



WiMAX Fuels Growth Opportunities for Wireline Service Providers

How WiMAX technology can speed wireline operators' entrance into the future of mobile broadband communications and services.



Even as their businesses flourish, wireline service providers find themselves facing a rapidly evolving communications environment that is threatening to erode both their share of market and share of wallet. The reason? Today's end users are becoming both more sophisticated and more demanding. Trends show that they have two main demands. First, they want richer media experiences that go well beyond voice and simple downloads; they're also looking for more personal services like music, video, live television and interactivity. Second, they're demanding total mobility that delivers high-speed access wherever they happen to be: at home, at work, in a car, walking down the street.

Can wireline providers move successfully into this new world of enhanced mobility? The answer is a resounding "yes," and the power and speed of IP-based WiMAX technology can help them make the transition rapidly, efficiently and cost-effectively.

State of the Market

There are tremendous forces at play in the telecommunications landscape. Users are demanding unprecedented levels of interactive, personalized, rich media services. New applications are popping up from all corners of the Internet disrupting traditional models of content delivery and revenue generation. Service providers are blending their lines seeking to position themselves to deliver full suites of voice, video, data and wireless. This new age of communications demands new tools and capabilities that allow service providers to realize the full value of their networks and increase their revenue generation potential.

Wireline operators have witnessed the most dramatic shifts in the telecommunications landscape as their legacy copper installations and circuit switched networks, once state-of-the-art in delivering local and long distance phone service, are redrawn with advanced digital modulation technologies and fiber extensions to support next generation data and video services. Where wireline operators once managed the sole connections to businesses and residences across markets, we now have parallel networks from a myriad of operator segments reaching the same addresses and competing for the same share of wallet.

The impact of these dramatic shifts has been magnified over the past several years with wireline telecommunication companies experiencing heightened competitive challenges from new market entrants and substitutive technologies. Traditional wireline voice continues to face significant competition from both wireless and data services. Growing wireless and broadband penetration is slowing down the demand for additional access lines. Competition from cable operators continues to intensify in many markets, further challenging the profitability of local services.

Yet at the same time, wireline operators are well positioned to take advantage of some tremendous opportunities that are coming to bear. Prospects for wireline and wireless network and service integration, as well as a migration toward a converged IP core, create exciting new cost efficiencies and opportunities for innovative service delivery. Communications no longer require choosing between voice or data, wireline or wireless. Businesses and consumers are fueling the demand for access to all forms of communications anytime and anywhere. By offering multiple network access solutions that are well integrated, simple to understand, and seamless to use, wireline operators can position themselves to gain a greater share of consumer spend.

Imperative for Transformation

Having already transitioned from circuit switch networks to packet networks, wireline operators are familiar with business transformation. Today, most transport networks, including frame relay and Asynchronous Transfer Mode (ATM) networks, are Multiprotocol Label Switching (MPLS) based. Powerful packet network, VoIP and IP Multimedia Solutions (IMS) solutions now provide hundreds of in-demand circuit features such as call waiting and call forwarding.

The drive toward network transformation will continue over the coming years as key motivators such as demand for bandwidth, demand for mobility and demand for simple networks influence how wireline operators will invest and evolve.

Demand for bandwidth is growing as operators seeking to differentiate their services popularize newer, more feature-rich applications. Evolving end-user lifestyles and the requirement for connectivity everywhere drives demand for mobility. Demand for simple networks is met through a converged IP core offering access and service delivery, optimizing network cost structure and delivering new revenue generating services and applications.

Wireline operators have always been backhaul solution providers but backhaul technologies are evolving, too. With the invention of new backhaul technologies based on Orthogonal Frequency Division Multiplexing (OFDM), there is demand for fast and flexible wireless backhaul solutions.

The need to address these demands has set the stage for the industry's embrace of next generation wireless broadband solutions. Solutions like 802.16e-2005 WiMAX are key to enabling true transformation for wireline operators, helping them increase competitiveness today and fueling future growth in the new digital, converged, mobile, IP world

Wireline operators planning to provide wireless broadband currently may consider multiple wireless technology options such as 2G, 2.5G and 3G cellular; satellite; Metro WiFi/Mesh networks; and WiMAX.

WiMAX is emerging as a preferred choice due to its high-performing, cost-effective, quick-to-deploy characteristics and easy integration into existing wireline IP networks and systems.

