

# An Illustrative and Protocol Oriented Review of Wimax Technology

<sup>1</sup>Kavita Dave, <sup>2</sup>Aabhas Mathur

<sup>1</sup>PG Student ECEDepartment, <sup>2</sup>HOD,ECE Department, <sup>3</sup>Designation of 3<sup>rd</sup> Author  
Electronics and Communication Engineering Department, Aravali Institute of Technical Studies,Udaipur India  
Rajasthan Technical University, Kota,Rajasthan,India  
Email – <sup>1</sup>kavita.dave91@gmail.com, <sup>2</sup>aabhas08mathur@gmail.com,

**Abstract:** *Through this paper we discuss the architecture, various standards applications and advantages of Wimax provided by developers who introduced the users across a broadband access services to solve barriers to adoption such as interoperability and cost of deployment.*

**Keywords:** *Wimax, DSL, Broadband,*

## 1. INTRODUCTION:

Wireless means transmitting signals using radio waves as the medium instead of wires. Wimax is one of the hottest broadband wireless technologies today. Wireless systems are expected to deliver broadband access services to residential and enterprise customer in an economical way. Wimax is the standardized wireless version of Ethernet intended primarily as an alternative to wired technologies is to provide broadband access to customer premises.

Wimax is an IP based wireless broadband access technology, i.e. also known as World Wide Interoperability for Microwave Access(Wimax). This provides similar performance to that of 802.11/Wi-Fi networks with the coverage and quality of service(QoS) of cellular networks. This wireless broadband access standard could supply the absent connection for the “last mile” relation in wireless metropolitan area networks(MAN). The IEEE 802.16 is aimed to operate in the 10-66 GHz spectrum and at 10-66 GHz range line of sight transmission is required. The IEEE 802.16 mentions the physical layer(PHY) and medium access control layer(MAC) of the air interface between a group of interacting bodies. The standard by itself is not enough to enable mass adoption. Wimax has stepped forward to help solve barriers to adoption such as interoperability and cost of deployment. Wimax will help ignite the wireless MAN industry by defining and conducting interoperability testing and labeling vendor systems.

## 2. LITERATURE REVIEW:

In this research work we have compared and analyzed 20 research papers details of which will be given in the subsequent sections . Thus in this way we have seen the evolution of Wimax technology and fit[s] comparison with other research works till date.

**Mr. Sanjeev Kumar Choudhary, Mr. Sanjay Kumar Dubey, Mr. Ramesh Gupta, “Wimax Technology: A Secure Broadband Connectivity for Governments, Military Services in Rural/Strategic Isolated Locations”.** In this paper presentation of information security in Wimax technology implementation with the use of encryption device which increased the security of data and draws an advantage of combination of Wimax and encryption.

**Gyan Prakash, Sadhana Pal, “Wimax Technology And Its Applications”.** This paper presents the features of the world wide inter-operability for microwave access (Wimax). Wimax technology and its future applications by comparing Wimax with DSL (digital subscriber line) and cable and wireless fidelity (Wifi). Wimax provides broadband wireless access (BWA) upto 30 miles and 3-10 miles for mobile stations.

**Mojtaba Seyezadegan and Mohamed Othman, “IEEE 802.16: WiMAX Overview, WiMAX Architecture”.** This paper is a quick technical overview and covers: Wimax overview technological based : standard update and Wimax architecture. It is designed for delivering broadband seamless quality multimedia services to the end users by combining the similarity of Wi-Fi with the mobility of cellular that will deliver personal mobile broadband that moves with you.

**Shuang Song and Biju Issac, “Analysis Of Wifi And Wimax And Wireless Network Coexistence”.** This paper will introduce these two technologies and make comparisons between WiMAX and WiFi. In addition, wireless network coexistence of WLAN and WiMAX will be explored through simulation. Lastly we want to discuss the future of WiMAX in relation to WiFi.

**Mr. Jha Rakesh, Mr. Wankhede Vishal A, Prof. Dr. Upena Dalal, “A Survey of Mobile WiMAX IEEE 802.16m Standard”.** This paper overview the Wimax technology and its development. This paper basically focuses on the Physical Layer, MAC Layer, Scheduler,QoS provisioning and mobile WiMAX specification.

**Shantanu Pathak and Shagun Batra, “Next Generation 4G WiMAX Networks - IEEE 802.16 Standard”.** This paper presents overview of various PHY and MAC layer that defines IEEE 802.16d-2004 standard for fixed Wimax and 802.16e-2005 standard for mobile Wimax and discuss about the various updates in the advanced air interface.

**Hanefi Çınar, Musa Çibuk And Hasan H. Balik, “History And Evaluation Of Mobile Wimax”.** This paper examined the three key themes. These are mobile Wimax and its historical development mobile Wimax evaluation and advantage of mobile Wimax. IEEE 802.16 WG has announced new amendment at this term. This impressive amendment, known as 802.16m, is designed to meet or exceed the requirements of IMT-Advanced (the 4th generation of cellular systems).

**Rachana Khanduri, Chhavi Chaudhary, Vishal Gupta, “The Role of IEEE802.16e Mobile WiMAX”.** This paper examined mobile Wimax, its applications and challenges on the wireless local and metropolitan area network (MAN) standard IEEE 802.16 and IEEE 802.12e. The mobile Wimax Air interface adopts orthogonal frequency divisor multiple access (OFDM) for improving multipath performance in non-line-of-sight environment.

