CS8601 –MOBILE COMPUTING

UNIT 1

INTRODUCTION

1.2.Generations of Mobile Communication Technologies:

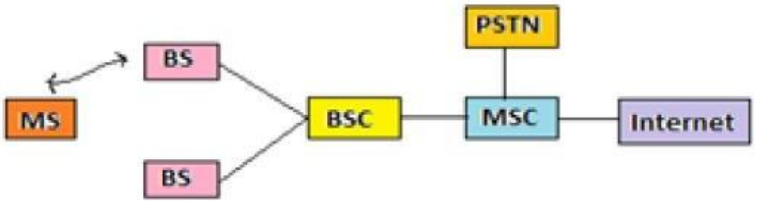
Mobile communication has become more popular in last few years due to fast reform **from 1G to 5G in mobile technology.** This reform is due to requirement of service compatible transmission technology and very high increase in telecoms customers. Generation refers change in nature of service compatible transmission technology and new frequency bands. In 1980 the mobile cellular era had started, and since then mobile communications have undergone considerable changes and experienced massive growth.

A. First Generation

- **1G These phones were the first mobile phones to be used,** which was introduced in **1982** and completed in early 1990.
- It was used for **voice services** and was based on technology called as **Advanced Mobile Phone System (AMPS).** The AMPS system was frequency modulated and used **frequency division multiple access (FDMA)** with a channel capacity of 30 KHz and frequency band of 824- 894MHz. .

Its basic features are:

- It introduces mobile technologies such as **Mobile Telephone System (MTS), Advanced Mobile Telephone System (AMTS), Improved Mobile Telephone Service (IMTS), and Push to Talk (PTT).**
- It has **low capacity, unreliable handoff, poor voice links, and no security** at all since voice calls were played back in radio towers, making these calls susceptible to unwanted eavesdropping by third parties.



Architecture of Advanced mobile phone system

B. Second Generation (2G)

- 2G refers to the **second generation based on GSM** and was emerged in late
- **1980s**.
- It uses **digital signals for voice transmission**. Main focus of this technology was on digital signals and **provides services to deliver text and picture message at low speed (in kbps**).
- It use the **bandwidth of 30 to 200KHz**.
- Next to 2G, **2.5G system uses packet switched and circuit switched domain and provide data rate up to 144 kbps**.
  e.g. **GPRS, CDMA and EDGE**.

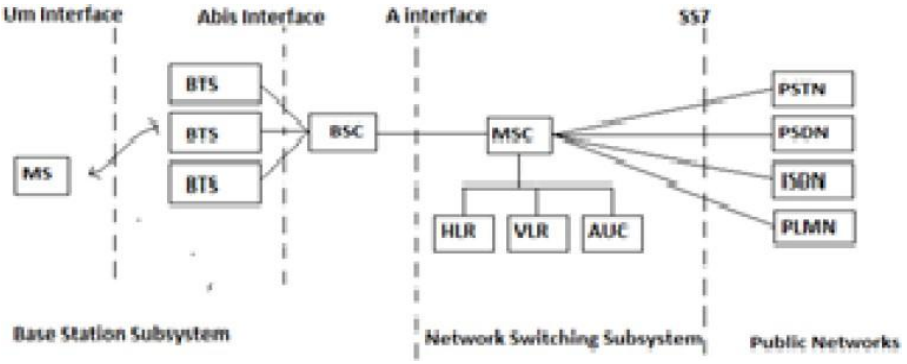
The main features of 2G and 2.5G are :

- ✓ Data speed was upto 64kbps
- ✓ Use digital signals
- ✓ Enables services such as text messages, picture messages and MMS(Multimedia message)
- ✓ Provides better quality and capacity
- ✓ Unable to handle complex data such as videos.
- ✓ Required strong digital signals to help mobile phones work. If there is no network coverage in any specific area, digital signals would weak.

2.5 G :

- The GSM technology was continuously improved to provide better services which led to **development of advanced Technology between 2g and 3g**

- Provides phone calls
- Send/receive e-mail messages
- Web browsing
- Speed : 64-144 kbps
- Camera phones
- Take a time of 6-9 mins. to download a 3 mins. MP3 song.



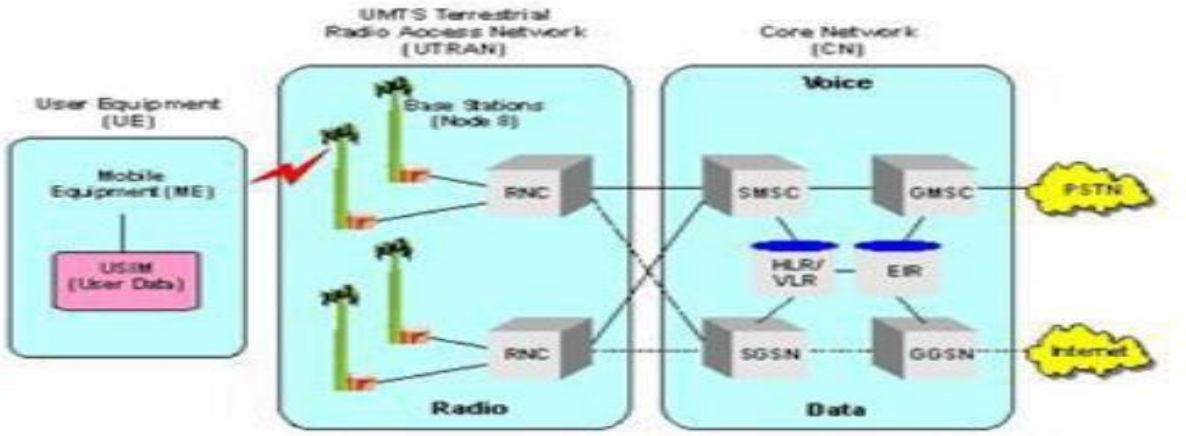
C. Third Generation (3G)

