



# PacketMAX™ Systems

Uniquely Powerful WiMAX Solutions



**Wireless to the MAX**

# WiMAX

## .. Starts with Aperto

Aperto Networks established its position as a broadband wireless leader by introducing the first line of carrier-class products in 2002. Since then, Aperto solutions have been deployed by network operators in every corner of the globe, serving tens of thousands of users in 65 countries.

### Aperto: A Tradition of Leadership

From its inception, Aperto has been singularly focused on delivering WiMAX class products. As founding member of both IEEE 802.16 and WiMAX Forum, Aperto's leadership is unsurpassed in specifying and developing the technologies required to realize the promise of WiMAX.

As board member and chair of the WiMAX Forum's Service Provider Working Group, Aperto plays a critical role in defining strategies for ubiquitous WiMAX rollouts. Continuing its tradition of leadership, Aperto is the first vendor to offer a WiMAX certified platform meeting the scalability, reliability, and performance requirements of carriers globally.

Aperto's PacketMAX™ family of products delivers the critical elements required to extend services to a constellation of subscribers, ranging from large and small enterprises and public-sector organizations, to multi-tenant buildings and single home residences.

## Accelerate ROI and Boost Profits

A quick return on investment (ROI) and the ability to drive profitable services across a diverse customer base are critical to the success of service providers everywhere. The PacketMAX solution is designed to address a broad array of subscriber segments in a timely manner, while minimizing capital and operational commitments.

### Pay as you grow.

PacketMAX offers operators several types of base station elements, allowing operators to cost effectively grow from very small to very large subscriber densities.

### Painless upgrades.

PacketMAX gives operators a future-proof platform designed to support both the IEEE 802.16-2004 and IEEE 802.16e standards. This forward-looking strategy enables PacketMAX products to support fixed and emerging mobile devices without large additional capital investments.

### Many services, one platform.

Using ServiceQ® technology that has already proven itself in deployments around the world, PacketMAX provides comprehensive quality of service (QoS) capabilities. With intelligent traffic

classification and scheduling, PacketMAX efficiently manages traffic from thousands of end users simultaneously engaged in multi-media and data services.

### Carrier-grade reliability.

PacketMAX products are designed to provide the levels of redundancy and fault-tolerant operation that providers must have to ensure uninterrupted service and to meet stringent service level agreements (SLAs).

### Maximum coverage and capacity.

Aperto has integrated several technologies into PacketMAX that increase overall system link-budget and enlarge cell range at higher modulations. These enhancements produce higher capacities over more expansive coverage areas, reducing the number of cells required and lowering infrastructure costs.

# Powerful Enabling Technologies

Aperto has put the full weight of its technical expertise behind the move to WiMAX operability by integrating several key enabling technologies into PacketMAX. Not all WiMAX products are created equal. Aperto has leveraged years of experience in delivering best-in-class WiMAX product suites through patented technologies.

## Advanced scheduling.

Many years of experience in providing multiple priority services over broadband wireless gives Aperto the edge in offering best-in-industry scheduling capabilities. PacketMAX easily accommodates the ever-changing RF conditions and the individual requirements of each subscriber, yielding greater profitability for the service provider.

## QoS across multiple services.

Aperto's patented ServiceQ® technology has been delivering industry-leading QoS since 2002. The delivery of premium voice service during harsh and unpredictable RF conditions is the

hallmark of many Aperto installations. Aperto customers leverage ServiceQ® to manage differentiated service flows for voice video and other premium services.

## Dynamic control of links.

Patented Aperto OptimaLink® technology performs dynamic control of link parameters to optimize each subscriber's connection in a multi-user, cellular network. The OptimaLink adaptive algorithm dynamically selects and adjusts several physical and MAC layer parameters—on the fly. The benefit to network operators is increased capacity, broader coverage, and interference mitigation.

# The PacketMAX Family

Aperto's PacketMAX system gives service providers the platform they need to take full advantage of the WiMAX opportunity now and in the years to come.

## PacketMAX Base Stations



### PacketMAX 5000

PacketMAX 5000 is the industry's highest density, highest capacity, and highest performing base station. ATCA chassis architecture ensures carrier-grade quality and the latest advances in reliability, availability, and serviceability for carrier telecommunications. Designed for modular growth and standards evolution PacketMAX 5000 provides complete fault-tolerance and scalability to higher processing speeds and bandwidth capacities in the future.

### PacketMAX 3000

PacketMAX 3000 is a stackable, rack-mountable, single-sector platform for delivering WiMAX services. Multiple single-sector PacketMAX 3000s may be co-located at a single site, providing an economical and modular multi-sector solution for less dense applications.



### PacketMAX 2000

PacketMAX 2000 is an economical, single-sector micro base station. The all-in-one design makes the PacketMAX 2000 suitable for pole-mount deployments extending coverage to new subscriber areas or connecting municipal or government network users to the internet and multimedia services.

