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Wireless Communication using WiMAX -Worldwide Interoperability for Microwave Access

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Abstract— WiMAX is one of the emerging wireless technologies that give us lofty speed mobile information and telecommunication services. It can support more than hundreds of subscribers from a single base station. It will support low latency on applications such as voice, videos, and Internet access at the same time. This paper deals with the WiMAX network which has lack of quality service because where hundreds of user trying to get access at the same tower which leads to heavy traffic and it is very hard to maintain high quality.

Keywords— WIMAX, high speed, lack of quality

1. Introduction

WIMAX is a telecommunications technology which offers transmission of wireless information via a digit of broadcast systems; such as portable or fully mobile internet access through point to multipoint relations. The WIMAX equipment gives approximately 72 Mega Bits per second without any cables. WIMAX technology is based on Standard that is IEEE 802.16.It is fully based on the wireless network in which data can be delivered to a wide area. WIMAX Technology is similar to Wi-Fi but it is more advanced and has improved efficient than Wi-Fi because it can direct information Wi-Fi apparatus can obtain improvement of WIMAX connection. It provides high speed on connection up to 70 Mbps over the area of 30 miles. There is no need for straight line connections between the subscriber terminal and the base station in WIMAX technology.

1.1 WIMAX Base Station

The WIMAX base station consists of indoor electronics and a tower. Typically, a base station can cover up to 10 km radius where a base station can cover up to 50 kilo meter radius/30 miles, though practical deliberations border it to about 10 km or 6 miles. Any wireless node inside the coverage area would be able to access the Internet. WIMAX works on a single antenna system which is called a base station and a WIMAX receiver as shown in the Figure.1.

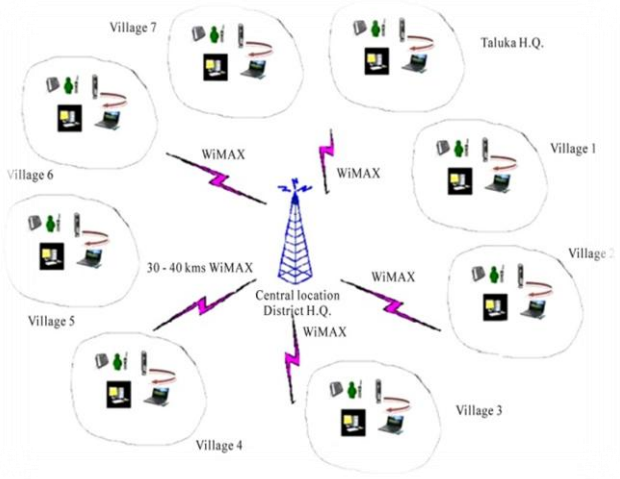

Fig.1: WiMax Structure

1.2 WIMAX Receiver

The WIMAX receiver receives the singles from the base station and connects it to the PCs and laptops. The signals receiving from the base station is similar to the wifi network, but WIMAX has a ability to cover a wide area. WIMAX is a technology based on the IEEE 802.16 stipulations to enable the delivery of last-mile wireless broadband access as an option to cable and DSL. The plan of WIMAX network is based on the following major principles

- *Spectrum* − capable to be organized in both certified and unlicensed range.
- *Topology* − supports different Radio Access Network (RAN) topologies.
- *Interworking* − autonomous RAN structural design to enable seamless integration and interworking with WiFi.
- 3GPP and 3GPP2 networks and accessible IP operative core network.
- *IP connectivity* – which supports a mix of IPv4 and IPv6 network interconnects to the client and server.
- *Mobility management* –this can able tto extend the fixed entry to portability and broadband multimedia services release.

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2. WiMAX and Wi-Fi

WiMAX is similar to the wireless standard recognized as Wi-Fi, but on a greatly better scale and at quicker speeds. This version of WiMAX-enabled devices connected over wide regions, much similar to today's cell phones. We can compare it with Wi-Fi based on the following factors.

- *IEEE Principles* - Wi-Fi is depend on IEEE 802.11 standard while WiMAX is based on IEEE 802.16. However, both are IEEE standards.
- *Range* - Wi-Fi characteristically gives local network entrée for a few hundred feet with the speed of up to 54 Mbps, a single WiMAX antenna is probable to have a array of up to 40 miles with the speed of 70 Mbps or more. As such, WiMAX can bring the original Internet link desirable to service local Wi-Fi networks.
- *Scalability* - Wi-Fi is planned for LAN applications, consumers balance from one to tens with one subscriber for each CPE tool. Set channel sizes (20MHz). WiMAX is intended to capably sustain from one to hundreds of Consumer grounds equipments (CPE)s, with limitless subscribers after each CPE. lithe channel sizes from 1.5MHz to 20MHz.
- *Bit Rate* - Wi-Fi workings at 2.7 bps/Hz and can climax up to 54 Mbps in 20 MHz channel. WiMAX works at 5 bps/Hz and can climax up to 100 Mbps in a 20 MHz channel.
- *Quality of Service* - Wi-Fi does not assurance any QoS but WiMax will offer your numerous level of QoS. As such, WiMAX can carry the original Internet link wanted to repair local Wi-Fi networks. Wi-Fi does not give everywhere broadband whereas WiMAX does.

