

# Positioning WiMAX as The Personal Broadband Technology



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## APPLICATION NOTE

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## **Abstract**

More and more users want a broadband connection that is exclusive, follows them around and is available 24/7. Welcome to the concept of personal broadband. To realize this concept the chosen broadband network has to be able to deliver users' expectations. Meanwhile, appropriate user devices must be employed. This paper presents WiMAX as the best technology to fulfill personal broadband and imparts what users expect from their personal broadband device.

## “I need broadband...and it has to be mobile!”

From the humble beginnings of dial-up, the Internet has undergone tremendous evolution so much so that the world risks facing a communication breakdown if the Internet is detached. The Internet is used by all layers of people and personalities for various reasons, ranging from business to pleasure. It is no longer used primarily for communication or to draw knowledge, but the Internet has now emerged as a principal mode of communication and more importantly as an entertainment hub.

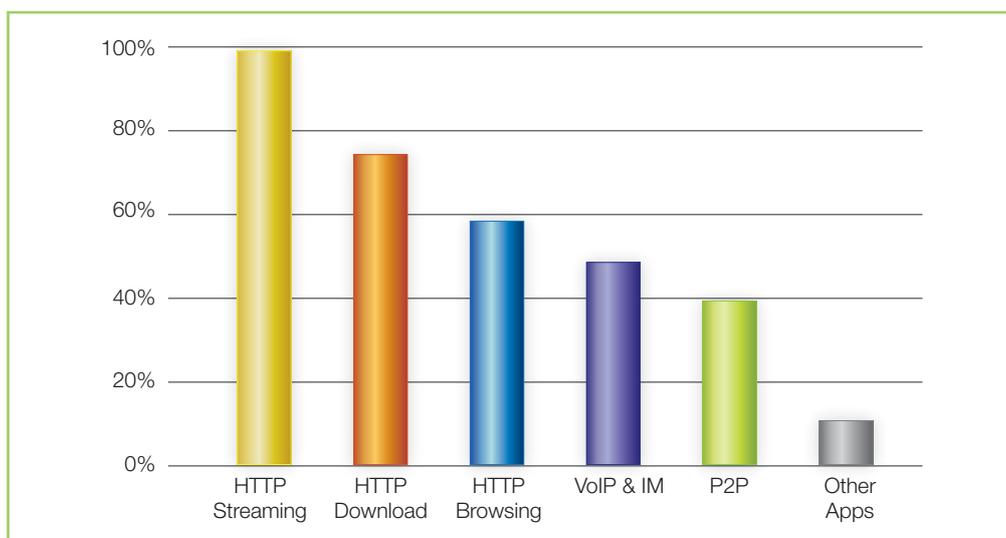
According to the IBM Consumer Study, TV and the Internet are now on an equal footing as entertainment sources, with consumers turning to online destinations like YouTube, MySpace, Facebook and online games for entertainment. 19% of respondents reported spending six hours or more daily on personal Internet usage, compared to 8% who reported the same level of TV usage.

This concludes that users need broadband connection more than before and this need is on an ascending trend, plus it has to be mobile. As Operators boost the performance of their mobile broadband networks, users are employing these networks like wired broadband and flushing mega chunks of data down these networks. According to Clearwire's CEO, Bill Morrow in a statement in March 2010, the average 4G customer on Clear network uses over 7 GB of data/month.

It is important that the industry takes heed of user consumption habits, regardless home or enterprise users. Dynamic changes in these habits, one glaring example is the exodus from fixed to mobile broadband, is setting the stage for new Operator business models and how technology is being developed. It has become a key force in navigating the adoption of newer standards such as WiMAX, LTE, FTTx and others.

### Mobile Application Craze

In Allot Mobile's market research report, Global Mobile Broadband Traffic Report H2/2009, it was reported a dramatic 99% increase in HTTP streaming, which is the application that consumes the largest chunk of data. This is likely due to several major factors - the global increase in the sales of smart phones, netbooks and USB dongles and the ease with which users can access streaming sites such as YouTube, Hulu etc.

