MOBILE COMMUNICATION NETWORKS 2G, 3G and 4G

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MCA -5th Sem.

SECOND GENERATION (2G)

- 2G refers to the second generation of mobile networks.
- It is popularly based on GSM(Global System for Mobile communications) architecture.
- It uses digital signal. (circuit switching tech.)

Features of 2G network as improvement over 1G are:

- Data speeds of up to 64 kbps (1G = 2.4 kbps) (data in the form of sms)
- Use of digital signals(data and voice digitally encrypted: more security) instead of analog.
- digital signals consume less battery power compared to 1g
- Enabled services such as SMS and MMS
- Provided better quality voice calls (Reduced Noise as compared to 1G)
- It used a bandwidth of 30 to 200 KHz (Better Bandwidth Utilization)

Drawback

- It cannot handle complex data such as videos
- strong digital signal requirements

THIRD GENERATION (3G)

- 3G refers to the third generation of mobile networks.
- It is popularly based on UMTS(Universal Mobile Telecommunications System) architecture.
- 3G network upgrades 2G network with new technologies and protocols to deliver faster data rate. (packet switching technology)

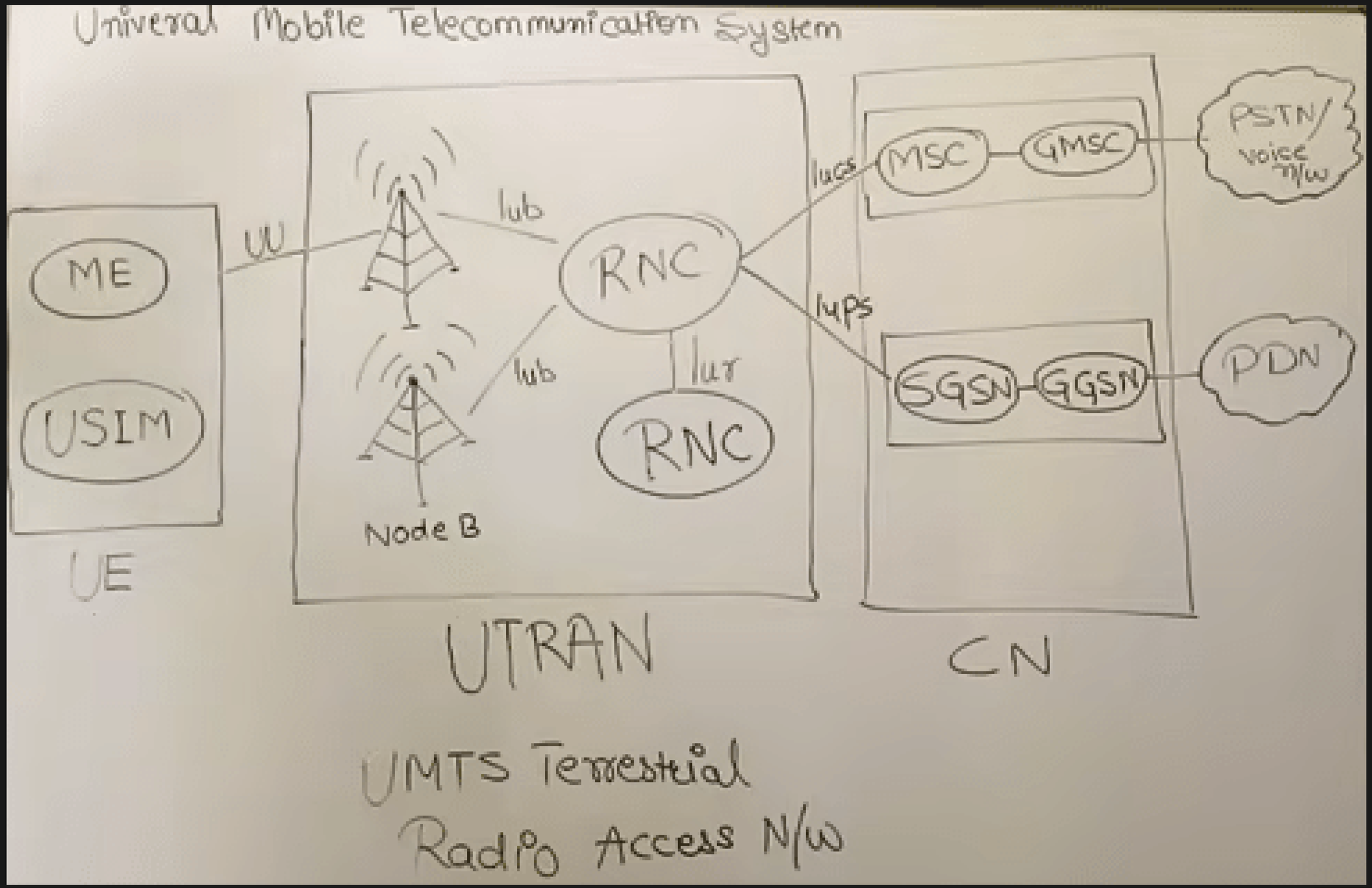
Features of 3G network as improvement over 2G are:

- Data speeds 144 Kbps to 2 Mbps
- Send/receive large email messages
- Increased bandwidth : 15-20 MHz
- faster communication
- web based application can run(surfing webpages with audio and video) youtube with buffering, GPS etc

Drawback

- Expensive
- High Bandwidth requirement

3G UMTS Network Architecture



FOURTH GENERATION (4G)

- 4G refers to the fourth generation of mobile networks
- The most important 4G standard :4G LTE
- 4G LTE is a “fourth generation long term evolution”, capable of delivering a very fast and secure internet connection by using IP protocols.
- The main difference between 3G and 4G is the data rate

Features of 4G network are:

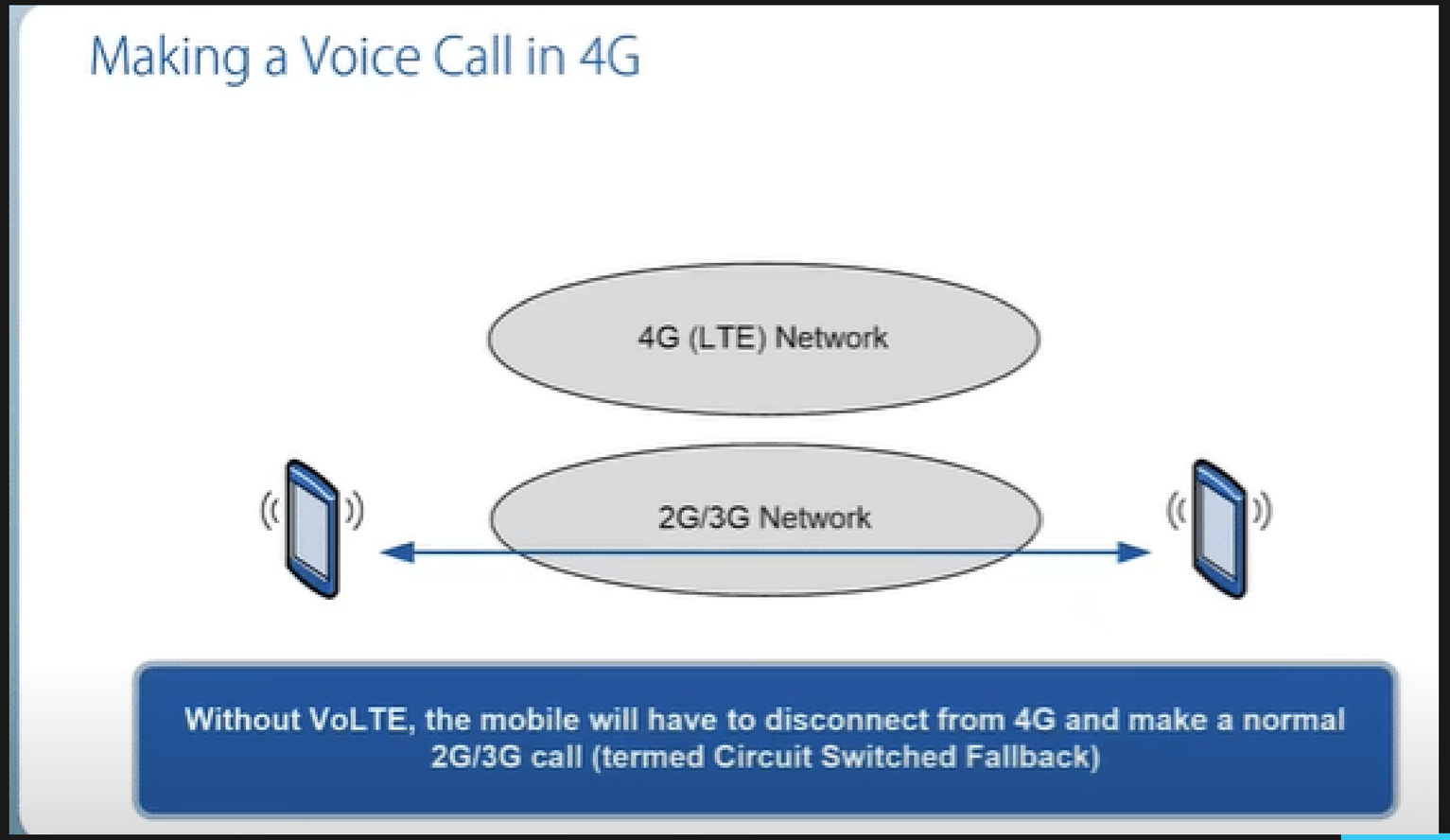
- Data speeds of up to 100 Mbps to 1 Gbps
- Support interactive multimedia, voice, video.
- Increased bandwidth : 100 MHz
- supports HD mobile tv, video conferencing , and other services that requires high data speed

