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Comparison of WLAN with WIMAX Networks

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Abstract: ***Now day's wireless networks are very popular way to connect to a network and totally changed the way people communicate & shared information. It provide high data rate to large number of users, signals are transmitted in radio waves. Wireless network has become popular for providing flexibility and mobility in accessing networks and services. Broadband Wireless has emerged as a means to provide a lower total cost of ownership than wired solutions. Wireless Local Area Network (WLAN) is based on IEEE 802.11 standard and WiMAX (Worldwide Interoperability for Microwave Access) that uses the IEEE 802.16 standard. This paper will introduce these two technologies and make comparisons between WiMAX and Wlan***

Keywords: WLAN, WIMAX, WIRELESS

I. INTODUCTION

Wireless LANs mean any local area network (LAN) that a mobile user can connect to through a wireless (radio) connection. Wlan is a wireless network technology that is based on IP addressing **[4]**. Generally Wlan has medium range data transfers i.e. 100 to 300 feet in indoor. This provides mobility in networking. WLANs are deployed as an extension to the existing fixed/wired LANs and due to the fact that the nature of WLANs are different from their wired counterparts, it is important to raise the security of WLANs to levels closer or equal to the wired LANs **[10]**. Wlan can be used for both peer to peer networks and point to point and point to multipoint applications. Wireless lan covers small area networks like office and campus area. A local area network generally provides high-bandwidth communication over inexpensive transmission **[6]**. All local networks are wired together and location remains static. Wi-Fi enabled devices operate in unlicensed spectrum **[1]**. It provides lan& Ethernet technology without confusing network of wire & cable. A wireless LAN is based on a cellular architecture where the system is subdivided into cells, where each cell (called Base Service Set or BSS*) is controlled by a Base station (called Access point or AP) **[5]**. The target of Wlan gives mobility at low cost to devices like as mobile, laptop and tab by wireless internet signal in the form of waves (radio wave) at home, college, hospital etc. Thus it means data transmit and receive in air. WLAN as its name mean LAN but without wires. Wireless LANs use radio frequencies or infrared light to provide internet signals. WLANs provide a throughput comparable to wired Ethernet, mobile access along with configuration flexibility **[3]**. It is cheaper medium as everybody wants freedom from wires. Wireless Local Area Network (WLAN) gives direct access to internet resources on the move. The landlord cost is reduced without influence on other resources. Wlan provides wireless Ethernet network & mobile access in remote areas. Using Radio Frequency technique, wireless LANs transmit and receive data in air, reducing the demand for wired connections **[2]**. It gives access to the people who can't be reached through wired Ethernet connection. An Access Point (AP) is used to provide connection for longer internet. Generally, Wlan is the data packet communication network but in limited area or in limited rang.It is very easy to develop, maintain as compare to traditional wired internet but also facing a number network relucted challenges such as security, low speeds, difficult in operating and Radio Signal Interference. Wireless Local Area Network (WLAN) attached two or more devices using a wireless communication method.

