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Technological Aspect to Heal the Social Communication Gap by Evolution in Mobile Networks from 1G to 5G

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ABSTRACT: Mobile wireless communication has progressed dramatically during the last two decades. This development spans several generations and is currently ongoing. The initial generation of mobile wireless technology was 1G, and the subsequent generations were 2G, 3G, and 4G. The problem arises in the while the first generation only offered voice communication capabilities, the second generation offered both voice and data services. Hence the author focusses on the evolution of communication network from 1G to 5G and the development of remote access technologies will lead to the enhancement of the client stations wherever the stations are will be the primary emphasis of 5G mobile systems. In this paper author discussed mainly on with the vast number of items connected to the Internet through 5G's internet of things (IOT) technology, the entire society should be connected. It concluded that the with fast data transmission capacity and proficient services, 4th and 5th generation technologies significantly improve communication. In the future scope, the world is attempting to go entirely wireless and demands unhindered access to information at all times with higher quality, faster speeds, more capacity, and lower costs.

Keywords: Communication, Generation, Internet, Mobile Network, Technology.

1. INTRODUCTION

Since the invention of wireless cellular technology, it has taken little over 40 years for the time frame and history from 1G to 5G. Since then, a lot has changed. The size of cell phones has decreased. The rate of download has risen. I've received the SMS message (and almost gone). Nowadays, many people use their phones to browse the internet. Social media posting is still being done. Additionally, it appears like there is an app for practically anything now [1], [2]. Without developing and improving each generation of telecommunications into what it is today, the transition from 1G to 5G could not have taken place. Since 1979, each successive generation has enhanced our way of life and modified how we communicate roughly every 10 years. Let's go into the depths of data and examine the history from 1G to 5G, quickly examining each generation to see what it had to provide. We'll also examine the most widely used cell phones at the time. "G" stands for "Generation," simply put. Your Internet speed while connected to the Internet is determined by the signal strength, which is indicated on your home screen by the letters 2G, 3G, 4G, etc. The technical execution of a certain mobile phone system is described in detail in a set of telecommunications network standards for each generation [3], [4]. The technology needed to accomplish that speed likewise changes as even the speed rises. Mobile Wireless Communication networks have also seen a striking transformation during the previous several decades. The term "mobile wireless Generation (G)" often denotes a shift in system characteristics, including latency, speed, technology, and frequency [5], [6]. Each generation differs from the one before it in terms of standards, capabilities, new methods, and features.

Only voice calls were made using the first generation (1G) mobile wireless communication system, which was analog. Text messaging is supported by second generation (2G), a digital technology. The third generation (3G) of mobile technology offered a faster rate of data transfer, more capacity, and support for interactive media. The fourth generation (4G), an advancement in mobile technology that gets over 3G's restrictions, combines 3G with fixed internet to offer wireless mobile internet. Additionally, it boosts bandwidth while cutting down on resource costs. The term "5G" refers to the fifth generation of mobile technology, which is set to bring about a new revolution in the mobile industry by transforming how cell phones are used in extremely high bandwidth. Users have never previously encountered such high-value technology that offers all types of advanced capabilities, and 5G technology will soon be the most potent and in great demand [7],[8]. Each new generation of services for wireless communication represents a significant stride (or more accurately, a leap) in the goal of providing high

quality, dependable communication similar to wired communication (optical fiber). Since 1G was introduced in 1979, this evolutionary process has continued through 5G. For a generation to utilize the G nomenclature, several requirements must be completed. Each generation of smartphone technology is standardized by organizations. Each generation includes specifications that must be satisfied in order to be included in that generation, including throughput, latency, and other factors. Every generation improved upon the research and advancement made since the one before it. Prior to the introduction of 2G, or the second generation, wireless technology was referred to as 1G. The transition from analog to digital wireless connections was a significant advance in technology.