Drawback

- Expensive
- Complicated Hardware Requirements

FOURTH GENERATION (4G)

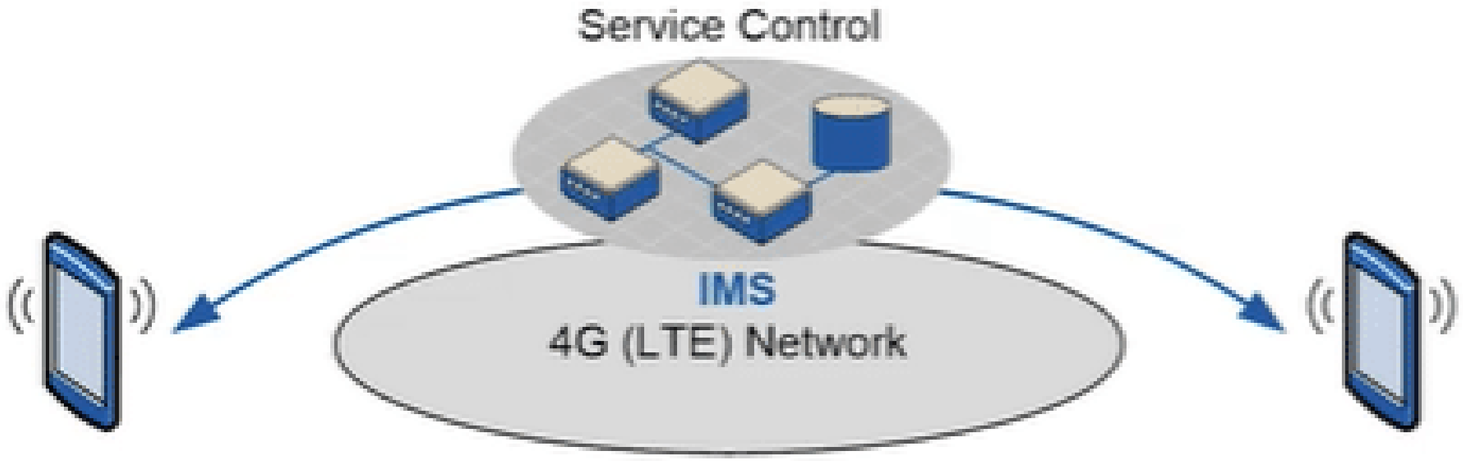
- The only service 4G LTE provides Broadband data connection
- it doesn't support voice voice services.
- that is done in 2 ways:
- 1. either pushing system to 2g/3g architecture



FOURTH GENERATION (4G)