- 3G is **based on GSM and was launched in 2000**. The aim of this technology was to **offer high speed data**. The original technology was improved to **allow data up to 14 Mbps** and more using packet switching.
- It uses Wide Band Wireless Network with which clarity is increased. **It also offers data services, access to television/video, new services like Global Roaming.**
- It operates at a **range of 2100MHz and has a bandwidth of 15-20MHz** used for High-speed internet service, video chatting.

The main features of 3G are:

- ✓ Speed 2 Mbps
- ✓ Typically called smart phones
- ✓ Increased bandwidth and data transfer rates to accommodate web-based applications and audio and video files.
- ✓ Provides faster communication
- ✓ Send/receive large email messages
- ✓ High speed web/more security/video conferencing/3D gaming
- ✓ Large capacities and broadband capabilities
- ✓ TV streaming/mobile TV/Phone calls
- ✓ To download a 3 minute MP3 song only 11 sec-1.5 mins time required.
- ✓ Expensive fees for 3G licenses services
- ✓ It was challenge to build the infrastructure for 3G
- ✓ High bandwidth requirement
- ✓ Expensive 3G phones
- ✓ Large cell phones

3G mobile system was called as UMTS(Universal Mobile Telecommunication System) in Europe,while CDMA2000 is the name of American 3G variant. Also the IMT2000 has accepted a new 3G standard from China, i.e TD-SCDMA. WCDMA is the air- interface technology for UMTS.



D.Fourth Generation (4G)

- 4G offers a downloading speed of **100Mbps**.
- 4G provides same feature as 3G and additional services like **Multi-Media Newspapers, to watch T.V programs with more clarity and send Data much faster than previous generations** .
- **LTE (Long Term Evolution**) is considered as 4G technology.

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- 4G is being developed to accommodate **the QoS and rate requirements** set by forthcoming applications like wireless broadband access, **Multimedia Messaging Service (MMS), video chat, mobile TV, HDTV content, Digital Video Broadcasting (DVB), minimal services like voice and data,** and other services

  that utilize bandwidth.

The main features of 4G are :

- Capable of provide 10Mbps-1Gbps speed
- High quality streaming video
- Combination of Wi-Fi and Wi-Max
- High security

- Provide any kind of service at any time as per user requirements anywhere
- Expanded multimedia services
- Low cost per-bit
- Battery use is more
- Hard to implement
- Need complicated hardware
- Expensive equipment required to implement next generation network

D. Fifth Generation (5G)

- 5G refer to Fifth Generation which was started from **late 2010s**.
- Facilities that might be seen with 5G technology includes far better levels of connectivity and coverage.
- The main focus of 5G will be **on world-Wireless World Wide Web (WWWW).**
- It is a complete wireless communication with no limitations.

The main features of 5G are :

- It is highly supportable to WWWW (wireless World Wide Web)
- High speed, high capacity
- Provides large broadcasting of data in Gbps.
- Multi-media newspapers, watch TV programs with the clarity(HD Clarity)
- Faster data transmission that of the previous generation
- Large phone memory, dialing speed, clarity in audio/video
- Support interactive multimedia, voice, streaming video, internet and other
- More effective and attractive

Comparison of all generations of mobile Technologies:

Technology	1G	2G	3G	4G	5G
Start/Deployment	1970-80	1990-2004	2004-10	Now	Soon (probably by 2020)
Data Bandwidth	2Kbps	64 Kbps	2 Mbps	1 Gbps	Higher than 1 Gbps
Technology	Analog	Digital	CDMA 2000, UMTS,EDGE	Wi-Max, Wi-Fi, LTE	WWWW
Core Network	PSTN	PSTN	Packet N/W	Internet	Internet
Multiplexing	FDMA	TDMA/CDMA	CDMA	CDMA	CDMA
Switching	Circuit	Circuit,Packet	Packet	All Packet	All Packet
Primary Service	Analog Phone Calls	Digital Phone Calls and Messaging	Phone calls, Messaging, Data	All-IP Service (including Voice Messages)	High speed, High capacity and provide large broadcasting of data in Gbps
Key differentiator	Mobility	Secure, Mass adoption	Better Internet experience	Faster Broadband Internet, Lower Latency	Better coverage and no droped calls, much lower latency, Better performance
Weakness	Poor spectral efficiency, major security issue	Limited data rates, difficult to support demand for internet and e-mail	Real performance fail to match type, failure of WAP for internet access	Battery use is more, Required complicated and expensive hardware	?

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