The Emergence of WiMAX as the Preferred Choice

The inevitability of evolution to mobile broadband networks has an increasing number of wireline service providers looking at WiMAX 802.16e 2005 rather than WiMAX 802.16d as the optimal technology for evolving their own networks to deliver wireless broadband mobility. WiMAX will enable them to create seamless wireless broadband extensions or overlays that empower end users in all their environments: home, office and mobile.

A growing number of companies from all over the world—more than 400 as of now—have become members of the WiMAX Forum to help them advance their network and product plans.

WiMAX HELPS WIRELINE PROVIDERS SERVE PROFITABLE NEW MARKETS

WiMAX technology can be the catalyst for enhancing revenues by efficiently serving a broadened range of markets:

- **Residential and SOHO.** WiMAX wireless broadband extensions help wireline networks provide high-speed Internet access to previously unreachable residential and SOHO customers, and those for whom wired access is proving to be too limited or too expensive.
- **Small to Medium-Size Businesses and Large Enterprises.** WiMAX technology enables wireline networks to cost-effectively meet the needs of underserved businesses in lower-density environments, as well as provide a cost-effective alternative to urban area businesses.
- **Hot Spots.** WiMAX technology allows operators to provide the cost-effective, high-capacity backhaul solutions that support the rapidly growing global hot spot market, as well as the burgeoning universal access/Metro WiFi marketplace.
- **Mobile Customers.** WiMAX network overlays and extensions can position wireline providers to begin serving the high potential mobile customers who will increasingly be driving worldwide communications industry growth.

A high-performing, cost-effective broadband wireless solution such as WiMAX offers the versatility to serve an array of wireline market needs.

This broad industry participation, plus the growing worldwide acceptance and adoption of WiMAX technology, helps ensure that WiMAX will realize full economies of scale. This, in turn, will accelerate growth by dramatically lowering the cost of equipment and subscriber devices, similar to what has happened in the WiFi marketplace. There are currently over 1000 WiMAX license holders worldwide, of which a large percentage is wireline operators.

Global spectrum allocations suitable for WiMAX deployments have been harmonized across a few discrete bands, allowing greater efficiencies in infrastructure and device production. More than 90% of WiMAX spectrum is focused on 3.5, 2.5 and 2.3 GHz. (Figure 1)

What is WiMAX?

WiMAX 802.16e is an IP-based broadband wireless access technology developed from the ground up to provide high-speed data and voice capabilities combined with advanced interactivity, ubiquitous mobility and exceptional cost-effectiveness.

WiMAX delivers standards-based high-speed voice, data and Internet connectivity in licensed spectrum. It is the first technology that delivers true broadband mobility at speeds that enable powerful applications—such as VoIP, online gaming, mobile TV and other personalized, interactive media experiences—that differentiate networks, enhance revenues and reduce churn.

WiMAX 802.16e is also a Non Line of Sight (NLOS) solution. That makes it an excellent choice not only for wireless broadband but also for wireless backhaul, disaster recovery, and business continuity applications... especially for government and enterprise markets.

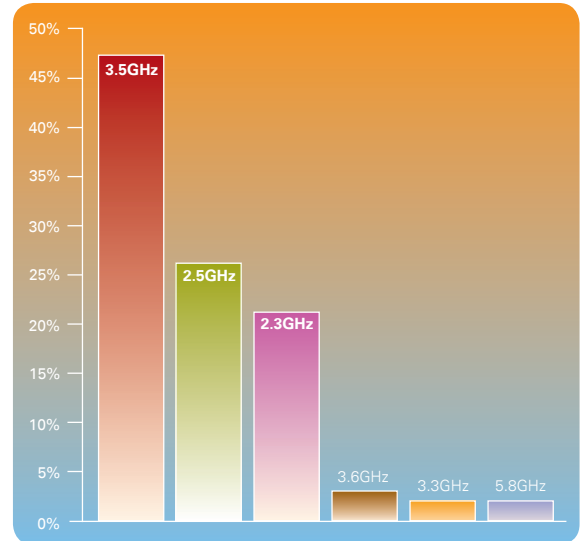


Figure 1. WiMAX Frequency Allocations

Source: Motorola Research

In addition, WiMAX is one of the first wireless technology platforms built to incorporate the full suite of wireline Quality of Service (QoS) capabilities. For example, as shown in Figure 2, Unsolicited Grant Service (UGS) is designed for services and applications that require fixed packet interval and fixed packet size such as VoIP application. UGS implementation in WiMAX is similar to Constant Bit Rate (CBR) implementation in Asynchronous Transfer Mode (ATM). Other QoS capabilities are Real-Time Polling Service (rtPS), Extended Real-Time Polling service (ertPS), Non-Real-Time Polling Service (nrtPS) and Best Effort (BE) - all of which can be applied to wireless applications just as they are in wireline applications.

