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Possible Utilization of Global System of Mobile Communication Advances in Information Communication Function of the Library

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Abstract

While its evolution dates back as far as 1921, break through begins in 1982 and today it has continued to advance unabatedly. This is the fate of Global System for Mobile Communication (GSM); a device in the hand that makes the world appears like a small place. It started with a one-way information medium within a defined distance but today it is a global phenomenon that seems unlimited. GSM at its recent era do not pretend to improve the voice communication experience only but provides access to global communication reality of information communication and sharing. These are achieved in the various social networks, search engines and data based, as well as internet and the likes. This article provides an overview of the evolution of GSM and it implication for information communication specifically as it concerns the library.

Keywords

Global System for Mobile Communication, Information Communication, Library

1. Introduction

GSM (Global System for Mobile Communications, originally *Groupe Spécial Mobile*), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second-generation (2G) digital cellular networks used by mobile phones. The major breakthrough is the wireless telephone system, which comes in either fixed wireless lines or the global system for mobile communication (GSM) (Wojuade, 2005). When introduced to the market in 1992, GSM defined by ETSI as the internationally accepted digital cellular telephony standard, was primarily a voice-only system with SMS and some low-bit-rate circuits witched data services (Håkan et al., 2006). Since then, GSM has continued to evolve unabatedly. The dawn of the 21st century marks the revolution in information and communication technology (ICT), revealing that more people are becoming reliant on wireless communication systems and at present, GSM is undeniably the most widely spread technology in the world.

The growth of the number of mobile subscribers over the last years led to a saturation of voice-oriented wireless telephony from a number of 214 minions subscribers in 1997 to 1,162 millions in 2002 (International Telecommunication Union Statistics, 2002). While users of GSM grew from 9.7% in 1995 to 55.9% in 2004 (Abdulkarim et al., 2006), it is predicted that by 2010 there will be 1,700 million subscribers worldwide (Kim et al., 2003). Its adoption has continue to increase among all socioeconomic and culture beyond prediction as according to GSM Association (2001), the number of worldwide subscribers exceeded 1 billion in 2004. By 2005, GSM networks accounted for more than 75% of the worldwide cellular network market, serving 1.5 billion subscribers. Worldwide GSM subscribers exceeded 3 billion in 2008 (GSM Association, 2001). GSM Association estimated in 2010 that technologies defined in the GSM standard serve 80% of the global mobile market, encompassing more than 5 billion people across more than 212 countries and territories, making GSM the most ubiquitous of the many standards for cellular networks (GSM Association. 2010). In addition, the services offer by GSM has advance too and multiply in numbers from telephone conversation, short messaging services (SMS), voice messaging, multimedia messaging services (MMS) and internet access, made possible through various developments such as General Packet Radio Service (GPRS), Wireless Application Protocol (WAP), and the 3G standard. These

services have aid the collection, processing, preservation and dissemination of information.

Considering that the Library is known as the central organ of information dissemination, with the advances in telecommunication couple with its implication as a necessary tool for the process of communication, there can be a working relationship between GSM and the library. The world is fast becoming a global village and this call for the need for information communication. The rapidly changing innovation and development in the telecommunications industry all over the world is very rapid as one innovation replaces another in a matter of weeks. Imagine therefore the application of these innovations in an important information dissemination organ such as the library? It is therefore the aim of this article to provide an overview of the evolution of GSM; starting from the initial introduction to the current 4G system that has been deployed and also throw a light on the 5G system that is been planned, and it implication for information communication in terms of its relation to the library.

2. Historical Overview of the Advancements in GSM

As dated back to 1921, the Detroit Police Department implemented a radio system that allows the patrol cars to communicate with central control point. This was the first mobile communication system (Ainscough, 2001). In World War II (1939 – 1944), there was mass production of VHF radios which made it possible to communicate and created some advancement to what was available in 1921. By 1946 in St. Louis it became possible to link a vehicle mounted mobile radio unit to a Public Switched Telephone Network (PSTN). This is an additional advancement to the world of mobile communications system compared to what was available in 1921 (Ainscough, 2001). During the 1950's, Private Mobile Radio (PMR) and Private Access Mobile Radio (PAMR) usually utilized vehicle mounted units were developed. These systems are mainly used by the emergency services, public utilities, road haulage and taxi's.

