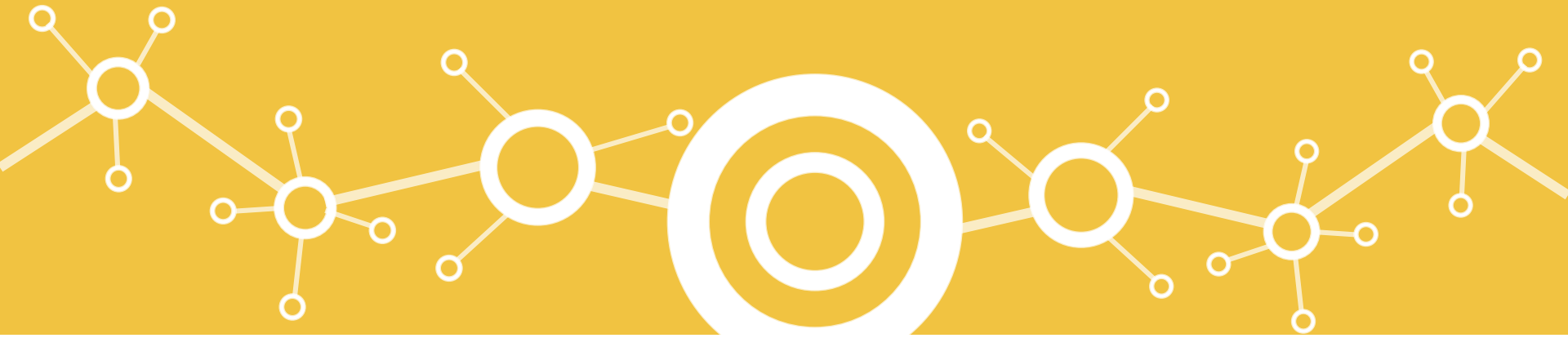
5G

WIRELESS TECHNOLOGY



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CONTENTS

INTRODUCTION

WHAT IS WIRELESS?

- The word Wireless in dictionary defines as “having no wires”.
- No physical wired connection between sender and reciever, but rather the network is connected by radio waves and or microwaves to maintain communication
- Wireless networking utilizes specific equipment such as NICs and Routers in place of wires(copper or optical fibre)

1G TECHNOLOGY

- It refers to the 1st generation of wireless telephone technology, mobile telecommunications.
- Developed in 1980s and completed in 1990s by AT&T at Bell's Lab.
- It uses AMPS technology.
- Based on Analog system.
- Limited within a country.
- Speed upto 2.4 kbps.

ADVANCED MOBILE PHONE SYSTEM (AMPS)

- It is a standard system for analog signal cellular telephone service in US.
- Based on the electromagnetic radiation spectrum allocation for cellular service in 1970.
- It allocates frequency range within 800-900 MHz spectrum to cellular telephone.
- The bands are divided into 30 KHz sub bands called channels.
- The receiving channels are called reverse channels and sending channels are called forward channels.
- The division of the spectrum into sub-band channels is achieved by using FDMA(Frequency Division Multiple Access).

DRAWBACKS OF 1G

- Poor voice quality.
- Poor battery life.
- Big phone sizes.
- Insecure.
- Frequent call drops.
- Poor hand off reliability.

2 G TECHNOLOGY

- 2G technology refers to second generation wireless technology which is based on GSM.
- Developed in late 1980's and completed in late 1990's.
- Based on digital system.
- Speed upto 64 Kbps.
- Semiglobal facility.
- Services such as digital voice and sms with more clarity.
- It includes GSM, Digital AMPS, CDMA, PDC, & Multiple Digital System.

GSM

- The term stands for Global System for Mobile Communication.
- It is a TDMA based wireless network technology.
- Uses sim card to identify user's account.
- GSM network operates on the 850MHz, 900MHz, 1800MHz & 1900MHz frequency bands.

WHY 2G TECHNOLOGY?

- 2G can support text messages, picture messages, and MMS(Multimedia Messages).
- More efficient on the sprectrum allowing for the greater mobile phone penetration levels.
- Error detection and correction.
- Allow channels to be dynamically shared by many users.
- It provides better quality and capacity.

DRAWBACKS OF 2G TECHNOLOGY

- 2G requires strong digital signals to help mobile phones work. If there is no network coverage in any specific area, digital signal willbe weak.
- These systems are unable to handle complex data as videos.

2.5G TECHNOLOGY

- 2.5G is a technology between the 2G & 3G of mobile telephony.
- 2.5G is sometimes described as 2G cellular technology combined with General Packet Radio Service (GPRS).

FEATURES OF 2.5G TECHNOLOGY

- Phone calls.
- Send/Receive E-mail Messages.
- Web Browsing.
- Speed:64-144 Kbps.
- Camera phones.