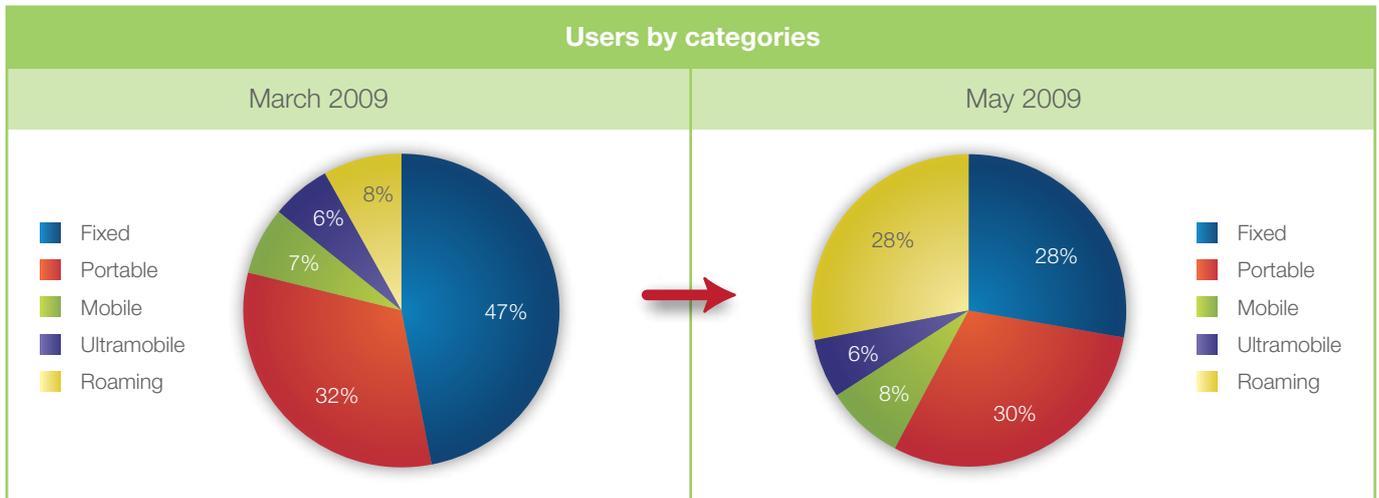


Source: Allot Mobile

Figure 1: Growth in mobile data usage broken down by top applications, H2/2009

## Device Mania

Aside from applications, broadband devices are also inline with mobility. More users prefer to purchase devices that extend mobility, compared to fixed or indoor devices. In a study done by Yota, there were visible changes in users' broadband usage patterns even on a monthly basis in 2009 as shown in the Figure 2 below. Compared to March, in May there was a 19% drop in the sign up of fixed broadband packages and an increase in the take up of mobile-centric packages.



Source: Yota

Figure 2: Changes in Broadband Usage Patterns in Russia

## The Demand for Personal Broadband

It is evident that users are hooked onto mobile broadband and this pattern inevitable in the evolution of telecommunications. Whenever a more convenient and 'larger-piped' network made an appearance, the industry focuses on its development and users eventually embrace this network and often discard their current network. The similar outcome visited the dial up era leading on to wireline broadband and wireless broadband succeeding wireline. The only difference is that the trend is turning more personal, just like mobile phones. Users want an exclusive broadband connection that follows them everywhere and is available 24/7, in other words, ubiquitous. This demand seems to be in step with the widespread adoption of mobile phones which has become a personal communication article one does not leave home without.

Personal broadband is the result of two key building blocks merging – mobile devices and broadband. Users today are equipped with mobile devices and habituated with the presence of broadband in their offices, homes, colleges, cafes and other public areas. The only drawback is that the broadband connections are stationary unlike their mobile devices. However today, with the myriad of mobile devices that support broadband, users can enjoy their very own personal broadband - a broadband connection that is private and trails them everywhere they go.

