Computer networks

Digital assignment-1

Standard network in worldwide interoperability for Microwave access

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WIMAX:

WiMAX is considered a disruptive technology, designed as an alternative to fixed line DSL and coaxial technologies, and with its 802.16e revision, the cell phone networks as well.

- **Need for the extension of the range of Wi-Fi**

The emerging IEEE 802.16 standard, commonly known as WiMAX, promises to deliver last mile wireless broadband internet access capable of carrying data intensive applications, such as VoIP and streaming video, to Metropolitan Area Networks, as well as sub-urban and rural communities.

The widespread adoption of the wireless LAN in the business community, as well as the emergence of Wi-Fi hotspots in public areas, airports, hotels and cafes, has been of tremendous significance in providing mobility to business people and consumers alike.

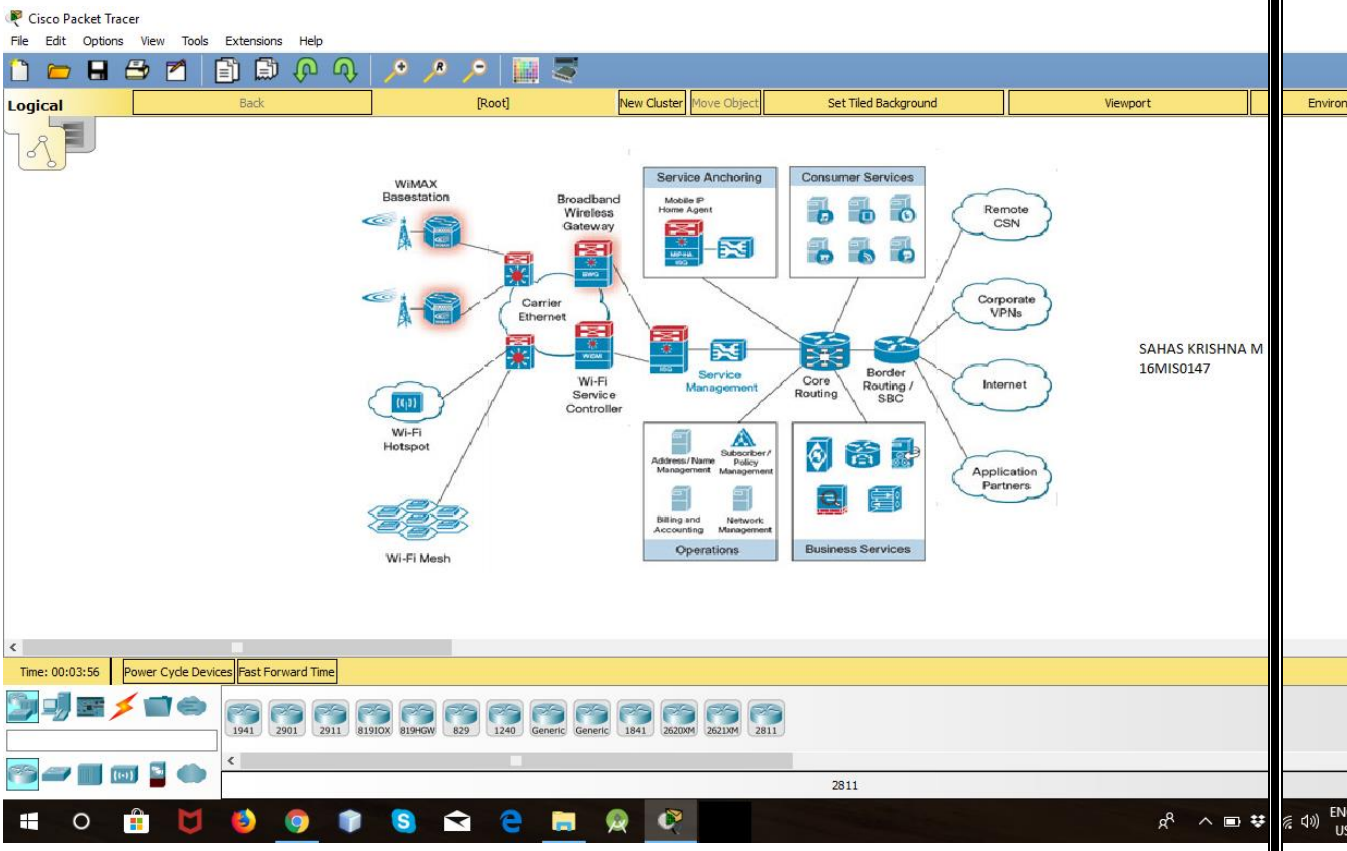
Necessities of using WIMAX:

- **Need to go beyond 3G**
- **Wireless Interoperability for Microwave Access (WiMAX)**
- **Long Term Evolution (LTE)**
- **Global perspective**
- **Rise of Broadband and Data traffic**
- **Improve Spectral Efficiency**
- **Spectrum flexibility**
- **Higher peak data rates**
- **Lower infrastructure costs**
- **Lower Latency**
- **Improved capacity**
- **Deployment of Flattening architecture**

WIMAX Characteristics:

- **WiMAX-An IP based wireless broadband access technology that provides performance similar to Wi-Fi with coverage and QoS (Quality of Service) of cellular networks.**
- **Intel, Samsung, Cisco etc. are supporting WiMAX**
- **Simple Time Division Duplex protocol and flat IP architecture**
- **Base station could be plugged into simple DSL line.**
- **Goal of WiMAX- to extend Wi-Fi like services to an entire community by using inexpensive components and licensed or unlicensed frequencies.**
- **WiMAX combines the cellular range with the Wi-Fi speed. It plugs into Ethernet like Wi-Fi and provides roaming voice and data like cellular.**

WIMAX architecture:



WiMAX standards

• First wireless MAN air interface standard in 2001 (use above 10GHz)- approved WiMAX 802.16a original WiMAX specs in January 2003

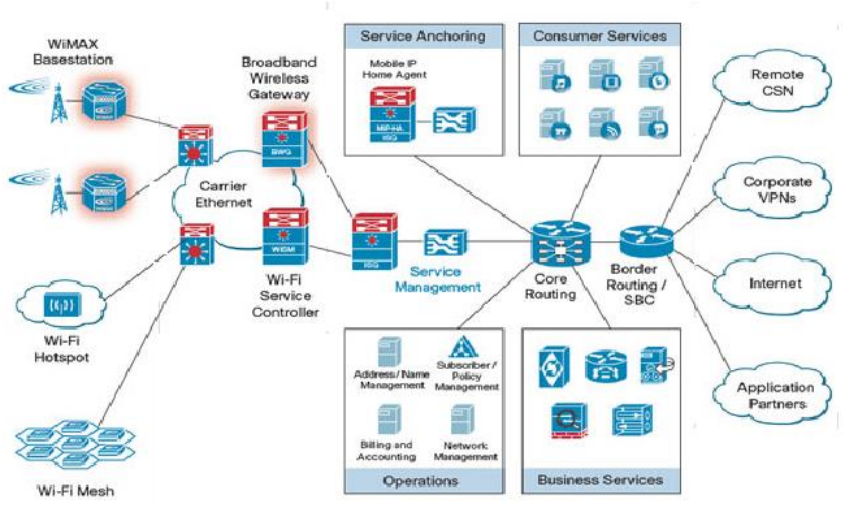
• Followed by 802.16d (fixed WiMAX) in 2004 which added the MIMO.

• Further came in 802.16e (mobile WiMAX) which added the

• Further came in 802.16e (mobile WiMAX) which added the mobility factor

• Current version is 802.16j which added multi hop relay

• Future standards of 802.16m, 802.16n and 802.16p are in progress which will bring in advanced air interface with higher data rates of 100mbps for mobile and 1Gbps for fixed services along with higher reliability of network and FDD along with TDD.



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Components of WIMAX involves:

The WiMAX architecture developed by the WiMAX form supports is a unified network architecture to support fixed, nomadic and mobile operation. The WiMAX network architecture is based upon an all-IP model.

The WiMAX network architecture comprises three major elements or areas.

- ***Remote or Mobile stations:*** These are the user equipments that may be mobile or fixed and may be located in the premises of the user.
- ***Access Service Network, ASN :*** This is the area of the WiMAX network that forms the radio access network at the edge and it comprises one or more base stations and one or more ASN gateways.

- ***Connectivity Service Network, CSN:*** This part of the WiMAX network provides the IP connectivity and all the IP core network functions. It is what may be termed the core network in cellular parlance.
- ***Subscriber Station, SS / Mobile Station, MS :*** The Subscriber station, SS may often be referred to as the Customer Premises Equipment, CPE. These take a variety of forms and these may be termed "indoor CPE" or "outdoor CPE" - the terminology is self-explanatory.
- ***Base Station, BS:*** The base-station forms an essential element of the WiMAX network. It is responsible for providing the air interface to the subscriber and mobile stations.
- ***ASN Gateway, ASN-GW:*** The ASN gateway within the WiMAX network architecture typically acts as a layer 2 traffic aggregation point within the overall ASN.
- ***Home Agent, HA:*** The Home Agent within the WiMAX network is located within the CSN. With Mobile-IP forming a key element within WiMAX technology
- ***Authentication, Authorization and Accounting Server, AAA:*** As with any communications or wireless system requiring subscription services, an Authentication, Authorization and Accounting server is used. This is included within the CSN.

WIMAX specifications:

Distances up to 50kms (30 miles) for point to point(line of sight) communication and up to 8kms (5miles) for point to multipoint (non line of sight) communication

• 20MHz WiMAX channel - speeds of up to75Mbps(theoretically) for users near the B.S. , practically only up to 45Mbps up to 45Mbps

• Frequency reuse and B.W. range from 1.5MHz to 20MHz
• It uses licensed spectrum of : 2.3GHz, 2.5GHz and 3.5GHz as well as unlicensed spectrum of 3.65GHz and 5.8GHz.

It should involves:

• OFDMA(Orthogonal Frequency Division Multiple Access) on downlink

• MIMO(Multiple Input Multiple Output) and beam forming

• Backward compatibility

• Speed

• Error correcting codes-Viterbiand turbo coding

• IP based technologies • Scalable Bandwidth

THANK YOU

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