3G TECHNOLOGY

- 3G technology refers to third generation wireless technology which was introduced in late 1990's and early 2000's.
- Data rates of 144Kbps-384 Kbps in wide area coverage and 2Mbps in local coverage area.
- Global roaming.
- Typically called smartphones with increased bandwidth and data transfer rate to accomodate web based application, audio and video files.
- Data are send through packet switching.
- Voice calls are interpreted using circuit switching.

WHY 3G TECHNOLOGY?

- Providing faster communication.
- Superior voice quality.
- High speed web, more security,video conferencing, 3D gaming.
- Large capacities and broadband capabilities.
- TV streaming, mobile TV, Phone calls.

DRAWBACKS OF 3G TECHNOLOGY

- Expensive fees for 3G Licenses services.
- High bandwidth requirement.
- Expensive 3G phones.
- Large sizes of cell phones.

4G TECHNOLOGY

- 4G refers to fourth generation of cellular wireless technology which was developed in 2010.
- Speed ranges to 100Mbps to 1Gbps.
- Both cellular and broadband services everywhere.
- Combination of Wi-Fi and Wi-Max.
- High quality of service and high security.
- High speed data access.
- Easy global roaming.

One of the basic term used to describe 4G is MAGIC.

- ☐ Mobile Multimedia
- ☐ Anytime Anywhere.
- ☐ Global Mobility Support.
- ☐ Integrated Wireless Solution.
- ☐ Customized Personal Services.

WHY 4G?

- Faster and more reliable.
- More security.
- High speed.
- High performance.
- Low cost per bit etc.
- Enhance the quality of services

DRAWBACKS OF 4G

- High Battery consumption.
- Hard to implement.
- Complicated hardware required.
- Increased bandwidth.
- Expensive equipment required for implementing.

COMPARISON BETWEEN 3G & 4G

TECHNOLOGY	3G	4G
Data Transfer Rate	3.1MBps	100MBps.
Internet Services	Broadband	Ultra Broadband
Mobile - TV Resolution	Low	High
Bandwidth	5-20 MHz	100 MHz
Frequency	1.6-2 GHz	2-8 GHz
Downaload and Upload	5.8 Mbps	14 Mbps


More Reliable
Better Speed
Better Range
5G

5G TECHNOLOGY

- 5G technology refers to 5th generation of wireless technology which is to be implemented by 2020.
- Complete wireless communication with almost no limitations.
- Next major phase of mobile telecommunication and wireless system, i.e. highly supportable to WWWW (WORLD WIDE WIRELESS WEB).
- Expected Speed ranges 1GBps and above.
- Uses LAN technologies, WAN, Unified IP & Software Define Radio.

HARDWARE & SOFTWARE 5G TECHNOLOGY

5G Hardware

- Uses UWB(Ultra Wide Band) network with higher Bandwidth as low energy levels.
- Bandwidth of 4000 Mbps, which is 400 times faster than today's wireless network
- Use smart antennas

5G Software

- 5G will incorporate wireless networks, including LAN technologies, LAN/WAN, WWWW.
- World Wide Wireless Web. unified IP & Software defined radio.
- Encryption, Flexibility, Anti-Virus.

ARCHITECTURE OF 5G TECHNOLOGY

OPEN WIRELESS ARCHITECTURE(OWA)

- For these two layers the 5G mobile network is likely to be based on open wireless architecture(OWA).
- OSI Layer one and OSI Layer two define the wireless technology.
- Physical layer + data link layer = OWA.

NETWORK LAYER

- All mobile network will use mobile IP.
- Each mobile terminal will be FA(Foriegn Agent).
- A mobile can be attached to several mobiles or wireless networks at the same time.
- The fixed IPv6 will be implemented in the mobile phones.
- Separation of nrtwork layer into two sub-layers.

I. Lower Network Layer (for each interface).

II. Upper Network Layer (for the mobile terminal).

OPEN TRANSPORT PROTOCOL(OTP)

- Wireless network differs from wire network regarding the transport layer.
- In all TCP versions the assumption is that lost segments are due to network congestion.
- In wireless, the loss is due to higher bit ratio in the radio interface.
- 5G mobile terminal have transport layer i.e. possible to be downloaded and installed-open transfer protocol(OTP).
- Transport layer + session layer = OTP.

