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Comparative Analysis of 3G and 4G for Mobile Communication

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Abstract *— Mobile communication does not depend on a physical connection between the sender and receiver that is move from physical connection to wireless connection. It is extremely fast to developing, thanks to advance technology that is field of mobile and wireless communication.3G is the 3rd generation of wireless technologies. 3G comes with enhancements over previous wireless technologies. It is a generation of standards for mobile phones and mobile telecommunication services.4G is 4th generation of wireless technologies.4G was introduced to provide a Wide Area Network for internet access..*

I. INTRODUCTION

The general concept of different technology "generations" is that each new generation offers significant "revolutions" in performance and capabilities compared to its predecessor. 3G and 4G are capable of connecting your phone to the internet, just that one is faster than the other. Third Generation (3G) mobile devices and services will transform wireless communications into on-line, real-time connectivity.3G wireless technology will allow an individual to have immediate access to location-specific services that offer information on demand.4G was introduced to provide a Wide Area Network for internet access. It provided high bandwidth and broadband. 3G and 4G network are standards for mobile communication. Standards specify how the airwaves must be used for transmitting information in form of voice and data.

Keywords: - 3G, 4G, technology generations, Mobile Communication.

II. 3G

3G telecommunications, is a generation of standards for mobile phones and mobile telecommunication services fulfilling the International Mobile Telecommunications- 2000 (IMT-2000) specified by the International Telecommunication Union.[2]. 3G is the third generation of wireless technologies. It comes with enhancements over previous wireless technologies, like high-speed transmission, advanced multimedia access and global roaming [1].

3G is mostly used with mobile phones and handsets as a means to connect the phone to the Internet or other IP networks in order to make voice and video calls, to download and upload data and to surf the net [2].The transfer rate for 3G networks is between 128 and 144 kbps (kilobits per second) for devices that are moving fast and 384 kbps for slow one [4]. 3G is a set of technologies and standards that include W-CDMA, WLAN and cellular radio, among others [4].

A. How 3G works?

3G work in three layers.3G uses three layers to provide a more flexible and responsive network when compared to its 2G forerunner, so it handles web applications, phone and video files more adeptly. The first layer provides a speedier output.

The second optimizes the capacity of the network to be distribute data. The third and bottom layer serves as the connectivity layer for voice traffic. 3G uses the KASUMI block crypto to authenticate the network and provide improved security over the older A5/1 stream cipher of 2G networks.