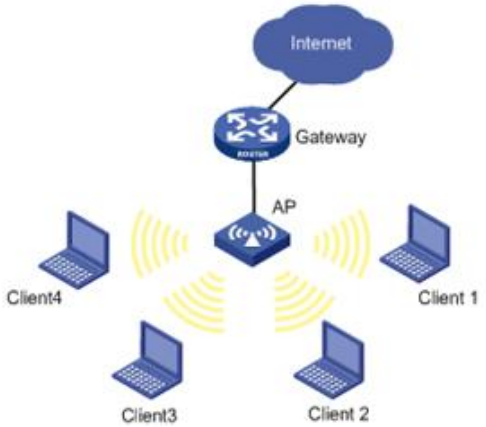

Fig- 1: IEEE802.11 WLAN

WIMAX NETWORK

WiMAX (Worldwide Interoperability for Microwave Access) is a telecommunications protocol that provides wireless communication hence transfer the data using various transmission modes The speed of connection is up to 40Mbps and cover the area in miles (3 to 10 Kms). WiMAX operates in between 10 and 66 GHz Line of Sight (LOS) at a range up to 50 km (30 miles) and 2 to 11GHz non Line-of-Sight (NLOS) typically up to 6 - 10 km (4 - 6 miles) for fixed customer premises equipment (CPE) **[9]**. It is based on IEEE 802.16 standard and also called Broadband Wireless Access. WiMAX also known as IEEE Wireless MAN (Metropolitan Area Network) can provide an effective interoperability broadband wireless access method under the MAN of a point to multipoint multi-vendor environment **[4]**. "WiMAX" name was first created by the WiMAX Forum, which was formed in June 2001 and to promote conventionality and interoperability of the IEEE standard. Wimax is like as 4G and is similar to 3G but faster and covers a long range of area. There is Fixed and mobile Internet access i.e. Supported by Wimax. WiMAX dispense the maximum speed is up to 1 Gbit/s. The throughput of the WiMAX lies between the WiFi and 4G mobility **[7].** WiMax, a broadband wireless access technology, is used to deliver a high data rate for residential and enterprise use in a line-of-sight as well as in non-lineof-sight **[8]**. **Where there is no possibility of internet via DSL cables, Wimax provides facility to access the internet.** Mobile WIMAX is installed in cars as well providing GPS and other applications. Now days 802.16e are in use.

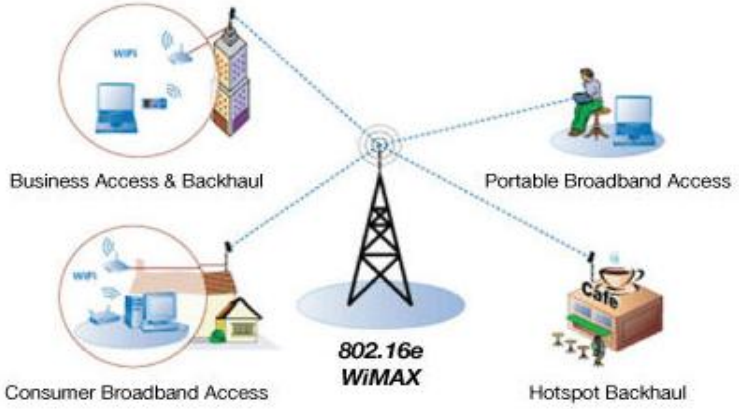

Figure 2:- IEEE 108.16e

II. LITERATURE SURVEY

Vijay Chandramouli "A Detailed Study on Wireless LAN Technologies" Bluetooth is inadequate for serious, security-sensitive work, and it lacks the strength required for a wireless extension to an enterprise or public network**.** Technologies like IEEE 802.11 are the better choice for corporate LANs (and perhaps WAN connectivitywith future improvements of the standards) while Bluetooth technology will be the better option for connectivity between computers and small PDAs, digital cameras, mobile phones and the like. With final ratification of the 802.11g wireless standard delayed until spring 2003, researchers are interested in dual-mode access points that let users enjoy Wi-Fi compatibility and higher speeds today.

Gagandeep Singh, et al "IEEE 802.11 WLAN and Advancements" had proposed now 802.11ac it has crossed 1Gbps mark. 802.11ac has the potential to support next generation of application, that are more bandwidth intensive and video oriented. This will offer more freedom and flexibility to choose interoperable solutions, since it is backward compatible with most IEEE 802.11 standards.

Sharanbeer Kaur1, et al "Study on Wireless Technologies Wimax and Wlan with Their Interfaced Scenario"had proposed that we can merge these two prominent technologies to speed up the communication. Also the security of these technologies is a challenging topic to be researched further. But according to time changes if new threats are coming, side by side researchers are also trying to find new security protection mechanisms.

Marc Portoles-Comeras, et al "Techniques for Improving the Accuracy of 802.11 WLAN-Based Networking Experimentation" The paper also highlights the fact that unexpected observations are generally related to throughput and loss measurements. This suggests the idea of using a priori workload and loss tests in controlled environments to assess the performance of the solutions to be used. This will help detecting in advance any potential issue thatmay arise during the operation of an experimental deployment.

Sunil Kr. Singh, et al "Architectural Performance of WiMAX over WiFi with Reliable QoS over Wireless Communication" had proposed In future, Develop the proposed a unified connection-oriented architecture to support the integration of WiFi and WiMAX technologies in broadband wireless networks. This common architecture is supposed to result in an overall advance in technology and a reduction in costs

Table 1 Comparisons of WiMAX and Wlan:-

Feature	**WLAN**	**WIMAX**
Primary Application	Wireless LAN	Broadband wireless Access
Connections	Oriented	Connection less
Quality of service(QOS)	No support	Support at MAC