The concept for GSM started in 1982 when Conference for European Post and Telecommunications Administration (CEPT) formed a committee known as Groupe Speciale Mobile. This was referred to as the 1G generation. The main reason for the formation of this committee was to create a standard for mobile communications with several distinct advantages, such that the user would be able to use their phone anywhere, and any manufacturer would be able to produce any part of the overall system. While France and Germany signed a joint development agreement in 1984, Italy and the UK joined in 1986. In 1985, Total Access Communications System (TACS) was introduced. This was the first real mobile communications system; although when this system was introduced it was mainly vehicle mounted units, but later developed into mobile units (Ainscough, 2001). In 1987 Europe produced the very first agreed GSM Technical Specification and later in the same year, 13 European countries signed a memorandum of understanding in Copenhagen to develop and deploy a common cellular telephone system across Europe, and EU rules were passed to make GSM a mandatory standard (European Telecommunications Standards Institute, 2011a). The decision to develop a continental standard eventually resulted in a unified, open, standard-based network which was larger than that in the United States (Leader, 2007; European Telecommunications Standards Institute, 2011b)

In the real sense, Global System for Mobile communication (GSM) belongs to the 2nd generation mobile telephone referred to as the 2G generation that was first established in 1992 (Jaloun and Guennoun, 2010). Although work began in 1991 to expand the GSM standard to the 1800 MHz frequency band, the first 1800 MHz network became operational in the UK by 1993. However, The world's first GSM call was made by the former Finnish prime minister Harri Holkeri to Kaarina Suonio (mayor in city of Tampere) on July 1, 1991, on a network built by Telenokia and Siemens and operated by Radiolinja (Yelisradio, 2008). The following year in 1992, the first short messaging service (SMS or "text message") message was sent and Vodafone UK and Telecom Finland signed the first international roaming agreement. Also that year, Telecom Australia became the first network operator to deploy a GSM network outside Europe and the first practical hand-held GSM mobile phone became available. In 1995, fax, data and SMS messaging services were launched commercially, the first 1900 MHz GSM network became operational in the United States and GSM subscribers worldwide exceeded 10 million and Pre-paid GSM SIM cards were launched in 1996 and worldwide GSM subscribers passed 100 million in 1998 (GSM Association 2001).

The 2.5G GSM network was launch in late 1990s referred to 2.5 generation. The "generation 2.5" is a designation that broadly includes all advanced upgrades for the 2G networks. Generally, the 2.5G GSM system includes at least one of the following technologies; 1) *High-speed circuit-switched data* (HSCSD) 2) *General Packet Radio Services* (GPRS) and 3) *Enhanced Data Rates for Global Evolution* (EDGE) (Jaloun and Guennoun, 2010). In 2000, the first commercial GPRS services were launched and the first GPRS compatible handsets became available for sale.

The 3rd generation Networks referred to as 3G became deploy by operators in 2001-2003. The principal objectives of the 3G networks are the delivery of higher data rate services with worldwide compatibility (Jaloun and Guennoun, 2010). In 2001 the first UMTS (W-CDMA) network; a 3G technology that is not part of GSM, was launched. The main 3G networks currently deployed are based on WCDMA and EV-DO (Jaloun and Guennoun, 2010). The promise of new radio spectrum encouraged some of the world's mobile operators to pay very high prices for 3G licenses. The Third Generation Partnership project (3GPP) defines a range of standards including WCDMA, TD- CDMA and refinements to GSM, GPRS and EDGE. The 3GPP is a cooperation of

ETSI (Europe), ATIS (North America), CCSA (China), TTA (South Korea) and ARIB/TTC (Japan) to create a global 3G standard that follows the ITU's IMT-2000 project.

The 3.5G networks referred to as 3.5 generation was launch around 2005. The main objective of the 3.5G is to increase the throughput to about 20 Mbits/s, but in practice the data speed is about 1Mbps (Jaloun and Guennoun, 2010). High Speed Downlink Packet Access (HSDPA) and High Speed Up-link Packet Access (HSUPA) are 3.5G upgrade for existing WCDMA networks. HSDPA introduces a new transport channel – formally known as high-speed downlink shared channel (HS-DSC) – that uses a number of intelligent and adaptive techniques to improve performance. Its key advantages are that;

1) it improves maximum downlink data rates to 14.4 Mbps, compared with 2 Mbps for WCDMA,

2) it reduces latency to 100ms, compared with 180-200 ms for WCDMA, and

3) it improve base station data capacity by a factor of five in dense urban environments.