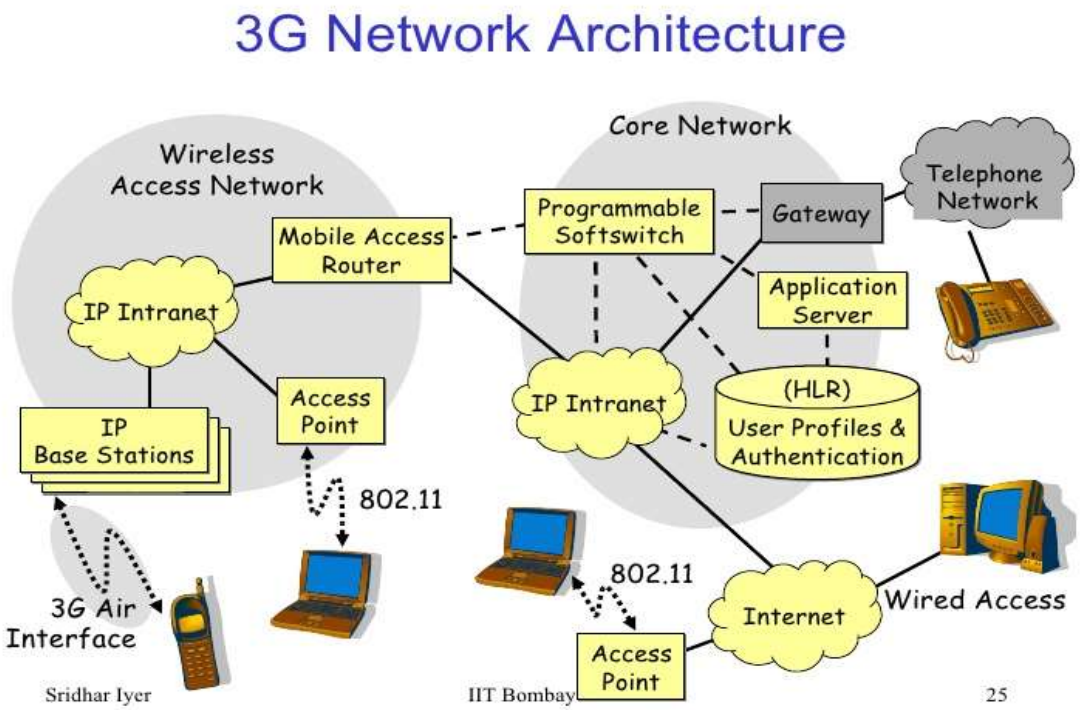

Figure 1. 3G Network Architecture

B. Applications of 3G

- Global Positioning System (GPS)
- Location-based services
- Mobile TV
- Telemedicine
- Video Conferencing
- Video on demand

C. Pros of 3G

- 3G offers much faster data transfers, up to speeds as high as 2Mbps.[1]
- Developers can use this network to create maps and positioning services. [1]

- The Most Popular Camera App. [1]
- This network also offers powerful multimedia services, using this develop apps such as online billing systems, video conferencing etc. [5]

- 3G is a preferred platform for many popular mobile phone games, especially those which contain graphics and animation. [1]
- Advanced developers can also develop apps for mobile TV, IM and video chatting, as 3G supports all these and much more.[1]

D. Cons of 3G

- 3G is expensive, you should understand that your clientele, though exclusive, will be limited in number.
- 3G users have the facility of enjoying video conferencing sessions with other 3G customers, they may not do too much more than that. So your sales of 3G apps may remain low-scale. [1]

- 3G, though available in most parts of the world today, still has to catch on in some nations. Users in these locations may opt for other types of network. [1]

III. 4G

A wireless access technology and is the successor of 3G.called"3G and beyond" [3].4G enable seemless roaming between techno logies [3]. NTT DoCoMo company is testing 4G communication at 100 Mbps while moving, 1 Gbps while stationary [1].

All the network elements are digital [2]. 4G networks are projected to provide speeds of 100 Mbps while moving and 1 Gbps while stationary [4].

'MAGIC'
Mobile Multimedia Communication
Anywhere, Anytime with Anyone
Global Mobility Support
Integrated Wireless Solution
Customized Personal Service [2]

A. How 4G works?

The process of IPv4 address exhaustion was expected to be in final stages. Therefore, IPv6 is essential to support a large number of wireless-enabled devices. 4G uses IP address is based on IPv6 [2]. IPv4 32 bits.
Format: X.X.X.X
Example: 192.168.251.1

IPv6 X IPv4 is 128 bits [5].
Example: 192.168.251.1, 79.23.178.225, 65.198.2.13, 000
(Home address),(care-of address), (mobile IP address), (local network address)

WiMax is using OFDMA in the downlink and in the uplink. The key technologies for 4G is called Open Wireless Architecture (OWA), supporting multiple wireless air interfaces in an open architecture platform.[4]

