Review Paper on Advanced Mobile Technology

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Abstract: Advances in wireless communication and mobile networking have increased the popularity of media services for mobile users. The wireless network technologies result in increasing the demand for mobile internet and multimedia application for users. With the increase in user demands the 3G network faces limitations to its bandwidth, data rate etc. Which are overcome through 4G network? This review paper describes the 4G network application and its features and introduction of fifth generation technology.

Index Terms: wireless technology, 1G, 2G, 3G, 4G and 5G.

1. INTRODUCTION

Wireless means "having no wires" in networking technology, wireless is the term used to portray in words that any computer network where no physical wired connection between sender and receiver, but the network is connected by microwaves and radio waves help to communications with user to users. Wireless applications are those which used free space as the transmission medium and not using the cabling like fibred or copper cables. Each generation has its unique needs and requirements. The mobile communication and the wireless network technologies have been improving so fast as day to day life. In today's world devices continue to shrink in size to growing the processing power, where 4G technology is the one of advance networks, which came on the wireless market like download data well over 100 Mbps and low cost for used its features. 4G is a new technology which provided the new wireless experience with new wireless applications like high definition imaging video and etc. Before discussing the 4G technology, it is important to understand the 1G, 2G or 3G.

1G a wireless network or mobile systems which designed to offer a single service and it's basically an analog cellular system with a circuit switched network. 1G network was amazing, but it provides limited services like low capacity, limited local, voice telephony and regional coverage. Due to increased demand of users in communication sector that help to development in 1G.

1.1. DRAWBACKS OF 1G:

In 1G the voice quality was not good. Battery life in 1G was weak. A size of the phone was large to carry. Security service was not good and has limited capacity and weak handoff reliability in 1G.

Then 2G is introduced to the wireless market with new features. 2G was based on analog, digital signal processing audio and images were communicated. It increased the demands of voice telephony, text messaging and limit circuit switched data services with growing generation It bit rate was very low around 10 to 50 kbps.

1.2. DRAWBACKS OF 2G:

2G requires strong digital signals to communicated mobile phone to mobile of different areas. But, 2g has digital signals was weak due to no network coverage in any specific area. For 2G was area difficult to handle complex data like videos.

Then 3G has come to the wireless market to overcome the 2G wireless network problems. 3G system complete by adding parts in voice and data applications. 3G systems are fully digital systems with audio, game, video and image. It is high-speed internet access for the first time to introduce in the market for the user used. 3G gives higher data rater to delivering more position and fascinate mobile broadband experiences to users. 3G also gives more application which does not present in 2G like mobile TV, video, video-conferencing, and location based services on demands. But, the user need does not end it demands for new generation wireless technology.

1.3. DRAWBACKS OF 3G:

The rent of 3G services was costly to user for users. It was required high bandwidth. The price of 3G mobile phones was very costly and size of a mobile phone was large.

2. FOURTH GENERATION TECHNOLOGY:

A 4G system provides an end to end IP solution where voice, data and streamed multimedia. 4G delivering faster and better mobile broadband experience with more data capacity 4G is based on IP covers the broad area and significant mobility is 50 to 100 Mbps.

4G is described with one word MAGIC:

1. Mobile Multimedia
2. Anytime, Anywhere
3. Global Mobility Support
4. Integrated Wireless Solution
5. Customized Personal Services

Table 1. Comparison of Advanced Mobile Networks:

Technology	1G	2G	3G	4G
Design Begin	1970	1980	1990	2000
Implementation	1984	1991	2002	2010
Service	Analog voice synchronous data at 9.6 kbps	Digital voice, short messages, data up to 10-50 kbps	Higher capacity broadband, data up to 2 Mbps	Higher capacity completely, IP orient multimedia, data up to 100 Mbps
Standards	AMPS, TACS, NMT etc.	TDMA,CDMA,GSM, PDC	WCDMA, CDMA 2000	Single Standard
Data Bandwidth	1.9 kbps	14.4 kbps	2 Mbps	200 Mbps
Multiplexing	FMDA	TDMA, CDMA	CDMA	CDMA
Core Network	PSTN	PSTN	Packet Network	Internet

2.1. 4G Features:
(i) 4G supports multimedia, voice, video, image, wireless internet and other multimedia application.
(ii) 4G provides high speed and high capacity.
(iii) 4G provides the call control techniques and better scheduling for the users.
(iv) 4G is the adhoc network and multiple networks.
(v) 4G also provides services like portability, scalable mobile networks and it supports packet and circuit switching
(vi) In 4G services based on quality of service requirements.

2.2. Characteristics of 4G Technology:
(i) Network Services: In 4G network services based on all IP networks and 4G provide mobile ultra broadband internet services example wireless modems, etc.