**Deman Kosale, H.R.Suryawanshi, Maheedhar Dubey, “Mobile WiMAX and It Comparison with other Next Generation Wireless Network Technologies”.** In November 2007 the mobile Wimax was successfully adopted by ITU (International Telecommunication Union) as one of the IMT 2000 (International mobile telecommunication) technologies. This paper provides vast overview of IEEE 802.16e, Phy-layer, MAC layer, Handover, IEEE 802.16m.

**Mohammed Awadh Ben-Mubarak,” Handover Schemes for Mobile WiMAX Networks: Review, Challenge and the State of Art”.** The paper advocates the handover mechanism along with their schemes, strategies and protocol categories and give comparison schemes. It also discusses several issues and challenges facing mobility management along with an evaluation and comparison of several relevant mobility studies.

**S.A.Amutha Jeevakumari, P.Maheswara Venkatesh, “Performance Analysis of Space Time Coded MIMO Mobile Wimax (IEEE 802.16e)”.** In this paper international telecommunication union (ITU) vehicular multipath single input single output SISO mobile Wimax and space time coding STC 2x1 multi- input multi-output MIMO mobile Wimax are simulated and their performance are compared using OPNET 14.5. The future work is to use of overhead reducing mechanism and proper scheduling that may significantly improve network performance.

**Esa Piri, Jarno Pinola, Ilkka Harjula, and Kostas Pentikousis, “Empirical Evaluation of Mobile WiMAX with MIMO”.** There are few publicly available studies demonstrating what is possible with Mobile WiMAX in practice and none that empirically evaluates the performance gains attained with MIMO. Authors fill this gap by comparing space time coding based 2x2 MIMO with single antenna mode in our Mobile WiMAX test bed. They also conduct thorough measurements that involve vehicular mobility with different types of traffic.

**Abdalraouf Hassan, Christian Bach, “WiMAX Basics from Deployments to PHY Improvements”.** In this paper a broad study is conducted about Wimax technology PMP and Mesh deployments from main physical layers features with differentiation of MAC layer features to scheduling and multicasting approaches in both nodes of operations. In addition communication in the 10.66 GHz freq band was augmented by line of sign requirements.

**Chakchai So-In, Raj Jain, and Abdel Karim Al-Tamimi, “Resource Allocation in IEEE 802.16 Mobile WiMAX”.** In this paper authors classify the proposed mechanisms based on the use of channel conditions. The goals of scheduling are to achieve the optimal usage of resources, to assure the QoS guarantees, to maximize goodput, and to minimize power consumption while ensuring feasible algorithm complexity and system scalability.

**Boris Makarevitch, “Jamming Resistant Architecture for WiMAX Mesh Network”.** The paper presents a jamming opposition infrastructure for military applications of WiMAX (802.16) mesh network. The main idea is to use multiple base stations (BS), access points to the fixed core network. Several algorithms were considered in the paper and their performance evaluated by the network simulation for both jamming and non-jamming cases. The best performance in both cases shows an algorithm with initial slot allocation based on the finite field properties.

**Vinod Sharma, A. Anil Kumar, S. R. Sandeep, M. Siddhartha Sankaran, “Providing QoS to Real and Data Applications in WiMAX Mesh Networks”.** IEEE 802.16 supports two modes of operation: Point to multipoint (PMP) and Mesh mode. In this paper we have designed efficient, fair and practically implementable algorithms for routing and centralized scheduling in IEEE 802.16 mesh networks. We provide end to end QoS to different flows in the network.

**Tássio Carvalho, José Jailton Júnior, Warley Valente, Carlos Natalino, Renato Francês and Kelvin Lopes Dias, “A Mobile WiMAX Mesh Network with Routing Techniques and Quality of Service Mechanisms”.** The constant evolution of technologies for future wireless networks, along with the demand for new multimedia applications (voice, video,... ) have led to the creation of new technologies for wireless communications. This paper showed an initial study on wireless mesh networks, pointing out the main goals of interest, challenges and issues encountered, highlighting the advantages and disadvantages of this mode of operation.

**Manal Al-bzoor and Khaled Elleithy, “Wimax Basics From Phy Layer To Scheduling And Multicasting Approaches”.** In this paper authors conducted a broad study of WiMAX. They started by describing main features and the evolution of the standards with focus on the current working standards IEEE 802.16de. Like all 802.x families,

the standards define only the MAC and the PHY layers to allow interoperability with higher layers and other standards.

**Hung-Yu Wei, Samrat Ganguly, Rauf Izmailov, Zygmunt J. Haas, “Interference-Aware IEEE 802.16 WiMax Mesh Networks”.** In this paper authors proposed an interference-aware research framework for the emerging IEEE 802.16 Mesh mode to improve spectral utilization. Using this framework, they also introduced an interference-aware route construction algorithm for 802.16 mesh network initialization process to improve the network throughput by selecting routes with minimal interference to existing nodes.

**Ismat Aldmour, “LTE and WiMAX: Comparison and Future Perspective”.** This paper aimed at comparing LTE with WiMAX wire - less technologies. It also discusses the factors that led to LTE winning as the technology for near future public networks. The article also foresees future directions of both technologies and the alternatives that WiMAX technology has.

#### **4. CONCLUSION:**

WiMAX Technology is facing many hurdles in market while it has some great advantages which make it a technology of today. This paper provide readers the quick and technical overview of concept, technology, standard, and architecture for IEEE 802.16 WiMAX.

With the introduction of mobile WiMAX technology, it can be expected that future work will focus on the mobility aspect and interoperability of mobile WiMAX with other wireless technologies. This paper advocates many results provided by various researchers and developers to market the need of high speed mobile communication.

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