The next question that arises is which broadband technology is worthy to take up the personal broadband role? WiMAX it is!

# WiMAX: A Vision for Personal Broadband

There are several qualities that make WiMAX an ideal technology candidate for personal broadband as compared to other broadband technologies such as ADSL or 3G.

## Easy Deployment in Urban and Sub-urban Areas

In order for the concept of personal broadband to materialize, broadband network coverage must be available not just in urban areas but also sub-urban areas which can be difficult to reach due to challenging geographical topologies. Due to its wireless capabilities, WiMAX is able to serve these areas cost effectively, as opposed to other wireless networks. Additionally, with WiMAX' NLOS and LOS coverage advantage, WiMAX Operators benefit from high installation success rates and controlled deployment cost.

## Standardization

The WiMAX revolution results from a standard-driven global solution. The scope of WiMAX is governed by IEEE 802.16 standard, while WiMAX Forum® an industry-led, non-profit corporation promotes conformance and interoperability of this standard. Having a fixed standard leads to an extensive ecosystem to support WiMAX and ensuring its success. Device vendors, infrastructure manufacturers, chipset makers, system integrators, Operators, service providers, applications developers and other players are all focused on WiMAX to grow their business with new products and services. In short, standardization glues the entire ecosystem and yields commitment for the technology's evolution compared to propriety technologies such as Canopy and BPL, which have failed to gain global recognition.

## Mobility

The beauty of WiMAX is its ability to support nomadic and mobile usage which is known as Mobile WiMAX, based on IEEE 802.16e standard. Mobile WiMAX, as a forth generation technology, meets all the requirements for personal broadband. Aside from being able to provide 24/7 Internet access anywhere, Mobile WiMAX supports high data rates, high sector throughput, multiple handoff mechanisms, power-saving mechanisms for mobile devices, advanced QoS and low latency for improved support of real-time applications, advanced authorization, authentication and accounting (AAA) functionality.

## Capacity

From the start WiMAX has been built as an IP-based network which gives it the edge in supporting massive amounts of data and voice unlike 3G networks, which have evolved from voice-centric systems. As such, 3G networks are not able to support current mobile data demands which often choke the networks.

Since WiMAX has been optimized to support data since its conception, it handles data traffic efficiently and is easily scalable to contain future radical data needs.

## Infotainment

Compared to the dial-up era, emergence of broadband has tremendously fueled the data-craze globally. The availability of attractive bandwidth-hungry infotainment applications and services, such as YouTube, online gaming and IPTV challenge the bandwidth capabilities of broadband networks in a greater manner. Plus, with the influx of mobile broadband devices, users have taken infotainment obviously, mobile.

With its mobility and capacity advantages, WiMAX can be easily positioned to support mobile infotainment services without congestion issues and at a quality level satisfactory to users. However, it is vital that the appropriate mobile and nomadic devices are available to support this trend.

# Listen to the Users

## What Users Want Today?

Aside from having a connection that follows them everywhere, end user devices play an important role in driving personal broadband. These devices, for example modems, interface users with the network and hence, factors such as aesthetics, usability, cost and performance are essential in helping users carve their personal broadband concept.

The current wave of WiMAX modems is simple in design and focuses on functionality. The primary objective is to ensure users can get connected to the WiMAX network, with little emphasis on exterior design or usage convenience. However, with the maturity of WiMAX and the user devices, this inclination is changing and of late, vendors are starting to pay attention to the beauty and practicality of their modems.

To date, USB modem is one of the key devices used to enable personal broadband primarily due to its mobility characteristics. To further drive WiMAX as the preferred personal broadband technology, it is important to understand what users want in their device. Greenpacket recently conducted a survey to gauge what are the factors users pay attention to when choosing USB modems, as shown in Figure 3 below.