## PacketMAX Subscriber Units

Aperto offers a complete range of subscriber units designed to meet a variety of subscriber needs and network requirements for businesses and consumers. User-oriented features like integrated voice, WiFi, TDM access, and all-indoor self-install options are available allowing the subscriber to customize the unit to its desires.



### PacketMAX 100 Series

The PacketMAX 100 Series of subscriber units is designed to suit the needs of the small business and home office user. With centralized provisioning and simple and rapid installation the PacketMAX 100 provides hands-off, error-free networking for up to five hosts.

### PacketMAX 300 Series

The PacketMAX 300 Series of outdoor subscriber units delivers the entire range of IP functions including bridging, VLANs, Point-to-Point Protocol over Ethernet (PPPoE), Network Address Translation (NAT), DHCP and IP routing, with support for up to 250 hosts and sixteen differentiated service flows. Medium to large enterprises and MDU/MTU environments are ideal scenarios for service providers to employ PacketMAX 300 combination of performance and functionality.



### PacketMAX 500 Series

The PacketMAX 500 Series provides an alternative to DSL for all-indoor consumer environments, supporting a complete range of networking functions and up to five active hosts. The integrated voice and WiFi options makes the PacketMAX 500 a single-box solution relegating telephone adapters, WiFi access points, and DSL modems to the past.

## WaveCenter™ Element Management System

WaveCenter EMS is a GUI-based, carrier-class element management system (EMS) for managing networks powered by Aperto's PacketMAX and PacketWave systems. A single WaveCenter server can centrally manage thousands of network elements, performing a full suite of FCAPS (Fault, Control, Accounting, Performance, and Security) functionality, making network information easy to view and analyze.



Enter the

**WiMAX Era** with **Aperto PacketMAX**

For more information about Aperto PacketMAX contact at:

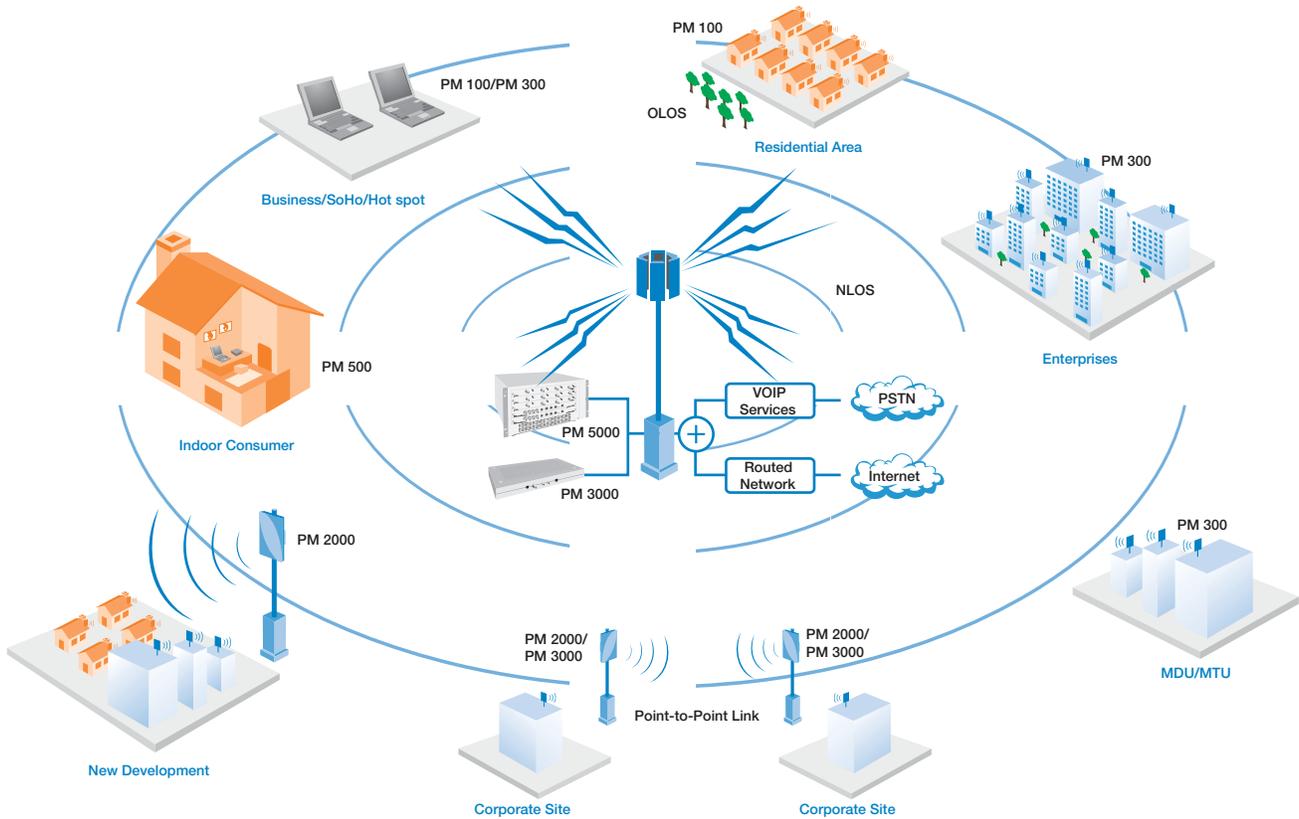
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# Uniquely Powerful WiMAX Solutions

