# Mobile WiMAX: A Review

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***Abstract:*** WiMAX (Worldwide Interoperability for Microwave Access) is a family of wireless communications standards initially designed to provide 30 to 40 megabit-per-second data rates, with the 2011 update providing up to 1 GBit/s for fixed stations. The name "WiMAX" was created by the WiMAX Forum, which was formed in June 2001 to promote conformity and interoperability of the standard. The forum describes WiMAX as "a standards-based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL".IEEE 802.16m or Wireless MAN-Advanced is a candidate for the 4G, in competition with the LTE Advanced standard. WiMAX refers to interoperable implementations of the IEEE 802.16 family of wireless-networks standards ratified by the WIMAX Forum.

***Keywords:****Wireless Communication, Interoperable, Broadband, WIMAX Forum.*

## I. INTRODUCTION

Wimax isWorldwide Interoperability for Microwave Access is a standards- based technology enabling the delivery of last mile wireless broadband access as an alternative to cable and DSL.Wimax eliminates the constraints of Wifi.Wimax is intended to work outdoors over long distances.Wimax and Wi-Fi the two technologies complement each other.

## USES

The bandwidth and range of WiMAX make it suitable for the following potential applications:

1. Providing portable mobile broadband connectivity across cities and countries through a variety of devices.
2. Providing a wireless alternative to cable and digital subscriber line (DSL) for "last mile" broadband access.
3. Providing data, telecommunications (VoIP) and IPTV services (triple play).
4. Providing a source of Internet connectivity as part of a business continuity plan.
5. Smart grids and metering WiMAX can provide at-home or mobile Internet access across whole cities or countries. In many cases this has resulted in competition in markets which typically only had access through an existing incumbent DSL (or similar) operator.

Additionally, given the relatively low costs associated with the deployment of a WiMAX network (in comparison with 3G, HSDPA, xDSL, HFC or FTTx), it is now economically viable to provide last-mile broadband Internet access in remote locations.[1]

## CONNECTING

A WiMAX USB modem for mobile access to the Internet

Figure 1: USB modem

Devices that provide connectivity to a WiMAX network are known as subscriber stations (SS).

Portable units include handsets (similar to cellular Smartphone's); PC peripherals (PC Cards or USB dongles); and embedded devices in laptops, which are now available for Wi-Fi services. In addition, there is much emphasis by operators on consumer electronics devices such as Gaming consoles, MP3 players and similar devices. WiMAX is more similar to Wi-Fi than to other 3G cellular technologies.

The WiMAX Forum website provides a list of certified devices. However, this is not a complete list of devices available as certified modules are embedded into laptops, MIDs (Mobile Internet devices), and other private labelled devices.

## MOBILE PHONES

HTC announced the first WiMAX enabled mobile phone, the Max 4G, on November 12, 2008. The device was only available to certain markets in Russia on the Yota network.

HTC and Sprint Nextel released the second WIMAX enabled mobile phone, the EVO 4G, March 23, 2010 at the CTIA conference in Las Vegas. The device, made available on June 4, 2010,[12] is capable of both EV-DO(3G) and WiMAX(pre-4G) as well as simultaneous

data & voice sessions. Sprint Nextel announced at CES 2012 that it will no longer be offering devices using the WiMAX technology due to financial circumstances, instead, along with its network partner Clearwire, Sprint Nextel will roll out a 4G network deciding to shift and utilize LTE 4G technology instead.

## SPECIFICATIONS

As a standard intended to satisfy needs of next-generation data networks (4G), WiMAX is distinguished by its dynamic burst algorithm modulation adaptive to the physical environment the RF signal travels through. Modulation is chosen to be more spectrally efficient (more bits per OFDM/SOFDMA symbol). That is, when the bursts have a high signal strength and a high carrier to noise plus interference ratio (CINR), they can be more easily decoded using digital signal processing (DSP). In contrast, operating in less favourable environments for RF communication, the system automatically steps down to a more robust mode (burst profile) which means fewer bits per OFDM/SOFDMA symbol; with the advantage that power per bit is higher and therefore simpler accurate signal processing can be performed.

Burst profiles are used inverse (algorithmically dynamic) to low signal attenuation; meaning throughput between clients and the base station is determined largely by distance. Maximum distance is achieved by the use of the most robust burst setting; that is, the profile with the largest MAC frame allocation trade-off requiring more symbols (a larger portion of the MAC frame) to be allocated in transmitting a given amount of data than if the client were closer to the base station.

The client's MAC frame and their individual burst profiles are defined as well as the specific time allocation. However, even if this is done automatically then the practical deployment should avoid high interference and multipath environments. The reason for which is obviously that too much interference causes the network to function poorly and can also misrepresent the capability of the network.

The system is complex to deploy as it is necessary to track not only the signal strength and CINR (as in systems like GSM) but also how the available frequencies will be dynamically assigned (resulting in dynamic changes to the available bandwidth.) This could lead to cluttered frequencies with slow response times or lost frames.

As a result, the system has to be initially designed in consensus with the base station product team to accurately project frequency use, interference, and general product functionality.