Scalability	Fixed	Flexible
Transmission Power(W)	2.0 W	0.5 to 3W
Receiver sensitivity	-95 dBm	-200 dBm
Physical characteristics	Extended rate PHY (802.11g)/ Direct Sequence	Wireless OFDMA 5 MHz
Area cover	Small	Wide area
Bandwidth	Less	High
Connection Reliability	Yes	No
Security Mechanisms	Wired Equivalent Privacy (WEP) authentication, pre-shared key	Extensible Authentication Protocol (EAP), Advanced Encryption Standard (AES)
Radio Technique (Modulation)	OFDM 64 channels	OFDM 256 Channels
Frequency band	Unlicensed	Licensed and Unlicensed
Access points	Limited	No
Mobility	In development (provides fixed and portable solutions within the coverage of hot spot)	Mobile Wimax (802.16e) (provides fixed and portable solutions over a wide area of 1-3 miles)
Mesh	Vendor Proprietary	Yes
Access Protocol	OFDM/OFDMA	CSMA/CA
Duplex	Full	Half
Downstream(Mbit/s)	288.8 (using 4x4 configuration in 20 MHz bandwidth) or 600 (using 4x4 configuration in 40 MHz bandwidth)	128 (in 20MHz bandwidth)
Upstream(Mbit/s)	288.8 (using 4x4 configuration in 20 MHz bandwidth) or 600 (using 4x4 configuration in 40 MHz bandwidth)	56 (in 20MHz bandwidth)

Some differences between Wlan and WiMAX can be found in the following table [4].

Table 2 Comparison of Wlan and WiMAX

Feature	**Wlan**	**WiMAX**
Standard	802.11a/b/g/n	802.16d/e
Data rate (MAX)	300 Mbps	70Mbps
Transmission Distance (MAX)	300m	50Km
Operating Frequency	2.4 GHz and 5GHz	2-11 GHz
Channel Bandwidth	20 to 25MHz	Ranging from 1.25 to 20 MHz
Encryption	RC4 and Advanced Encryption Standard (AES)	Triple Data Encryption Algorithm (3 DES) and Advanced Encryption Standards (AES)

III. CONCLUSION

Wimax is out playing thenWlan, in matter of coverage area. It also helped us in overcoming the limitation of wlan. The network coverage of wlan is restricted to a small area, but wimax is completely free from such limitation of area. It is the ultimate medium of providing wireless internet access, but inspires of their unique limitations both wlan and wimax are reliable technologies. Security in Wimax is stronger than Wlan. All over performance of Wimax as compare to Wlan is much excellent.

REFERENCES

[1] YashiAmola, Md. AlimulHaque, Dr. N. K. Singh "Performance of WiMAX over WiFi with Reliable QoS over Wireless Communication Network" World Applied Programming, Vol (1), No (5), December 2011. 322-329 ISSN: 2222-2510 ©2011 WAP journal. www.waprogramming.com

[2] SharanbeerKaur, ShivaniKhurana, "Study on Wireless Technologies Wimax and Wlan with Their Interfaced Scenario" International Journal of Emerging Technology and Advanced Engineering (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 11, November 2013

[3] Gagandeep Singh, Shelza, Sukhvir Singh, "IEEE 802.11 WLAN And Advancements" International Journal of Recent Development in Engineering and Technology (ISSN 2347-6435(Online) Volume 3, Issue 2, August 2014)

[4] Shuang Song and BijuIssac, "ANALYSIS OF WIFI AND WIMAX AND WIRELESS NETWOR COEXISTENCE" International Journal of Computer Networks & Communications (IJCNC) Vol.6, No.6, November 2014

[5] Vijay Chandramouli "A Detailed Study on Wireless LAN Technologies"https://www.uta.edu/oit/policy/ns/docs/wireless-paper-vijay

[6] Putman, Byron W. (2005). "WLAN Hands-On Analysis" Author House, 2005.

[7] Garima Malik *, Ajit Singh " Performance Evaluation of WiFi and WiMax Using Opnet" International Journal of Advanced Research in Computer Science and Software Engineering Volume 3, Issue 6, June 2013 ISSN: 2277 128X

[8] Vikash Solomon Abel and Rodney Rambally, "WiMAX and WiFi in Current World," International Journal of Scientific & Engineering Research, ol.2, pp.1-4, September 2011.

[9] Sourangsu, B., and Rahul, S. C. (2013) 'WiFi&WiMAX: A Comparative Study'. Journal ofIndian Journalof Engineering, 2(5), [Preprint]. http://arxiv.org/ftp/arxiv/papers/1302/1302.2247.pdf (Accessed: 8 July 2014)

[10] Ahmed M. Al Naamany , Ali Al Shidhani, HadjBourdoucen*"IEEE 802.11 Wireless LAN Security Overview" IJCSNS International Journal of Computer Science and Network Security, VOL.6 No.5B, May 2006*