(ii) Converged Services: Since different access technologies horizontal communication is used to combine on common platforms. 4G network works fast.
(iii) Broadband Services: 4G increasing position of ADSL and optical fiber access system or home LANs. 4G have speed as high as 100 Mbps for the users.
(iv) Personalized Services: 4G provides quality of services and multimedia application and stable system of performance to users. It provides high definition video and images to the users for users.

2.3. Applications of 4G:
(i) 4G technologies give virtual presence and virtual navigation.
(ii) It provides the tele-Geo processing application to the users.

(iii) It provides support for uncast, multicast and broadcast services and useable application and services for users.

(iv) 4G increased the security and reduce the handoff rate.

2.4. Key Challenges Faced By 4G:

✓ 4G does not support large users for advanced mobile applications.

✓ Due to limited speed it does not possible to offer full an internet experience to users.

✓ As compared to 3G the cost of 4G is high for users to use.

✓ In 4G the use of the battery was more and it required a complicated hardware.

✓ 3G also available in the market so it is competition in the internet market.

✓ Wireless devices are used so fast in the markets like mobile, tablets etc. These can scan the system completely to remove the hidden threats. The antivirus installed has to be updated is necessary.

✓ 4G provides a major threat while tracing the location of the SIM.

✓ If we use the cell phones with 4G it should heat up and it also causes diseases to humans like cancer etc.

2.5. 4G TECHNOLOGIES:

1. Orthogonal Frequency Division Multiplexing (OFDM):

OFDM works by dividing the radio signal into multiple smaller sub signals then it transmitted the signals at different frequencies to the receiver used. The frequencies of OFDM are does not interfaced at space with each other.

2. Ultra Wide Band (UWB):

UWB is used to detect as noise and UWB are the advanced technology which used in 4G. UWB used that frequency spectrum. It has used the current radio frequency devices of others. The frequency rate used in it is 3.1 to 10.6 Hz. It used less power to transmit the frequency.

3. IPV6:

Internet Protocol Version 6 is the protocol which sends the data from one computer to another computer on the internet. In ipv6 each computer on the internet has its unique IP address to communicate with other computer. It includes 128 bits.

4. Smart Antennas:

It resolves the problem of deceasing spectrum availability. It growth the power of antennas used for transmitting and receiving the antennas and it does not need additional frequency.

2.6. DRAWBACKS OF 4G:

4G mobiles used more battery and hard to implement. 4G required complex hardware and equipment to implement a fourth generation network was costly. Due to the drawbacks of 4G the fifth generation wireless technology introduced in the market, which is also known as 5G.

3. FIFTH GENERATION TECHNOLOGY:

5G is completed wireless communication with no limitations, it is real wireless world. 5G is the next generation wireless technology and mobile telecommunication. The 5G has speed up to 1Gbps and faster and reliable than 4G. 5G offers lower cost than previous generations. 5G give more features and power in the hand phones, clarity in video and audio, more dialing speed, high connectivity and large memory in the phone for the use of others.

3.1. 5G ARCHITECTURE:

1. Open Wireless Architecture (OWA):

OWA = Physical layer + Data Link layer

2. Network layer:

It separated the layer into sub-layers:

a. Lower network layer
b. Upper network layer

3. Open Transport Protocol (OTP):
OTP = Transport layer + Session layer

4. Application Layer:
Application layer = Presentation layer + Application layer

3.2. ADVANTAGES OF 5G:

✓ 5G provides 1Gbps data bandwidth and higher speed.

✓ 5G give globally accessibility and dynamic information access to the users

✓ The cost of 5G is less as compared to 4G.
✓ 5G give the media independent handover and radio resource management.
✓ 5G has the feature like to enable the VOIP.
✓ 5G is wearable devices with artificial intelligence and global networks.
✓ 5G works with 6TH sensor technology of the wireless world.

4. CONCLUSION:

Today's wired world is going to wireless many technology are introduced in this world with wireless technology. The 4G network to be a success, with its multimedia application and coverage of maximum area with its capacity over the past few years the use of internet has changed from user to user and it remain changing with the generation 4G can fulfill the demands of the users. But the demand of users increase than 5G introduces in the market with real wireless world available in the market in 2020. 5G is an open platform on different layers which have proposed a wireless concept designer. 5G is safe and secure for public need to increase the user demand. All the broadband packages now offered new high speed connection to users with new features like fast video, downloading speed etc. 5G ends the current confusion of single provider has both specific wireless technology and spectrum allocation. 4G provide 100 Mbps speed and 5G provide more speed than 4G. 5G provide 200 Mbps speed to users .

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