Review Paper on Development of Mobile Wireless Technology

Dr. Pardeep Kumar1 Dr. Sumit2

1Department of Electronics and Communication Engineering, Shree Guru Gobind Singh Tricentenary University, Gurugram-Badli Road, Gurugram, HR, India
pardeep_fet@sgtuniversity.org
2Department of Computer Science and Engineering, Shree Guru Gobind Singh Tricentenary University, Gurugram-Badli Road, Gurugram, HR, India
drsumit_fet@sgtuniversity.org

Abstract: Wireless technology these days is very quickly becoming crecent. A network that was recently wired to get online was required. Just wired phones have been a thing of the past. In the past four decades, mobile networks have thrived immensely. The starting point was the 1G cellular concept where ‘G’ stances for generation linkages. This had fully developed very rapidly, generating 1G, 2G, 3G and gradually transferring into 4G from generation to generation. And now people are utilizing the 4G networks. 5G network will nearly stretch its wings to conquer this complex world of cell technology. Integrated 5G work is continuing, with complete service planned in 2020. The development of 5G technology is the perfect solution for the many problems facing us today with today's innovations. 5G will become an intelligent technology that will limit to a single global uniform body the number of different innovations. This paper is mostly about the evolution of mobile wireless networks like 1G and 5G as well as how they vary and their benefits and drawbacks.

Keywords: Cellular concept, Mobile communication, 1G, 2G, 3G, 4G, 5G, Wireless Technology.

1. INTRODUCTION

The mobile network has changed dramatically in the last few decades. Mobile wireless communications [1] Most of them refer to enhancements to the definition, speed, infrastructure, bandwidth, data size, latency, and so forth in mobile wireless generation G. Each generation has different values, abilities, modern practices as well as fresh landscapes that distinguish it from the past. The first-generation (1G) handheld without wire networking network utilized analogy for phone calls solitary. Digital technology and text messaging are provided in second generation (2G). Third-generation cell technology (3G) provided a higher rate of data processing, increased performance and expanded digital media. The fourth-generation (4G) [2] blends 3G with fixed broadband, which supports mobile networks and breaks 3G's limitations. There was a higher bandwidth with less energy costs. 5G [3] stands for mobile technology of the fifth generation, which will be proclaimed to be another disruption in the mobile sector, transforming how mobile telephones work at a very high width. In the future, a customer can never comply with this highly regarded technology that combines all types of advanced technology and the best and most challenging 5G technology.

2. EVOLUTION OF WIRELESS TECHNOLOGY

During the last two years, mobile communications has proved to be well established thanks to the progressive transition from 1G to 4 G of mobile technology. The change stems from the need for service-friendly transmission systems and a huge increase in telecommunications subscribers. Generation typically refers to improved communication systems and multiple frequencies ranges consistent with...
The mobile cellular network [4] was first implemented in 1980, and since then, there have been enormous improvements in mobile communications which have followed its vast sustainability. Fig. 1 demonstrates how mobile wireless technology is developing.

Fig. 1. Development of Wireless mobile Technology Development

3. LITERATURE SURVEY

3.1 First Generation (1G):

This is the principal and last mobile phones that used; they were introduced in 1982 and launched in mid-1990. This is based on Advanced Mobile Phone System (AMPS) technologies for language advantages. The AMPS device was modulated in frequency and used the FDMA, a channel of 30 KHz as well as the range of frequencies from 824 MHz to the 894 MHz.

Voice voicing in single country via analog indicator, deprived sound quality, deprived battery lifespan, low telephone power, inadequate storage, low quality handling, poor health and low spectrum performance. It includes Smartphone, Mobile telephone system as well as Advanced Mobile Telecommunications System, Boost Mobile Services, and Push to talk. It contains small capability, troubled hand-off, and low sound excellence as well as is totally unprotected because voice is played in radio towers and makes such voice calls vulnerable to unauthorized listening abroad. The biggest drawback to 1G scheme utilizes analog signals somewhat than digital signals. That means that it is less reliable, slower and can't access the signal as far back as distant locations.

3.2 Second Generation (2G):

2G denotes to secondary wave of GSM, built at the end of the eighties. It uses digital signals to communicate. Its technology was mainly based on wireless signaling and provides content relays and image communication at low speed (kbps). The frequency ranged from 30 to 200 kHz. The wireless second-generation networking network, IS-54 (TDMA), in 1991; IS-95 (CDMA) in 1993; and IS-136 in 1996 created three modes of invention. In addition to 2G, the 2.5G system uses the GPRS [5], CDMA and EDJE example files, which are switched into the device and the circuit.