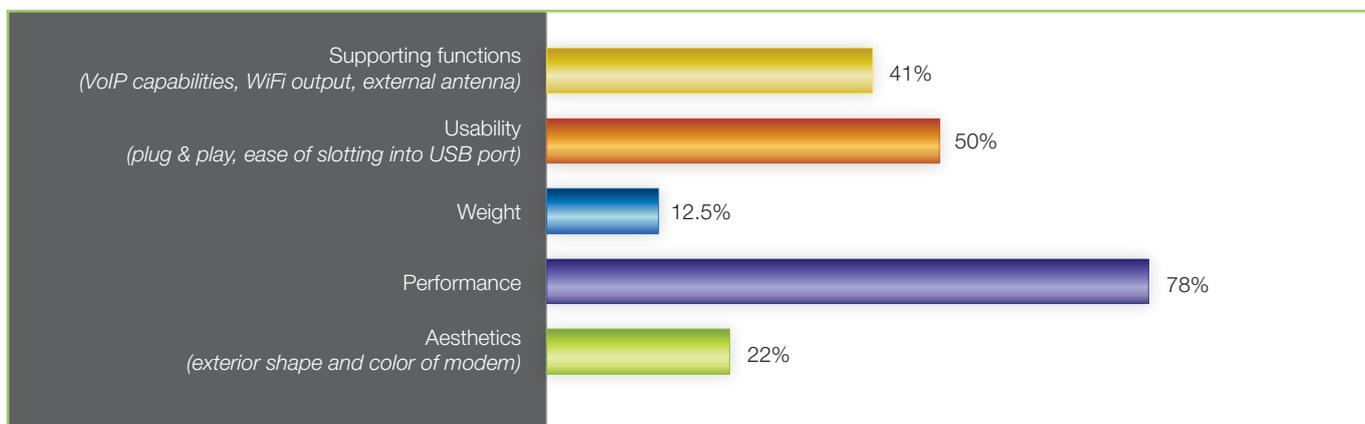


Figure 3: Factors concerned in selecting WiMAX USB modem

### Key Factor – Performance

From the above findings, it is evident that performance remains the key factor in selecting a USB modem and Operators as well as device manufacturers should not underestimate the importance of performance. From our research, we discovered that 94% of respondents would investigate the modem’s performance before signing up a WiMAX package, while 84% would switch WiMAX Operators if the performance was lousy.

Performance includes many factors, but from a user’s point of view, the most visible metrics are download and upload speeds in megabits per second (Mbps). Download speed has traditionally been the metric that most users care about because it affects the user’s Web-browsing experience, but the emergence of peer-to-peer networking and the growing need to upload user-generated content such as videos and pictures is creating the need for faster upload speeds.

Aside from device qualities, WiMAX technology itself is designed for performance by offering a stable connection both on uplink (upload) and downlink (download) speeds similar to wireline connections. Additionally, WiMAX provides an unwavering connection while on the move, an essential consideration that brings more value to the concept of personal broadband. This is contributed by the IEEE 802.16e standard which defines handoff mechanism protocols for Mobile WiMAX. Referred to as 'hard handoff (HHO)', a connection with the initial base station is ended first before the user is switched to next base station. This is known as the break-before-make approach. A network-optimized hard handoff mechanism was developed for Mobile WiMAX to keep a handoff delay under 50 ms.

Though performance is generally a combined effort of the network infrastructure and end user devices, the latter plays a major role in the WiMAX subsystem to improve performance. Often pressing performance issues of WiMAX include poor indoor coverage and sporadic coverage areas, especially during early stages of deployment.

For improved indoor coverage (keeping in mind that studies show 80% of users enjoy WiMAX indoors), device performance can be enhanced by implementing diversity techniques such as Switched Transmit Diversity, Dual Transmitter using Cyclic Delay Diversity (2Tx CDD) or even 2Tx Spatial Time Coding (STC). These antenna technologies aid in overcoming the technical limitation of WiMAX's high frequency transmission and link budget restraint which limits indoor penetration.

#### *Who Should Play the Cards Right?*

Through Greenpacket's study, selection criteria from a user's perspective are obvious. The mantle lies upon device manufacturers to produce WiMAX USB modems that appeal to users with prominence on factors highlighted earlier.