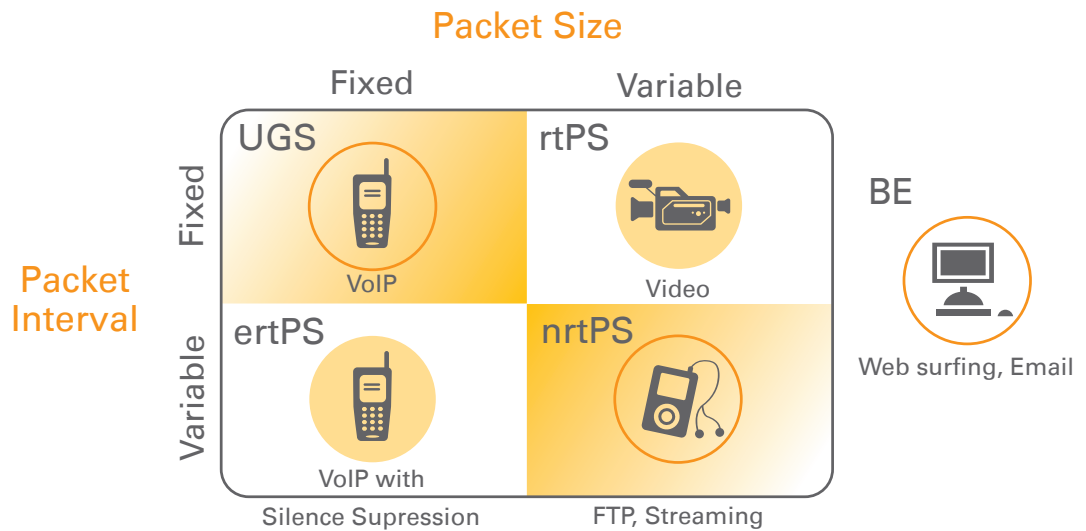


Figure 2. Wireline Quality of Service

Equally important, the WiMAX 802.16e standard enjoys remarkable industry wide acceptance. That means WiMAX is well positioned to be embedded in a wide range of low-cost, off-the shelf CPEs—including handsets, laptops, digital cameras, gaming consoles, mp3 players, television sets and more—that can virtually eliminate costly end user CPE subsidies.

The Convergence of Wireline and WiMAX

A high-performing, cost-effective broadband wireless solution such as WiMAX offers the versatility to serve an array of wireline market needs.

Extending Reach

Many wireline operators have sought to increase their capacity for data delivery on their existing networks through further distributing their broadband infrastructure toward the edge of the networks, shortening the span of the connections to end-users, and deploying fiber to the neighborhood or premise. While effective for delivering greater bandwidth to the end-user, such deployments also carry a hefty price tag and require long lead times for completion.

In addition to delivering more bandwidth to existing addressable households, there is also an enormous need to expand the footprint of existing networks to support communities yet unserved. With WiMAX

technology, operators have the opportunity to reach regions where running wires and deploying wireline broadband infrastructure is not economically favorable. With simple-to-deploy, IP-based WiMAX infrastructure, wireline operators can seamlessly introduce wireless broadband into their access portfolio and extend the broadband footprint to establish a much larger addressable market.

WiMAX technology features inherent advantages in cost efficiency, ease of management with capabilities like Over the Air (OTA) upgrades, and reduced time-to-market in comparison to greenfield wireline broadband deployment. These benefits can provide a win-win situation as operators seek to better support municipality broadband initiatives, universal service policies and efforts to bridge the digital divide.