2. DISCUSSION

2.1. Journey of 1G to 5G:

Let's first discuss 1G, 2G, 3G, 4G, and 5G in actual detail. These are the five distinct mobile network generations (thus the "G"). Contrary to popular belief, mobile networks have existed since the 1980s, and a new generation have debuted every ten years. A phone network's "generation" is a particular group of accepted norms. These networks' speed improves with every iteration. 1G began to gain popularity globally in the early 1980s. The first commercial cellular networks employing analog transmissions appeared about this period. Although inventive, this initial generation had a number of problems. Phones typically feature poor speech quality, a short battery life, and frequent call drops. The size of phones at the time made them difficult to own and operate. 2G was only starting to take off in the early 1990s [9], [10]. The Global System for Mobile (or GSM), a new digital instrument for wireless transmission, was incorporated in this second iteration and replaced analog signals with digital ones. GSM has been developed throughout time. The key goal here was to offer a more dependable and secure communication alternative. SMS, teleconferences, call holding, internal roaming, and other features were added at this period. With faster data rates, the 2G technology could be used to transmit and receive email as well as text messages, and by the early 2000s, 3G had arrived. Many of us first became familiar with this generation when mobile phones were widely accessible to the general public [11], [12]. It is now feasible to do things like download videos, search the Internet, share images, make video chats, play games, and sign up for social media sites thanks to this technical advancement. The objective of 3G was to enhance data transfer and capacity offerings while retaining affordable costs and the capability to accommodate a variety of applications. Late in 2010, 4G was launched. LTE (or Long-Term Evolution) became the norm throughout this generation by advancing current technologies. Devices can now process data at quicker speeds and with more multimedia capabilities thanks to this. This generation is characterized by faster speeds, as well as superior quality, better security, and reduced costs. We currently have a 5G network. New standards are being created in this age to accommodate the expanding Internet of Things. Remember that the technologies created for 5G are meant to further speed data while lowering latency, increasing capacity and dependability, and preserving stability and performance. Despite being a young age, it aspires to give everyone a more integrated experience.

2.2. 1G mobile communication system:

The Nippon Telephone as well as Telegraph Company (NTT) in Tokyo introduced the first generation of mobile phone systems in Japan in 1979. It became more well-liked in the US, Finland, UK, and Europe towards the beginning of the 1980s. The system, which relied on analog transmissions, had a number of drawbacks because of technological restrictions. Even though it was a cutting-edge technology at the time, 1G had significant flaws by today's standards. On a 1G network, communication was challenging due to the poor voice quality. The coverage was likewise subpar, with a lot of static noise and a raspy backdrop. Additionally, no roaming assistance was given. Since there was no encryption on the 1G channel, there was no security, making it possible for anybody with a radio scanner to listen in on the call. Additionally, download rates exceeding 1G were very poor, barely reaching a top of 2.4kbps. Despite being forward-thinking for its day, 1G still had a lot of space for development.

2.3. 2Generation:

When cell phones switched from 1G to 2G, it was the first significant improvement. The primary distinction between the two mobile phone networks—1G and 2G—is that 1G networks employ analog radio transmissions, whilst 2G networks use digital ones. This generation's principal goal was to offer trustworthy and secure communication methods. The GSM and CDMA concepts were put into practice provided SMS and MMS-style small data services. Radial Ninja commercially debuted the GSM-based second-generation 2Mobile communication telecommunications network in Finland in 1991. By enabling numerous users over a single channel via multiplexing, 2G capabilities are made possible. Cell phones are utilized for both voice and data communication during 2G. Many of the fundamental services that we still use today were introduced with the

transition from 1G to 2G technology, including SMS, internal roaming, phone conversations, call hold, and service-based invoicing, such as. Real-time invoicing and charges depending on long distance calls. With improved data rates for GSM Evolution, the top speed of 2G with Normal Packet Radio Network (GPRS) is 1 Mbps (EDGE). The lesser-known 2.5G through 2.75G wireless networks served as an intermediate standard to bridge the gap between 2G and 3G wireless networks before the major transition.

2.4. 3Generation:

In the years after the year 2000, not one, but two significant 3G technologies were introduced to the globe. Still far better than the numerous 2G networks, much alone 1G. Both of which were UMTS and CDMA2000, the latter of which replaced the 2G CDMA network (originating from GSM and GPRS). 3GPP (Third Generation Partnership Project), which also suggested cdma2000 and called it 3GPP2, came up with UMTS. By the way, all of these organizations, including the 3GPP, ITU, and others, are mostly made up of employees of businesses in the sector who want to have an impact on how future technology functions. They are not in any other sense the authorities; rather, they are the standardizing bodies that produce documents that individuals may use if they want. They may be significant if they create a standard that the entire world aspires to use, but they lack the authority to impose demands on any nation or business in the globe. Since then, the 3GPP track has been the norm, and 3GPP2 did not proceed with 4G or 5G even if 3G was the front-runner. In other words, what we're seeing now is the development of UMTS for 3G. The core network did not gain anything ground-breaking from UMTS. Remember that it just included a super-fast radio access network including two systems from the 2G voice switch as well as data router, allowing user speeds to eventually reach numerous Mbits per second. Megabits towards the end, yes. The concept, or at least their vision for the future, was to completely replace the current method of conducting phone calls with VoIP, or voice-over-IP. Additionally, the 3GPP has created a component for this based on the SIP VoIP protocol (Session Initiation Protocol). The component was known as IMS (IP Multimedia Subsystem). We had nodes in the network that might handle voice calls via IP as well as mobile phones having IP connectivity to the network. And it ought to have succeeded. It just did not occur. It was extremely difficult to achieve the quality of radio links where mobile VoIP conversations could compete with conventional non-IP voice. IMS, on the other hand, was a fairly good IP telephony system with access to technology-agnostic, therefore it was utilized for fixed VoIP for ten years (if any technical system could do it). After a decade, as we approach 2010, IMS has at last found its true position, including in the realm of mobile telephony.