APPLICATION (SERVICE) LAYER

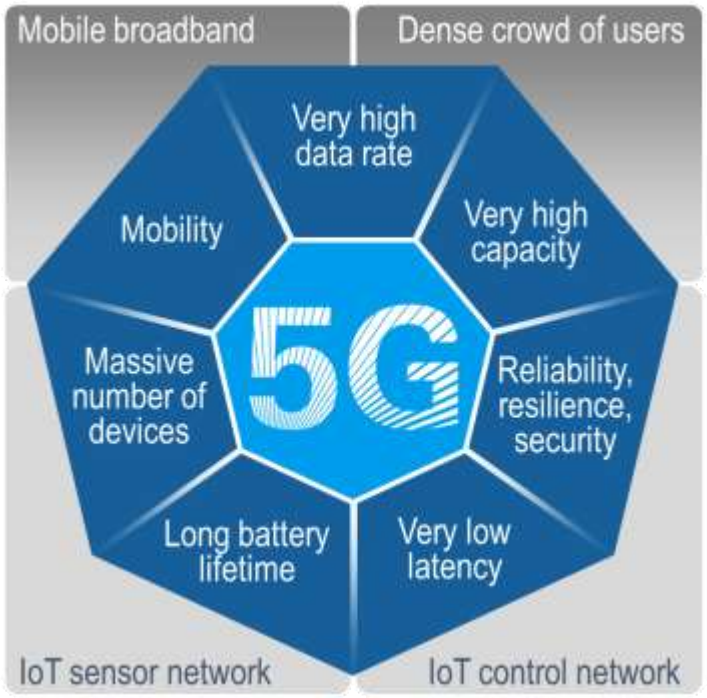
- Provides intelligent QoS(Quality of Service) management over variety of networks.
- Provides possibility for service quality testing and storage of measurement information in database in a mobile terminal.
- Select the best wireless connection for given services.
- QoS parameters, such as, delay, losses, Bandwidth, Reliability, will be stored in Database of 5G mobile.
- Presentation layer + Applicaiton layer = Application.

FEATURES OF 5G

- 5G networks will be very fast and realiable.
- Hand held devices will be revolutionized.
- 25 Mbps connectivity speed.
- Better & fast solution.
- Every mobile will have an IP address (IPv6).
- The traffic statics will be accurate.
- Uploading and Downloading speed of 5G touching the peak (upto 1 Gbps)

ADVANTAGES OF 5G

- Data BW of 1Gbps or higher
- Globally accessible.
- Dynamic information access.
- Worldwide cellular phones.
- Extraordinary Data capabilities.
- High connectivity.
- Large phone memory, more dialing speed, more clarity in audio & video.
- Flexibility.



Huawei Likely to Develop 5G Technology by 2020

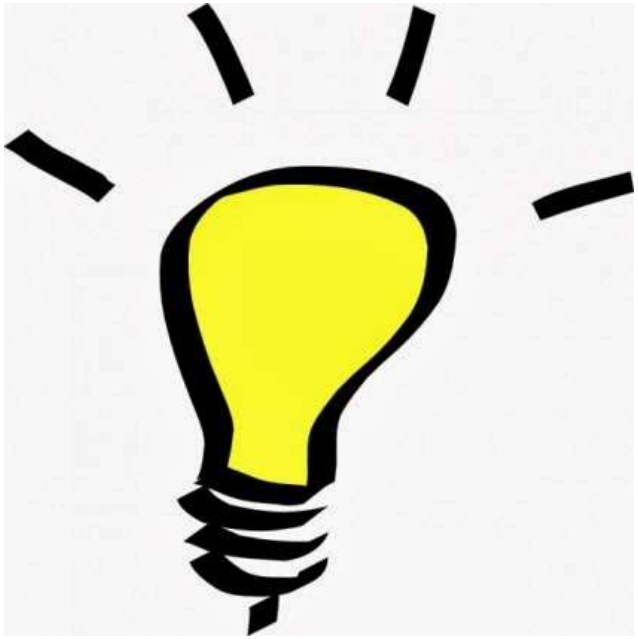
COMPARISON BETWEEN 1G TO 5G.

Technology	1G	2G/2.5G	3G	4G	5G
Deployment	1970/1984	1980/1999	1990/2002	2000/2010	2014/2015
Bandwidth	2kbps	14-64kbps	2mbps	200mbps	>1gbps
Technology	Analog cellular	Digital cellular	Broadbandwidth/ cdma/ip technology	Unified ip &seamless combo of LAN/WAN/WLAN/PAN	4G+WWWW
Service	Mobile telephony	Digital voice,short messaging	Integrated high quality audio, video & data	Dynamic information access, variable devices	Dynamic information access, variable devices with AI capabilities
Multiplexing	FDMA	TDMA/CDMA	CDMA	CDMA	CDMA
Switching	Circuit	Circuit/circuitor access network&air interface	Packet except for air interface	All packet	All packet
Core network	PSTN	PSTN	Packet network	Internet	Internet
Handoff	Horizontal	Horizontal	Horizontal	Horizontal&Vertical	Horizontal&Vertical

THE EVOLUTION

CONCLUSION

- 3G Operator centric, 4G Service centric where 5G User centric.
- The new coming 5G technology will be available in the market at affordable rates, high peak future and much reliability than the preceeding technologies.
- 5G will bring evolution of active infrasharing and managed services and eventually all existing network operators will be MVNO(Mobile Virtual Network Operators)
- 5G technology is going to be new revolution in wireless system market.



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THANK YOU