On the other hand, WiMAX Operators must produce WiMAX USB modems with strong customer appeal to further encourage the adoption of WiMAX as the personal broadband of choice. Additionally, as mentioned previously, personal broadband entails having a broadband connection anywhere, anytime. As such, a strong commitment is required from WiMAX Operators to mature their network and provide blanket connectivity across their coverage area.

## **Future Demands to Expect**

What will users demand next as part of their need for personal broadband?

It is important to note market changes and the direction headed by WiMAX devices. While the beginning of WiMAX (2006-2008) was dominated by fixed broadband CPEs, the tendency starting from 2009 has changed to incorporate a device mix consisting of mobile broadband devices, netbooks, mass market multimode handsets and multi-radio devices. The market's future drift (towards late 2010), according to Maravedis, will focus on producing more mass-market handsets, MIDs, consumer electronics (gaming consoles, digital cameras, home entertainment systems) and the emergence of M2M applications.

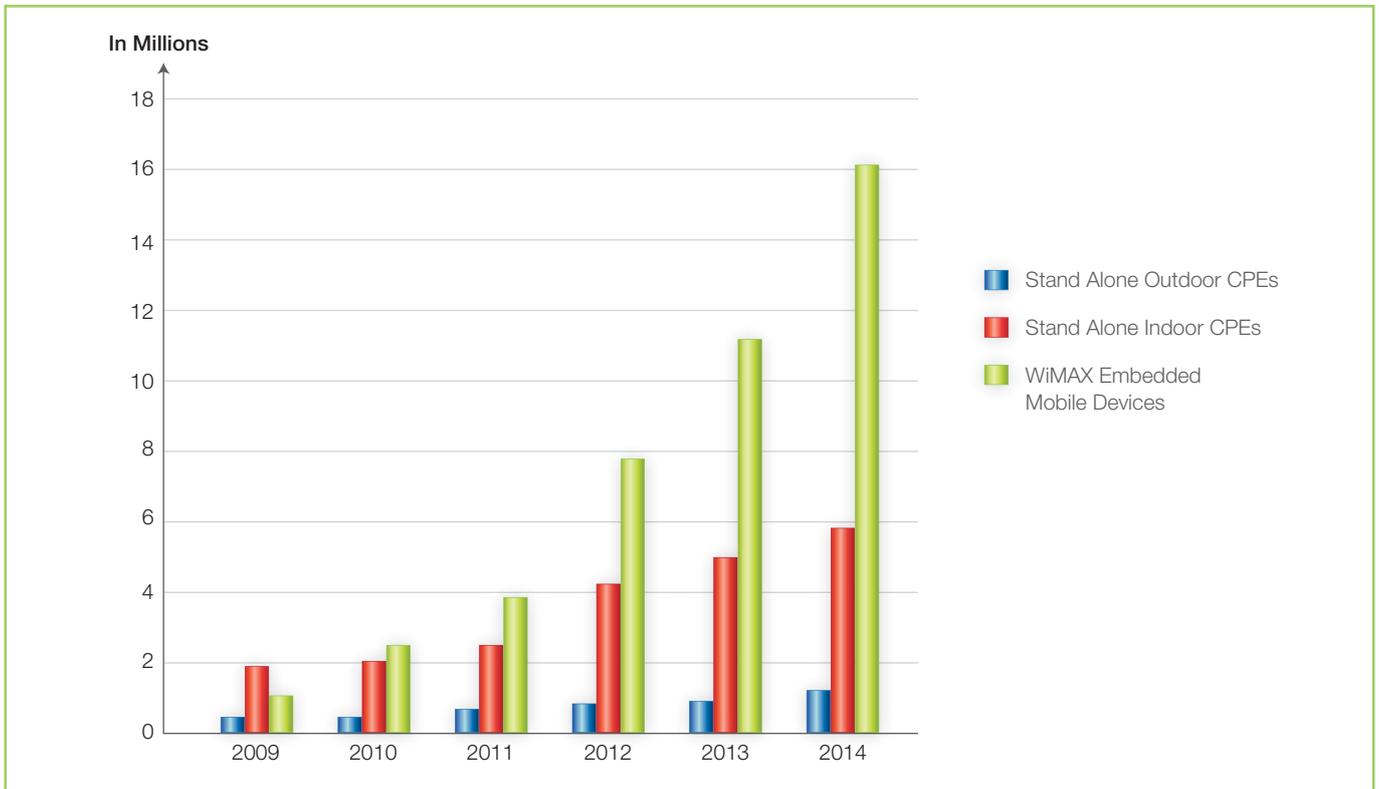


Figure 4: Forecasted growth in WiMAX embedded mobile devices

The advancement in user devices illustrate two fashions upcoming in the personal broadband space.

*Personal and Business Infotainment*

The adoption of widget-based applications that present a wide variety of personal and business oriented infotainment material are driving the need for ultra mobile PCs (UMPCs) and media phones as a personal portable portal. What began with Microsoft through early pre-browsers that run on PC has diversified into comprehensive portals such as Yahoo!, MSN and other vertical and professional portals, and today has evolved to personal portable portals (PPP) that users interface through intelligent mobile devices. PPP is created by combining favourite and commonly used applications within a user device (such as UMPC/media phone) for quick and easy access. Every PPP is unique and designed for and by each individual.

Figure 5 illustrates how media phones such as Apple’s iPhone function as a personal portable portal to integrate a multitude of widget-based applications.



Source: Personal Portable Portals Opening a New Chapter in the Mobile Internet Era

Figure 5: Media phones function as a personal portable portal to integrate a multitude of widget-based applications.

