e	✓
Fixed WiMAX Migrating to Mobile WiMAX	Mixed 802.16d migrating to 802.16e	✓
Mobile WiMAX Services	All 802.16e-2005	✓

## Leveraging Mobile WiMAX

PacketMAX includes CPE options for consumer, small business and large enterprise users that harness the advanced technology of 802.16e-2005 for robust indoor and mobile performance. Multiple antenna (MIMO), uplink and downlink sub-channelization, mobile IP (handoff) and power-saving features leverage the Mobile WiMAX specifications for ubiquitous networking. All CPEs offer options to support VoIP and advanced routing features.

- PacketMAX 300 series CPE delivers the functionality, scalability and performance required by enterprise and business grade users in an outdoor gateway form factor.
- PacketMAX 500 series CPE provides a wireless alternative to DSL for indoor consumers.

## SPECIFICATIONS

### 802.16-2004 Base Stations

- WiMAX Forum Certified
- OFDM 256 FFT
- All TDD Operation
- 2.5 GHz, 3.5 GHz, 5 GHz WiMAX bands
- High Gain Antennas
- Higher Power Base Station Radios
- Single sector or Multi-sector options
- Collocation with 802.16e wireless sectors

### 802.16e-2005 Base Stations

- 802.16e-2005 Complaint
- SOFDMA 512/1024 FFT
- All TDD Operation
- 2.3 GHz, 2.5 GHz, 3.5 GHz WiMAX bands
- Space Time Coding (STC)
- Sub-channelization
- Rx/Tx Antenna Diversity
- Matrix A and Matrix B MIMO
- Single sector or Multi-sector options
- Collocation with 802.16d wireless sectors

### Subscriber Units

- WiMAX Forum™ Certified, standards based interoperable terminals
- Dynamic QoS
- IP or Bridge Mode forwarding
- Rx/ Tx Diversity (MIMO)
- Maximal Ratio Combining (MRC)
- Integral voice (POTS)
- SIP call agent (VoIP)
- 802.11 b/g WiFi

### Form Factors

- Outdoor Gateway
- Indoor Gateway
- PC Card
- USB

### Management

- Centralized WiMAX provisioning
- Aperto WaveCenter EMS Pro
- SNMP V2
- Telnet



Wireless to the MAX

## PacketMAX Solutions Architecture

The Vision of Mobile WiMAX includes ubiquitous access to a consistent set of content and services for consumers and business users at work, at home or on the go. PacketMAX Solutions Architecture is an end-to-end infrastructure approach driving operator choice and CapEx and OpEx advantages. Built on best-of-breed elements with guaranteed interoperability, PacketMAX Solutions Architecture permits operators to make individual selection for each network function.

End-to-end solutions consist of base stations, subscriber units, ASN gateways, and connectivity services network (CSN) elements—all pre-tested and pre-integrated to function within a PacketMAX optimized solution package. Based on open standards, solutions comply with WiMAX Forum NWG standard for 802.16e-2005 networking and relevant interfaces. All solution components are standards compliant and relevant components are WiMAX Forum certified.

PacketMAX Base Stations are the key enabler of Mobile WiMAX solutions with key technologies defined within the IEEE 802.16e-2005 specification.

- SOFDMA PHY
- MIMO Matrix A/B with 2X2 or 4X4 diversity
- UL/DL Sub-channelization
- Enhanced Quality of Service
- R6 standard interface to ASN Gateway
- R1 interface to subscriber units