The most important points 2G and 2.5G are Digital signals allowed for signals of up to 64kbps, which enabled content, such as text messages, images, and multimedia messages (MMS), to provide quality and reliability enhanced and to provide strong digital signals to facilitate the use of mobile phones. Digital signals are unfitting to support sophisticated information, such as video, device control, cell towers have a narrow range and mysterious drop calls, if there is some network coverage in any defined range. In order to offer better services that led to advanced technological improvements between 2G and 3G, GSM infrastructure has been consistently improved. Facilitates telephone calls, e-mails send and
receive, internet browsing, Speed: 64-144 kbps. Main biggest disadvantages of 2G scheme to overawed this coming 3G scheme problem is its slow digital signal.

### 3.3 Third Generation (3G):

3G established on GSM technology and in 2000 year was propelled. This technology was designed to provide performance at high speed. The first hardware has been updated, allowing traffic equal to 14 Mbps as well as package swapping. It utilizes a wireless broadband system that increases clarity. It delivers broadband services, television and video connectivity as well as new services like global roaming. It runs at 2100 MHz and has a bandwidth of about 15-20 MHz for video messaging and high speed web surfing.

The most important highlights for 3G include 2 Mbps capability, usually referred to as enhanced cell phones, increased bandwidth and data transmission rates, fast networking, transmission of large-scale email, Fast speed web/high-speed video/video/3D games,, TV Streamer/mobile TV/telephone calls, immense power & broadband capacity, It took just 11 sec-1.5 minutes to access a 3 minute MP3 tuning, 3G licensing services expensive fees, 3G Framework Assembly, Costly 3G phones and enormous smart phones have been monitored for high latency.

The 3G telecommunications network was branded in Europe as UMTS [6] (Universal Telecommunications Telecommunication Network), while the American 3G version is branded CDMA 2000. The IMT 2000 also accepted additional 3G stock coming from China, i.e. The air-interface system for UMTS is TD-SCDMA, WCDMA [7].

The service operator must spend a large amount for 3G permits and arrangements, the biggest drawback of 3G in order to overcome this 4G is the issue surrounding the supply of phones in certain areas and their costs, 3G networks require special hardware and high-power utilization.

### 3.4 Fourth Generation (4G):

4G broadband infrastructure brings together many existing and future wireless network networks to ensure free access and roaming from one device to another. 4G is 100 Mbps at full velocity. 4G offers the same services as 3G and other services, such as digital media, for TV viewers and for transferring information even more simply than ever.

It is understood that LTE [8] denoted as 4G. Fourth generation is expected to comply with the QoS and rate requirements provided by proposed implementations, for instance wireless wideband and Multi-Media Messaging Service as well as Mobile TV etc. 4G's major highlights: the ability to have 10Mbps-1Gbps, high-quality digital videos, the high security, the provision of some kind of content, the improvement of television content, low per-bit storage cost, higher battery use, heavy installation, infrastructure and expensive infrastructure necessary to upgrade next-generation networks, are the main highlights. 4G's services provide a large number of services.

It is illegal to obtain information from the public, 4G equipment includes the opportunity of intrusion, nevertheless not abundant can be targeted (jamming frequencies) and privacy infringements can be improved. The new frequencies mean new parts on cell towers, higher users' data speeds, the technology can't be 4G compliant with the current system, and various network bands for different phones are available. The new frequencies mean new parts for the mobile tower. 4G technologies involves expensive network facilities, represented in eNodeB and mainly in EPCs, and fourth generation is perfect for rates of internet data, but not essentially good for Voice facilities, both of which are discharged into Wi-Fi or third generation wireless technologies in the network. The above 4G drawbacks would be resolved by 5G.

### 4. REQUIREMENT FOR FIFTH GENERATION (5G) WIRELESS COMMUNICATION SYSTEM
Lower wait, In contrast to LTE, latency decreased considerably, Improved coverage, Competitive wide range of wireless sensor links, Data rate approx. 100Mbps better-quality signal proficiency, improved as well as inventive methods of coding of data as well as millimeter wave frequencies, intelligent beam antenna networks, black-out problems, reduced traffic prices, World Wide Wireless Internet[9], more stable and SDR protective systems, less battery consumption, various simultaneous data-sharing options and smoother data transfers, data rates approx. 100Mbps.

The 5G standards have been examined above. The 5G is another scheme that will supply all accessible computers with just one machine worldwide and join the whole network. The unparalleled multi-mode and cognitive radio will encourage stations of the fifth generation. The 5G mobile systems would enhance the development of customer locations somewhere stations are simultaneously using various wireless technologies and incorporating various problems from various schemes. The station also has the finest possible coverage among various providers of networks.

By 2020, 5G technologies will be deployed. It gives consumers a great advantage with a higher or higher 1Gbps data limit. It works with IPv6 protocol. 5G scheme is CDMA as well as BDMA [10], and the permitting speed wireless millimeter is more than 100Mbps at high speed and common with low speed over 1 Gbps. Fifth generation networks operate on OFDM type encoding. 5G aims to supply high-speed networking and information everywhere without restrictions. There was no limitation on entirely cellular correspondence. 5G main features are: www, fast volume, high capability, massive data transfer in Gbps, multimedia newspapers, clear watch TV programmes, large memory telephones, dial speeds, sound/visual illumination, smart hypermedia support, voice as well as video networking, web and much more, and more attractive and efficient.