PacketMAX delivers the complete range of end-to-end WiMAX solutions including voice, multi-media, and data from virtually any subscriber type (fixed, outdoor, indoor, and evolving to mobile). The high performance, high capacity PacketMAX infrastructure scales elegantly from small initial deployments to very large ones, while limiting capital costs. Deployment options include single sector, multi-sector, point-to-point, and point-to-multipoint with seamless co-existence facilitating planned growth. Aperto offers the widest array of WiMAX-compliant subscriber units including units designed for large and medium enterprises, small businesses and home office users, and all-indoor residential users.



NLOS: Non Line of Sight  
OLOS: Obstructed Line of Sight

## Aperto Firsts

- First** to deploy IEEE 802.16 class solutions in 2002, and first to deliver OFFM based infrastructure for WiMAX certification in 2005.
- First** to implement carrier-class QoS profiles to support simultaneous voice and tiered data services.
- First** to enable up to six different adaptive link parameters per subscriber for high throughput, peak performance, and interference resilience.
- First** to support a Media Access Control (MAC) scheme using burst-mode, time-division multiple access (TDMA) that can scale from a few users to hundreds of users per sector.
- First** to offer enhanced IP networking functionality, such as virtual LAN (VLAN) support, IP routing, and Dynamic Host Configuration Protocol (DHCP) server.

## PacketMAX Base Stations

## PacketMAX Subscriber Units

### Radio and System Specifications

Models/Types	PacketMAX 5000 - Modular Macro Base Station PacketMAX 3000 - Mini Stackable Base Station PacketMAX 2000 - Outdoor Micro Base Station	PacketMAX 100 - Business/SoHo Subscriber Unit PacketMAX 300 - Enterprise Class Subscriber Unit PacketMAX 500 - All Indoor Consumer Subscriber Unit
Compliance	IEEE 802.16-2004 ETSI HiperMAN	IEEE 802.16-2004 ETSI HiperMAN
Duplexing Mode, PHY	TDD, OFDM 256 FFT	TDD, OFDM 256 FFT
Frequency Bands	2.5, 3.5, 5 GHz	2.5, 3.5, 5 GHz
Radio Output Power	17 dBm, 20 dBm, 30 dBm Options	PM 100: 19 dBm; PM 300/PM 500: 20 dBm
External Antenna/Option	Yes	Yes

### IP Networking Features/Options

IEEE 802.3 Bridging	Yes	Yes
RIP/OSPF Routing	Yes	PM 300
IEEE 802.1 P/Q VLANs	Yes	Yes
DHCP, NAT	N/A	PM 300, PM 500
Integral WiFi Option	N/A	PM 100, PM 500

### Multi-Service/Multi-User Support

Traffic Classification	L2, L3, L4 Parameters	L2, L3, L4 Parameters
Scheduling/QoS	UGS, RTPS, NRTPS, BE, CIR, MIR	UGS, RTPS, NRTPS, BES, CIR, MIR
Integral VoIP Option	N/A	PM 100, PM 500
Total # Sectors	PM 5000: 12; PM 3000/PM 2000: Single	N/A
Active Connected Units/Hosts	PM 5000: 6144 PM 3000/PM 2000: 512	PM 300: 250 PM 100/PM 500: 5

### Physical Interfaces

RF Sectors	PM 5000: up to 12 PM 3000/PM 2000: Single (f-type)	N/A
Network/Backhaul	PM 5000: 2 100/1000 Ethernet PM 3000/PM 2000: 10/100 Ethernet	10/100 Ethernet
Management	PM 5000 10/100 BT and RS-232 PM 3000/PM 2000: In-band	In-band
External Clock/Sync	10 MHz/1 PPS GPS (BNC)	N/A

### Management

Remote Management and Monitoring	WaveCenter EMS; (SNMP)	WaveCenter EMS; (SNMP)
Remote Management Access	Telnet, SNMP	Telnet, SNMP

### Installation Type

Indoor/Outdoor	PM 5000: Telco rack controller/outdoor radio PM 3000/PM 2000: Wall mount power injector/outdoor radio	PM 100/PM 300: Wall mount power injector/outdoor radio PM 500: All-indoor
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### Power

Input DC Voltage	AC, DC Options	AC
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## WaveCenter EMS

### Server Hardware

Dual 1.1 GHz Pentium or higher  
2048 MB RAM  
40 GB Mass storage space

### Client Hardware

2 GHz Pentium IV  
1024 MB RAM  
4GB Mass storage space

### Software

Platform : Windows 2000, 2003  
Database Support/Options : Integrated SQL server, Oracle 8i & 10g  
Element Management : SNMP V2