PPP has opened up a new chapter in mobile Internet era, impacting both devices and applications. Meanwhile, Operators benefit from the opportunity to host and offer application stores that utilize on triple play applications, which are optimized to run on wireless broadband networks such as WiMAX.

The telecommunications industry will see more intelligent and lightweight user devices such as media phones entering the market to equip users with two crucial needs – being able to stay in touch and access to their very own personal portal.

#### *Ubiquitous Connectivity*

Personal broadband means having a dedicated broadband connection everywhere. There are two ways to go about this – firstly, the WiMAX Operator ensures 100% blanket coverage is available under its coverage region (which is an expensive and time-consuming option) or secondly, engage other mobile broadband operators on a roaming partnership.

For this to work, user devices must support multiple radio technologies which is in fact at the horizons. According to Sequans Communications, current developments in the ecosystem include multi-radio coexisting devices and equipment manufacturers such as Sprint have produced USB modems that cater for both WiMAX and CDMA.

# Shuttle: Greenpacket's WiMAX Modem for Personal Broadband

In line with the vision of positioning WiMAX as the personal broadband of choice, Greenpacket, through extensive R&D efforts has produced Shuttle, a WiMAX USB modem that meets user requirements for personal broadband.

Shuttle is part of Greenpacket's portfolio of next generation Wave 2 compliant WiMAX modems and the world's first high gain USB modem supporting both fixed and nomadic WiMAX. Shuttle is also one of the first breakthrough wideband modem that supports the frequency range of 2.3GHz to 2.7GHz.

## In Response to User Requirements on Personal Broadband

Shuttle is designed to meet the basic user requirements for personal broadband and more!



Figure 6: How Shuttle Empowers Personal Broadband

### *Aesthetically Pleasing*

Strong aesthetic values that appeal to style conscious users.

### *Superior Performance*

- Improved uplink coverage  
Shuttle deploys Switched Tx Diversity, a next generation antenna technology which intelligently selects the best antenna during transmission to increase signal strength for improved uplink performance.
- High Gain Omni Antenna  
Shuttle incorporates omni antenna that radiates and receives WiMAX signals from any direction for greater flexibility in modem placement and all-direction performance. The high gain antenna ensures WiMAX signals are transmitted in spite of penetration loss, resulting in improved indoor coverage.

