WIRELESS COMMUNICATION WIMAX

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ABSTRACT

The growing demand of the cell phones and multimedia networks results in the development of the broad band access. One of such broad band access developed is IEEE 802.16 which is commonly known as WIMAX (Worldwide Interoperability for Microwave Access). IEEE 802.16 is a standard which is used to state the radio frequency of fixed broad band Wireless Access. There are many advantages in WIMAX compared to Wi-Fi. This article deals with explanation, architecture as well as pros and cons of WIMAX.

I. DEFINITION OF WIMAX

WIMAX is defined as Worldwide Interoperability for Microwave Access. WIMAX is officially known as Wireless Man. WIMAX is a standard based technology which is widely used for providing wireless access instead of wired communication. WIMAX is meant for transferring of data from point to point or point to multi point communication. It is dedicated to the advancement of IEEE 802.16 standards.

II. ARCHITECTURE OF WIMAX

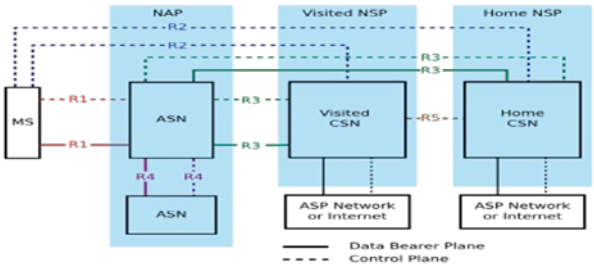
A WIMAX system consists of two important parts which are the transmitter and the receiver. A single WIMAX tower which acts as a transmitter can provide coverage nearly upto 3000 sq. miles whereas a receiver could be a small box or it can be built in laptops and it can be accessed as Wi-Fi is accessed today.

There are two physical layers in WIMAX: Uplink and Downlink. The functions of the physical layer of the WIMAX are:

1) It is capable of encoding or decoding signals.

2) It can perform transmission or reception of bits.

The architecture of WIMAX was proposed by WIMAX forum regarding the connection with IP based network.



SS/MS: the Subscriber Station or the Mobile Station.
ASN: The Access Service Network.
BS : Base Station.
CSN: Connectivity Service Network
NAP: a Network Access Provider.
NSP: a Network Service Provider.
AAA: Authentication, Authorization and Accounting Server.
HA: Home Agent, part of CSN.

WIMAX uses OFDM (Orthogonal Frequency Division Multiplexing) topology. OFDM is capable of assigning subcarriers to different users. OFDM is divided into 256 substations.

III. FEATURES OF WIMAX

- WIMAX uses wireless link in the range of microwave or millimeter waves.
- WIMAX uses licensed spectrum.
- It can provide faster connectivity.
- It has separate voice and data channel for fun.
- A smart antenna which is present in WIMAX can provide high quality through a long route without any encryption.

IV. WORKING OF WIMAX

WIMAX technology providers build a network with towers which is used for enabling communication access over miles. The coverage area of WIMAX is separated into series of over lied areas called channels. When a user sends data from one location to another location, the wireless connection is transferred from one cell to another cell. When any signal is transmitted from user to base station or from base station to user the wireless channel faces much attenuation. The target of the receiver of WIMAX is to rebuild the transmitted data to make it as a reliable data transmission.

V. WHY WIMAX WAS INTRODUCED?

Broad band connections had been offered by several companies or it may come from satellite links which is economically very difficult. To overcome this issue, WIMAX was introduced. WIMAX can provide wireless access to large geographical area and is meant for serving large number of people at low cost. WIMAX can provide access upto31 miles. We do not require stringing wires and WIMAX works faster.

VI. TYPES OF WIMAX

There are two types of WIMAX: Fixed WIMAX and mobile WIMAX**.** The fixed WIMAX includes two category named stationary and pedestrian and the mobile WIMAX includes a category named vehicular. WIMAX can provide broadband wireless access upto 30 miles for fixed stations and 3-10 miles for mobile stations. The two forms of wireless services include LOS (Line Of Sight) and NLOS (Non Line Of Sight).Fixed WIMAX is optimized for Fixed and nomadic applications in LOS and NLOS environment. The range of licensed frequency bands in LOS is 10-66 GHz. The Mobile WIMAX is optimized for portable and mobile applications in NLOS environment.

VII. WIMAX Vs WI-FI

WIMAX is almost similar to Wi-Fi in 3G technologies. But still WIMAX plays a vital role in this technical era. WIMAX is more advantageous than Wi-Fi because it isn't speed instead WIMAX is capable of covering over larger kilometers, thus it supports long range communication. Also WIMAX uses licensed or

Unlicensed spectrum to provide point to point or point to multi point communication. WIMAX is very essential because it can provide broadband wireless access upto 30 miles for fixed stations and 3-10 miles for mobile stations whereas Wi-Fi is limited to only 100-300 feet. It is capable of transmitting data in the order of 2 to 75Mbps. WIMAX installation is very simple. In developed countries, WIMAX is famous and it has become the only wireless technology because Wi-Fi and cellular networks have not even penetrated in the areas with WIMAX technology.

VIII. INSTALLATION OF WIMAX

WIMAX installation is very simple. There are numerous products available in the markets which are meant for providing connection with WIMAX network. These products are called as subscriber units.

IX. SPECIFICATIONS OF WIMAX

Some of the specifications of WIMAX is given below:

- Spectrum: 10-66 GHz.
- Bit Rate: 32-134 Mbps at 28 MHz Channelization
- Channel Bandwidth: 20,25,28MHz

X. ADVANTAGES OF WIMAX

WIMAX technology has many advantages in which some are mentioned below.

- WIMAX can transfer data at high speed over larger distance.
- A single station of WIMAX is responsible for transmitting and receiving information to hundreds of users.
- WIMAX technology is capable of performing multiple tasks at a time at a very high speed.
- WIMAX can provide opportunity to provide various types of services.
- Simply by connecting to WIMAX, we can surf internet at any time and at any place.

XI. DISADVANTAGES OF WIMAX

Though WIMAX has many advantages, there are also some disadvantages which are listed below.

- The WIMAX network has lack of quality services since nearly hundred users are accessing from the same tower.
- The range for mobile stations is about 70Mbps only in ideal or particular circumstances. If user is away in such a situation from the tower, the speed may drop.
- If there are a lot of users in a single area, the speed is about 2 to 10 Mbps which is caused due to shared bandwidth.
- The service quality of WIMAX gets decreases during weather seasons because there is a possibility that the signal can gets interrupted because of the weather.
- The WIMAX network is very high. So we need large electrical power and it is of high cost.

XII. APPLICATIONS OF WIMAX

- WIMAX is used in residential areas. This technology is also used in markets for satisfying the need of the customers.
- It plays a vital role in small to medium scale business. Sometimes, the bandwidth may not be sufficient in high density areas. So it is well suited for low density areas.
- WIMAX is expected to perform more for Metropolitan Area Networks. WIMAX is not projected to replace Wi-Fi but to provide quicker access.
- WIMAX is the only wireless network used in some developed countries in which Wi-Fi or other cellular network cannot penetrate.
- WIMAX is also consider to be a secure network because of the presence of encryption system in WIMAX. So WIMAX can be used for any secret operations.

XIII. CONCLUSION

It has been found that WIMAX was the technology that offers first major mobile standard to all mobile broadband infrastructures. WIMAX supports both wired