2.5. 4Generation:

In comparison to 3G, 4G is a fundamentally different technology, and it has only just been realistically feasible as a result of recent technological developments. While enhancing security and lowering the cost of phone and data services, multimedia, including Internet over IP, it seeks to provide consumers fast speed, great quality, and high capacity. Modified mobile online access, IP telephony, electronic sports, high-definition mobile TV, teleconferences, 3D television, as well as cloud services are examples of potential and actual uses. MIMO (Multiple Input Multiple Output) and OFDM are the principal technologies that already have made it all possible (Orthogonal Frequency Division Multiplexing). WiMAX, a now-defunct 4G technology, and LTE are two crucial ones (widely seen deployment). Long Term Evolution (LTE) will be implemented on Telstra's current 1800MHz frequency range and is a series of enhancements to the current UMTS technology. When the device is running, the 4G cable network maximum speed for low-mobility communication, such as stationary or mobile communications is 100 Mbps or 1 Gbps, and there is also much reduced congestion and a decrease in latency from roughly 300 ms to less than 100 Ms. When 4G originally came out, it wasn't any quicker than 3G. 4G LTE, which comes extremely near to achieving the benchmarks, is not the same thing as 4G. This allows you to watch an HD TV show or install a new game without buffering. A 4G phone may connect via 3G or 2G networks since next generation phones are typically made to be backward-compatible. The majority of carriers appear to concur that OFDM is one of the key signs that a service may properly be promoted as 4G. The digital modulation technique known as OFDM divides a signal into several narrowband channels operating at various frequencies. When LTE is adopted, carriers will have to redesign their voice call networks because GSM, UMTS, and CDMA2000 require significant connectivity changes in order for network operators to supply them as voice call circuits. Then there are the fractional parts: 4.5G as well as 4.9G mark the transformation to LTE (in a phase called LTE-Advanced Pro).

2.6. 5Generation:

A generation called 5G is currently being developed with the goal of outperforming 4G. The benefits of 5G include extremely low latency, larger connection density, and much quicker data speeds. Device-to-device communication, reduced energy usage, and improved overall wireless coverage are some of the 5G ideas. 5G is

expected to have a maximum speed of 35.46 Gbps, which really is 35 times faster than 4G. Key technology to keep an eye on Massive MIMO, mobile communications using millimeter waves, etc. Li-Fi, tiny cells, millimeter wave, and massive MIMO With previously unheard-of low latency and support for at approximately 100 billion devices, all recent new technologies can be leveraged to provide 10 Gb/s to the user. Backing for Permit connection. Various projections have been made regarding the launch timing of 5G networks on a commercial scale. According to the Next Generation Mobile Networks Alliance, 5G should be implemented by upcoming year to satisfy consumer and commercial demand.

3. CONCLUSION

Wireless mobile communication is a fast growing industry. The cellular business has seen impressive expansion during the previous few years. The mobile sector will undergo a fresh revolution thanks to 5G technology. The upcoming 5G cellular mobile telecommunications system would make extensive use of several novel techniques and technology. The general standards for these new 5G technologies have not yet been established. But when the necessary technologies advance, they will be included into the new system, which the standards organizations will define during the ensuing years. 5G is the outcome of efforts to consolidate existing technologies into a single, universal standard. In an effort to go entirely wireless, people seek constant access to information that is of the highest quality, swiftest possible speed, has the widest possible bandwidth, and has the lowest possible latency. It was implied that wireless communication has been developing continually to suit rising demand and more stringent specifications. Since the rollout of first-generation mobile networks, the telecommunications sector has been confronted with a number of new difficulties related to technology, effective spectrum usage, and, most significantly, end-user security. Future wireless technologies will offer mobile networks that are extremely fast, packed with features, and highly secure.

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