### *Lightweight*

At simply 70g, Shuttle's lightweight design enables it to be easily carried around.

### *Easy-to-use*

- Plug 'n play  
Users can enjoy instant Internet connection minus the complication.
- Easy slotting into USB Port  
Shuttle is attached with a USB cable which is to be slotted into a USB port, while the modem can be placed in an ideal position to receive signal without disruption to usage.
- Easily attached to wall/window for better coverage  
Shuttle is comes with a suction cap that allows users to affix the modem onto a window or wall, which enables the modem to receive better signal quality, thus improving indoor performance. Meanwhile, the accompanying USB cable gives users the flexibility of sitting away from the window/wall and yet enjoy optimum WiMAX signal!

### *Wideband Support*

With the ability to access WiMAX in the 2.3GHz – 2.7GHz frequency range Shuttle enables personal broadband to be extended globally.

### *Additional Upgrade Functions*

- WiFi and VoIP Features  
Shuttle can be easily attached to a WiFi and VoIP Router to enjoy additional features such as WiFi and VoIP.
- External Antenna  
Affix Shuttle to an external antenna to further improve indoor reception.

## Personal Infotainment

The old school of broadband merely concentrated on extending connectivity. In today's generation of personal broadband, users rely on their personal broadband to provide infotainment.

Likewise, Shuttle offers more than a modem. It can be integrated with Infnit Services Management Platform (ISMP), a carrier-grade solution that enables Operators to host and manage their own Application Store, affording them the opportunity to increase subscriber adoption efforts and grow ARPU through the sale of applications.

It's an all-in-one solution that handles the complete works of an application store platform, from content submission to billing.



Figure 7: Shuttle, ideal for indoor, outdoor and mobile use

# Realize WiMAX As The Personal Broadband For Your Users!

Operators around the world have selected have successfully leveraged on WiMAX to start realizing the dream of personal broadband for their users. At Greenpacket, we have helped many WiMAX Operators achieve this through our best-in-class and award-winning USB modems.

Let us show you new perspectives on how to effectively extend the new age in connectivity and meet the demands of your subscribers.

With Greenpacket, limitless freedom begins now!

## Free Consultation!

If you would like a free consultation on how you can position WiMAX as the personal broadband for your users, please contact us at [marketing.gp@greenpacket.com](mailto:marketing.gp@greenpacket.com) (kindly quote the reference code, AP0410 when you contact us).

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# About Greenpacket

Greenpacket is the international arm of the Green Packet Berhad group of companies which is listed on the Main Board of the Malaysian Bourse. Founded in San Francisco's Silicon Valley in 2000 and now headquartered in Kuala Lumpur, Malaysia, Greenpacket has a presence in 9 countries and is continuously expanding to be near its customers and in readiness for new markets.

We are a leading developer of Next Generation Mobile Broadband and Networking Solutions for Telecommunications Operators across the globe. Our mission is to provide seamless and unified platforms for the delivery of user-centric multimedia communications services regardless of the nature and availability of backbone infrastructures.

At Greenpacket, we pride ourselves on being constantly at the forefront of technology. Our leading carrier-grade solutions and award-winning consumer devices help Telecommunications Operators open new avenues, meet new demands, and enrich the lifestyles of their subscribers, while forging new relationships. We see a future of limitless freedom in wireless communications and continuously commit to meeting the needs of our customers with leading edge solutions.

With product development centers in USA, Shanghai, and Taiwan, we are on the cutting edge of new developments in 4G (particularly WiMAX and LTE), as well as in software advancement. Our leadership position in the Telco industry is further enhanced by our strategic alliances with leading industry players.

Additionally, our award-winning WiMAX modems have successfully completed interoperability tests with major WiMAX players and are being used by the world's largest WiMAX Operators. We are also the leading carrier solutions provider in APAC catering to both 4G and 3G networks and aim to be No. 1 globally by the end of 2010.

For more information, visit: [www.greenpacket.com](http://www.greenpacket.com).

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