4.1 Emerging Applications:

- M2M Communication: All data transactions including data generation, analysis and transmission are carried out automatically by smart machines.
- Internet of things: Supports the large-scale implementation of IoT concepts for intelligent homes and smart objects linked through the web.
- Internet of vehicles: Encourages online and traffic connectivity with vehicles and prevents collisions. This ensures low latency and fast running availability.
- Health care: Advanced sensors and communication technologies enable monitoring of wellbeing, data collection, and communications in real time. A remedy for healthcare is offered through wearable devices.
- Smart home as well as smart city: Appropriate in automation, appliances, embedded device and defense, for smart homes and cities.

5. CONCLUSION

Phone is an important part of our everyday lives. Their formation today is the culmination of many decades. In this article, we discuss and compare mobile wireless technology from generations to generations, the performance, benefits and drawbacks of first generation as compared to other. This sector remains full of possibilities for research as well as will continue to focus on the latest 5G infrastructure to be applied by 2020. This integration would cause the problem of handoff as mobile users pass between the systems, limiting the movement of mobile apps. To resolve this issue and convert the 5G into a true wireless setting the data path for the Mix bandwidth is created. This should be started by 2020. 6 G incorporates 5G terrestrial networks with global satellite networks. This gives people everywhere, anyway and at all times a mobile internet service, subject to 2030 launching.

References

[1] O. Ur-Rehman and N. Zivic, “Wireless communications,” in Signals and Communication
[2] U. Varshney, “4G wireless networks,” *IT Prof.*, 2012, doi: 10.1109/MITP.2012.71.

[3] J. G. Andrews *et al.*, “What will 5G be?,” *IEEE J. Sel. Areas Commun.*, 2014, doi: 10.1109/JSAC.2014.2328098.

[4] F. Rebecchi, M. Dias De Amorim, V. Conan, A. Passarella, R. Bruno, and M. Conti, “Data offloading techniques in cellular networks: A survey,” *IEEE Commun. Surv. Tutorials*, 2015, doi: 10.1109/COMST.2014.2369742.

[5] S. Lee, G. Tewolde, and J. Kwon, “Design and implementation of vehicle tracking system using GPS/GSM/GPRS technology and smartphone application,” in *2014 IEEE World Forum on Internet of Things, WF-IoT 2014*, 2014, doi: 10.1109/WF-IoT.2014.6803187.

[6] J. Sanchez and M. Thioune, *UMTS*, 2010.

[7] *WCDMA for UMTS*, 2010.

[8] E. Dahlman, S. Parkvall, and J. Skold, *4G: LTE/LTE-Advanced for Mobile Broadband*, 2013.

[9] O. Marques, “The world wide web,” in *SpringerBriefs in Computer Science*, 2016.

[10] C. Sun, X. Gao, S. Jin, M. Matthaio, Z. Ding, and C. Xiao, “Beam division multiple access for massive MIMO downlink transmission,” in *IEEE International Conference on Communications, 2015*, doi: 10.1109/ICC.2015.7248614.

[11] Natarajan, B., Obaidat, M.S., Sadoun, B., Manoharan, R., Ramachandran, S. and Velusamy, N., 2020. New Clustering-Based Semantic Service Selection and User Preferential Model. IEEE Systems Journal. DOI: 10.1109/JSYST.2020.3025407.

[12] Nataraj, S.K., Al-Turjman, F., Adom, A.H., Sitharthan, R., Rajesh, M. and Kumar, R., 2020. Intelligent Robotic Chair with Thought Control and Communication Aid Using Higher Order Spectra Band Features. IEEE Sensors Journal, DOI: 10.1109/JSEN.2020.3020971.

[13] Babu, R.G., Obaidat, M.S., Amudha, V., Manoharan, R. and Sitharthan, R., 2020. Comparative analysis of distributive linear and non-linear optimised spectrum sensing clustering techniques in cognitive radio network systems. IET Networks, DOI: 10.1049/iet-net.2020.0122.

[14] Sitharthan, R., Yuvraj, S., Padmanabhan, S., Holm-Nielsen, J.B., Sujith, M., Rajesh, M., Prabaharan, N. and Vengatesan, K., 2021. Piezoelectric energy harvester converting wind aerodynamic energy into electrical energy for microelectronic application. IET Renewable Power Generation, DOI: 10.1049/rgp.2.12119.

[15] Sitharthan, R., Sujatha Krishnamoorthy, Padmanaban Sanjeevikumar, Jens Bo Holm-Nielsen, R. Raja Singh, and M. Rajesh. "Torque ripple minimization of PMSM using an adaptive Elman neural network-controlled feedback linearization-based direct torque control strategy." *International Transactions on Electrical Energy Systems* 31, no. 1 (2021): e12685. DOI: 10.1002/2050-7038.12685.