3. Existing System

The present WIMAX system uses a single antenna system from which signals are received .Within the bazaar, WIMAX's most important antagonism came from obtainable, widely deployed wireless systems such as Universal Mobile Telecommunications Systems(UMTS), CDMA2000, existing Wi-Fi and mesh networking.PAN(personal area network) allows devices to communicate with each other example: Bluetooth. LAN (local area network) allows devices to share information but is limited to a fairly small central area. WIMAX is the wireless solution for the next step in scale, the metropolitan area network (MAN).

4. Proposed System

In this proposed system, WLAN is used. WIMAX technology can make high speed wireless broadband internet services obtainable to much better areas than can typical WI-FI hot spots. This WIMAX implementations can provide a wireless range of up to 30 miles or 50 kilometers much greater than the physical distance limitations of WI-FI hot spot or DSL. WIMAX technology can also be used to interconnect existing WI-FI networks.

5. Methodology

To improve the efficiency for which number of bits broadcasted form a solitary basis we use to concepts called signal modulation and MIMO.

5.1 Signal Modulation

This is the primary technique used in wimax for the signal modulation. Signal modulation uses orthogonal frequency division multiplexing (OFDM).this concentrates bandwidth to improve the efficiency and more reliable.when OFDM is coupled with the bandwidth it transmits data at high frequency and traffic between them can be reduced.

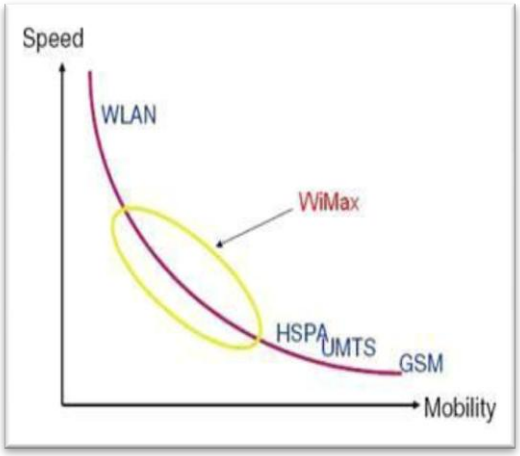

Fig.2: Effectiveness of WiMax

5.2 MIMO Antenna System

The other major technique used in wimax is multiple inputs and multiple output antenna system. This helps in transferring multiple inputs and outputs from a base station to the user.at the same time user can clever to propel and obtain data concurrently.

6. Result

By using these techniques we can achieve high data rates and improve the efficiency.the wireless LAN are used to connect with the wifi which can cover a extensive area and utilize can propel and accept data simantaneosly with the multi antenna system where the lack of quality can be reduced.

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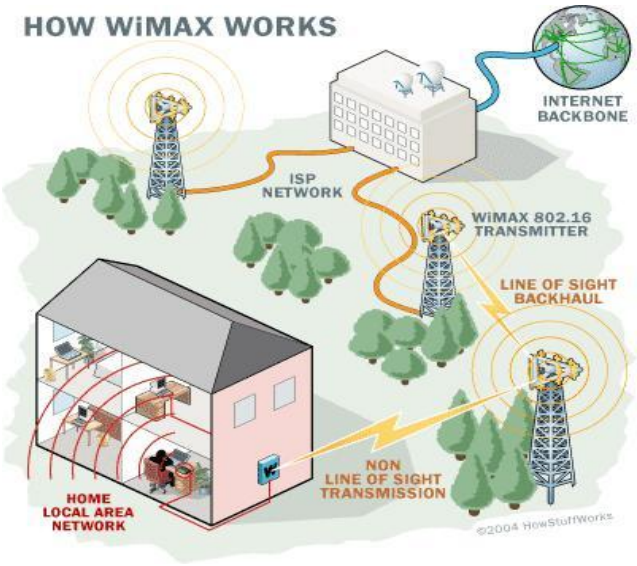

Fig.3: WiMax Working Structure

7. Conclusion

WiMAX has a number of front-line uses, including at-home and mobile internet access.. In totaling, the standard can be utilized as backbone for cellular equipment, either by restoring current expertise or acting as superimpose in order to boost capacity. It can also be used to give "triple-play" service, which engages the use of two bandwidth-intensive operations and one fewer bandwidth- intensive operation over a single link. This can comprise, for example, lofty velocity Internet access, Internet TV and a customary phone line

8. Future Enhancements

Here we suggested WiMAX should be included as a basic component like Bluetooth in all upcoming mobile models. Currently only few smart phones have this facility which is not accessible to all**.** A number of mobile operators in promising markets may think mobile WiMax as a better alternative to DSL in rural areas.

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