The Asia-Pacific region has surpassed the North American region in terms of 4G broadband wireless subscribers. There were around 1.7 million pre-WiMAX and WiMAX customers in Asia - 29% of the overall market - compared to 1.4 million in the USA and Canada.

The WiMAX Forum has proposed an architecture that defines how a WiMAX network can be connected with an IP based core network, which is typically chosen by operators that serve as Internet Service Providers (ISP); Nevertheless, the WiMAX BS provide seamless integration capabilities with other types of architectures as with packet switched Mobile Networks.

The WiMAX forum proposal defines a number of components, plus some of the interconnections (or reference points) between these, labelled R1 to R5 and R8:

SS/MS: the Subscriber Station/Mobile Station

ASN: the Access Service Network[18]

BS: Base station, part of the ASN

ASN-GW: the ASN Gateway, part of the ASN

CSN: the Connectivity Service Network

HA: Home Agent, part of the CSN

AAA: Authentication, Authorization and Accounting Server, part of the CSN

NAP: a Network Access Provider

NSP: a Network Service Provider

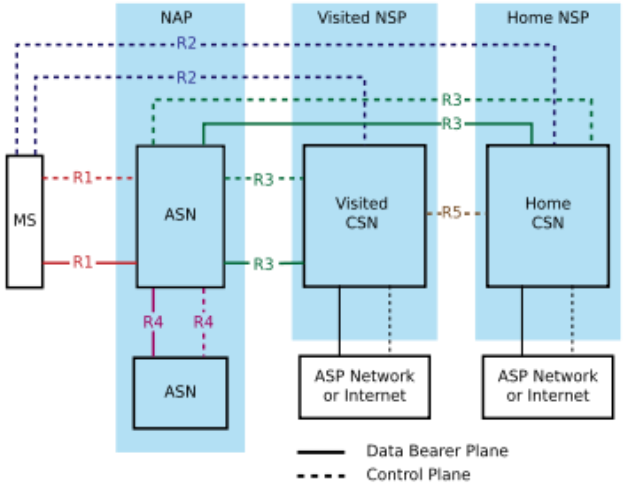


Figure 2: Internet Access

It is important to note that the functional architecture can be designed into various hardware configurations rather than fixed configurations. For example, the architecture is flexible enough to allow remote/mobile stations of varying scale and functionality and Base

Stations of varying size - e.g. feta, Pico, and mini BS as well as macros.[2]

## COMPETING TECHNOLOGIES

Within the marketplace, WiMAX's main competition came from existing, widely deployed wireless systems such as Universal Mobile Telecommunications System (UMTS), CDMA2000, existing Wi-Fi and mesh networking.

Speed vs. mobility of wireless systems: Wi-Fi, High Speed Packet Access (HSPA), Universal Mobile Telecommunications System (UMTS), and GSM

In the future, competition will be from the evolution of the major cellular standards to 4G, high-bandwidth, low-latency, all-IP networks with voice services built on top. The worldwide move to 4G for GSM/UMTS and AMPS/TIA (including CDMA2000) is the 3GPP Long Term Evolution (LTE) effort.

The LTE Standard was finalized in December 2008, with the first commercial deployment of LTE carried out by TeliaSonera in Oslo and Stockholm in December, 2009. Since then, LTE has seen increasing adoption by mobile carriers around the world.

In some areas of the world, the wide availability of UMTS and a general desire for standardization has meant spectrum has not been allocated for WiMAX: in July 2005, the EU-wide frequency allocation for WIMAX was blocked.

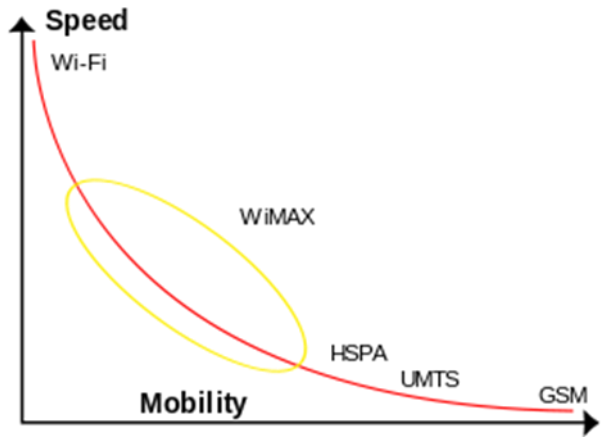


Figure 3: Mobility and Speed

## HARMONIZATION

Early Wireless man standards, The European standard HiperMAN and Korean standard WiBro were harmonized as part of WiMAX and are no longer seen as competition but as complementary. All networks now being deployed in South Korea, the home of the WiBro standard, are now WiMAX.[3]

## CONCLUSION

Thispaper presentsanoverview ofthe IEEEformat. It also discusses themain features of the newly standardized mobile WiMAX, the introduction of mobile WiMAX technology, it can be expected that future work will focus on the uses, connecting,specification and WiMAX with other completing wireless technologies of WiMAX foe high quality of voice ,internet and mobility and it provides aggregate rates to high-speed mobile users at the range of Gbps.

## *References*

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