Introducing Mobile Services

Despite the many advances in communications technology, the broadband experience continues to be a static one. Yet mobility is a core constituent in delivering the elusive quad-play and there is no question that the world is increasingly demanding connections to their content and services wherever they are, whenever they need it. The prevalence of home WiFi networks and the increase in wireless telephony substitution points to the strong demand for mobility. Additionally, it has been demonstrated that end users are willing to pay a premium for mobile services making it an important means for operators to grow revenue.

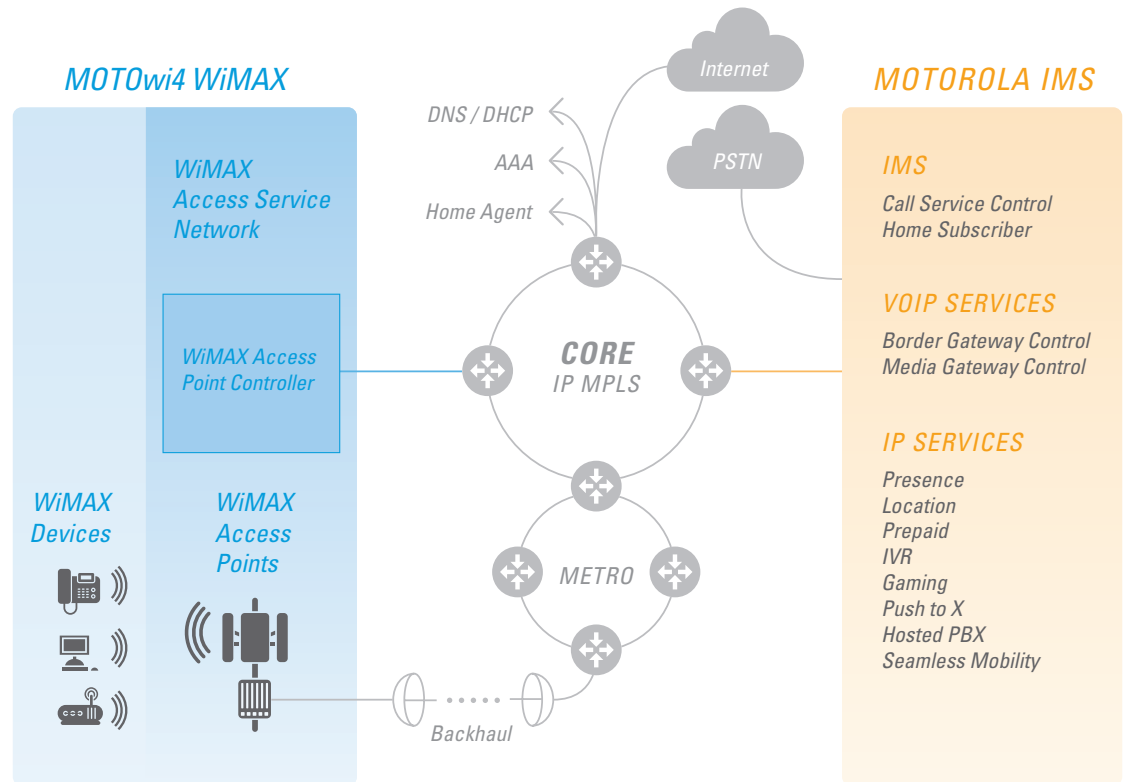


Figure 3. WiMAX Architecture Diagram Showing Interoperability with Wireline Networks

With WiMAX, wireline operators have an opportunity to compete with mobile operators by offering full mobility data and voice services with greater capacity and capability than traditional cellular technologies, allowing the realization of a differentiated “Broadband-on-the-Go” product. Broadband mobile telephony technologies will increasingly liberate broadband from the restrictions of a fixed-line business and WiMAX will enable wireline operators to embrace this shift and reap its rewards.

Satisfying End Users

In the last decade, wireline operators have invested in the ability to deliver rich telecommunications experiences to their end customers via high speed Internet service. As networks evolve, current subscribers desire to carry with them the same home page, the same applications and the same experience. Wireline operators can accommodate them by leveraging the IP-based, WiMAX service delivery platform with the quality of service and security expected from wireline connections.

With the availability of low cost, standardized WiMAX chipsets, WiMAX is positioned to permeate virtually all types of consumer electronics. Clearly we will find low cost WiMAX modules embedded into a wide variety of outdoor and indoor customer premise equipment, PC cards and mobile handsets. We can also easily imagine how WiMAX will become baked into next generation gaming consoles, mp3 players, television set-top boxes and factory machines. The public commitment from major chipset manufacturers further fuels the promise of a large embedded base of WiMAX-enabled devices.