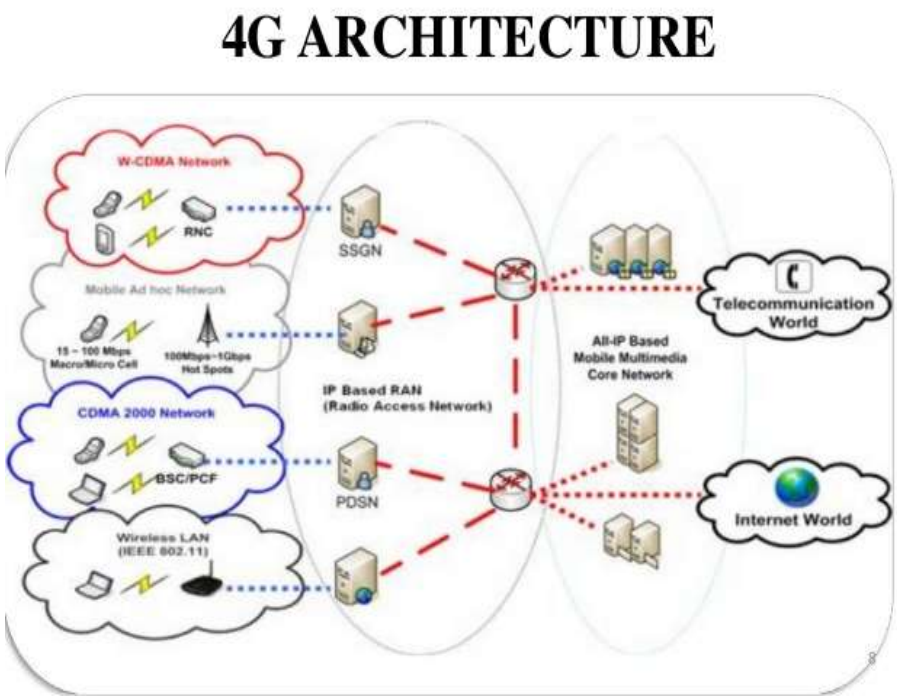

Figure 1. 4G Network Architecture

B. Applications of 4G

- 4G and public safety
- Sensors in public vehicle
- Cameras in traffic light
- First responder route selection
- Traffic control during disasters
- M-commerce
- Entertainment services
- Communication services
- Organizational services

C. Pros of 4G

- 4G offers is very good for advanced mobile services such as video and movie streaming. This offers much higher speed than 3G or Wi-Fi [4].
- Unlike Wi-Fi, 4G has far expanded coverage and hence, offers more or less constant connectivity.
- 4G enhances safety and privacy of data [5].

- You can choose from wide payment options. If you are renting 4G equipment, you can choose from among many pay-as-you-go plans. [4]
- Many companies are introducing low-cost 4G introductory offers. You can avail whichever suits you the best. [4]

D. Cons of 4G

- Though 4G coverage is expanding rapidly, it still is not available in many locations of world. [4]
- Though 4G offers great quality connectivity, it is still in the formative stages and could result in bugs. [5]
- You will have to purchase a wireless modem or take it on rent. This is available at reasonable rates, though. [4]

IV. Comparison of 3G and 4G

Table 1. Comparison of 3G and 4G

	3G	4G
Data Throughput	Up to 3.1Mbps	2 to 12 Mbps
Peak Upload Rate	5 Mbps	500 Mbps
Switching Technique	packet switching	packet switching, message switching
Network Architecture	Wide Area Cell Based	Integration of wireless LAN and Wide area
Services And Applications	CDMA 2000, UMTS, EDGE etc	Wimax2 and LTE-Advance
Forward error correction (FEC)	Uses Turbo codes for error correction	Concatenated codes are used for error corrections
Peak Download Rate	100 Mbps	1 Gbps
Frequency Band	1.8 – 2.5 GHz	2 – 8 GHz
Component Design	Optimized antenna; multi-band adapters	Smart antennas; SW multi-band; wideband radios
Access	WCDMA/CDMA2000	MC-CDMA or OFDM
Mobile top Speed	200 kmph	200 kmph
IP	Multiple versions	All IP (IPv6.0)

V. Conclusion

Conclude that, both 3G and 4G networking have a great deal to offers in terms of speed and quality. 4G technology is expected to catch on and become the premier connectivity provider in the coming few years. 3G will become a fundamental aspect. 4G will open door to various mobile applications. 4G will be available, might be differ. 4G's predecessor, 4G is often up to 10x faster than 3G in real-world use — with speeds commonly between 20Mbps and 30Mbps. it uses a little bit more of your phone's battery.

VI. REFERENCES

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