or using VoLTE

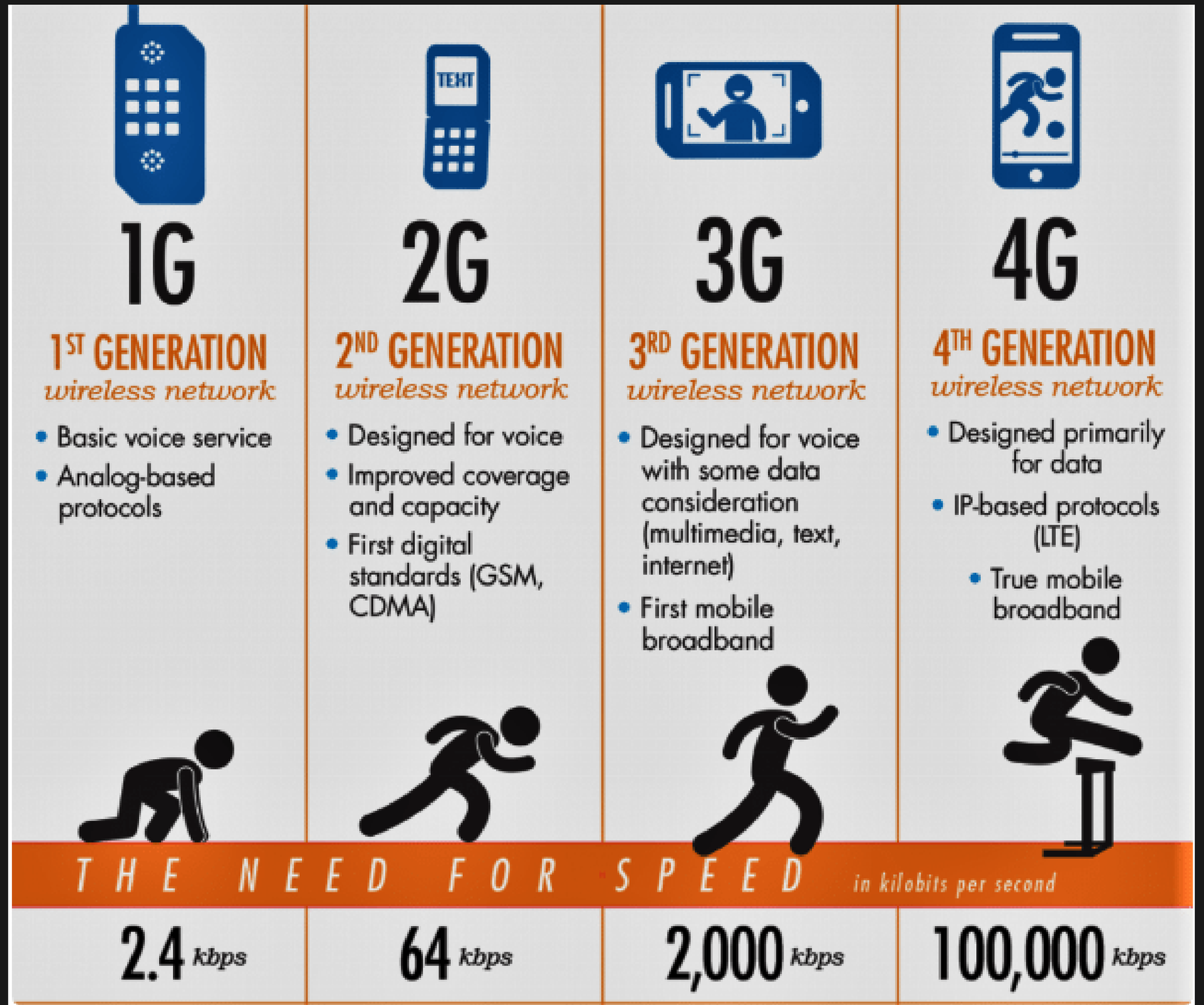
Making a Voice Call in 4G



The technology is termed “VoLTE” and requires a separate network called an IP Multimedia Subsystem to provide service control

comparison

	2G	3G	4G
Start Year	1991	1998	2008
Technology	GSM	WCDMA/UTMS	LTE/WiMAX
Frequency	1.8 GHz	1.6-2 GHz	2-8 GHz
Data speed	64 kbps	upto 2 mbps	upto 1 gbps
Access System	TDMA/CDMA	CDMA	CDMA
Core Network	PSTN	Packet N/W	Internet
Bandwidth	30 to 200 KHz	15-20 MHz	100 Mhz


TEXT
1G
1ST GENERATION
wireless network
• Basic voice service
• Analog-based protocols
2G
2ND GENERATION
wireless network
• Designed for voice
• Improved coverage and capacity
• First digital standards (GSM, CDMA)
3G
3RD GENERATION
wireless network
• Designed for voice with some data consideration (multimedia, text, internet)
• First mobile broadband
4G
4TH GENERATION
wireless network
• Designed primarily for data
• IP-based protocols (LTE)
• True mobile broadband
THE NEED FOR SPEED
in kilobits per second
2.4 kbps
64 kbps
2,000 kbps
100,000 kbps

REFERNCES

- https://www.youtube.com/channel/UChTsiSbpTuSrdOHpXkKlq6Q
- https://www.slideshare.net/kaushal_kaith/3g-4g-5g
- https://www.electronics-notes.com/articles/connectivity/3g-umts/network-architecture.php
- https://www.linkedin.com/pulse/mobile-wireless-communication-technology-journey-0g-mutabazi/
- https://www.tutorialspoint.com/