This broad base of WiMAX devices will further drive demand-side requirements for the WiMAX infrastructure. Think of the pervasiveness of WiFi or Bluetooth today, and then add all the benefits of wide area mobile networking with broadband speeds. The capability of delivering service to this expanse of zero-subsidy client devices is a tremendous opportunity for the wireline operator.

With WiMAX providing connections across a landscape of devices, we also position ourselves to offer a host of rich applications such as mobile TV, video telephony, real-time trading, remote office and networked home. With the IP foundation of WiMAX we can take maximum advantage of the next wave of mobile broadband applications emerging from all corners of the Internet. A key ingredient for fueling future growth for the wireline operator will be providing the right mix of value added services over their next generation IP core and access networks. This will enable them to differentiate themselves from the crowd of encroaching competitors and position themselves as the clear provider of choice for future applications and services.

Conclusion: Delivering Seamless Mobility

As wireline operators seek to deploy the technology and effect the business transformations necessary to compete effectively in a new digital, converged, mobile IP world, WiMAX arrives at an opportune time to play a key role in their transformation strategies.

As once the widespread adoption of wired broadband enabled a dramatic shift in how end-users connect and communicate and how global business and commerce is conducted, mobile broadband is now changing the game again. End-users will have ubiquitous broadband connections that follow them wherever they may be for ready access to bandwidth-intensive, personalized, rich-media content. Compelling multi-modal devices will allow operators to seamlessly transition across multiple networks – wireline or wireless.

The IP-based distributed architecture of the WiMAX network, illustrated in Figure 3, is inherently more interoperable with legacy wireline networks—in large part because the design is not encumbered by the requirement to support a number of proprietary components. This makes interconnectivity to existing operator systems more agnostic when integrating common subscriber management, messaging and other services.

Supporting full mobility applications and effective service delivery, the flexibility of the WiMAX architecture also facilitates core network integration. Through its converged IP core, the network can connect across the operator's full portfolio of access solutions and connect to the end user in any environment by the most capable network and best device – delivering on the promise of Seamless Mobility.

NEW, FEATURE-RICH SERVICES DELIVER INCREASED AVERAGE REVENUE PER USER (ARPU)

WiMAX enhances its business case by enabling providers to offer breakthrough applications. These enable wireline providers to provide customers with in-demand high-speed voice and data services as well as innovative and compelling rich media experiences such as streaming live TV, interactive gaming, location-based services and many more. Not only will these advanced services help increase ARPU, they'll also help differentiate wireline businesses, attract new users, increase customer loyalty and reduce churn.

The strength of the WiMAX solution lies in its versatility and ability to address varying applications in different regions of the world with economics that make sense. For example, a study of necessary monthly ARPU with fixed year payback on investments and a range of Market requirements, end-user applications, population densities - a host of factors contribute to representing substantially different business parameters and we find WiMAX installations can be very favorable even to the highly constrained price sensitivities of emerging markets.

GLOSSARY

1xRTT	1x Radio Transmission Technology	OFDM	Orthogonal Frequency Division Multiple Access
3G	Third Generation Wireless	OTA	Over the Air
ARPU	Average Revenue Per User	MPLS	Multiprotocol Label Switching
ATM	Asynchronous Transfer Mode	rtPS	Real-Time Polling Service
BE	Best Effort	SOHO	Small Office Home Office
CDMA	Code Division Multiple Access	TD-CDMA	Time Division Code Division Multiple Access
EDGE	Enhanced Data for GSM Evolution	UMTS	Universal Mobile Telecommunications System
ertPS	Extended Real-time Polling service	WiFi	Wireless Fidelity
EVDO	Evolution Data Only	WiMAX	Worldwide Interoperability for Microwave Access
GSM	Global System for Mobile Communications	QoS	Quality of Service
GPRS	General Packet Radio Service	UGS	Unsolicited Grant Service
IMS	IP Multimedia Subsystem	rtPS	Real-Time Polling Service
MIMO	Multiple Input Multiple Output		
NLOS	Non Line of Sight		
nrtPS	Non Real-Time Polling Service		



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