As an evolutionary upgrade to HSDPA, High Speed Up-link Packet Access (HSUPA) brings a faster upload channel (up to 5.76 Mbps) in order to provide a more symmetric communication channel and allow full-duplex packet services to be used. HSUPA was released as a part of 3GPP Release 6 during March 2005. Unlike HSDPA, HSUPA uses lower order modulation schemes in order to conserve battery life at the user terminal.

The 3.9G Networks referred to as 3.9 generation was deployed in the 2008-2010. Both 3GPP and 3GPP2 refer to standards beyond 3.5G as Long-Term Evolution (LTE), although other terms including 3.9G are used. 3.9G technologies aim to improve the performance of 3.5G networks significantly and to provide some back-ward-compatibility with those networks (Jaloun and Guennoun, 2010).

The design phase of the 4th generation Networks referred to as 4G Networks started and was deployed in the 2010 but expected to last to 2020 time-frames. The working definition of the 4th generation GSM network; a term refer to as 'Advanced Technology Evolution', is summarized as follows (Jaloun and Guennoun, 2010);

1) 4G systems should be IP-based and should combine elements of mobile, wireless and fixed networks in a seamless architecture transparent to the user.

2) Target data rates should be 100Mbps for mobile users and 1Gbps for nomadic users.

3) Worldwide common spectrum and open global standards should be pursued.

The 5th generation expected to be referred to as 5G Networks are still at an early stage of development; so early in fact that there is no industry consensus on the definition of 5G. The architecture of 5G systems is also likely to be design to deliver the long-held industry vision of seamless access to services across multiple mobile, wireless and fixed networks. This could be enabled by a range of technologies including IMS, IPv6, OFDMA, MIMO. etc. The 5G networks is also be planned and optimized to support these different services (mobiles and fixes) with differents QoS.

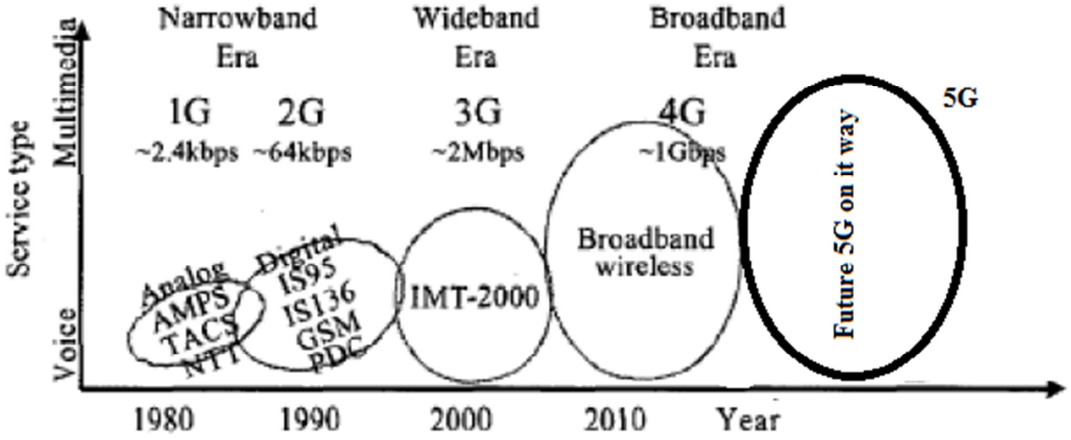

Figure 1. *Evolution of Mobile Cellular Networks (adapted from Fumiyuki (2001) cited in Amit et al., 2010 with modification by the present Author).*

3. Information Communication as a Function of the Library

Although the library is seen as a building established for the purpose of collecting and storing books and related materials for reading and research, the Chamber's Encyclopedia (1977) defines it as a place set aside for reading or reference and by extension, a collection of books. Olanlokun and Salisu (1993) on the other hand considered the library to engage in the collection, processing, preservation and dissemination of recorded information in the various formats most convenient to its target users.

With the advent of the 21st century technology such as Information Technology (IT), this function of the library is now a quality that puzzles researchers (Momodu and Akpamu, 2014). The Library is therefore challenged with satisfying their users' needs for information in a demanding and dynamic generation. While IT is the acquisition, processing, storage and dissemination of information by means of computer, office machine and telecommunications (Ehikhamenor, 1993), Information and Communication

Technology (ICT) emphasizes the use of technology for development. Interestingly, the element of the library can be seen in both IT and ICT. Although ICT is reported to have overtaken IT because of its appropriateness and relevance (Akintunde, 2004) both as well as the library still show a dynamic interplay. For this reason IT should not be seen as taken the place of the library as with the communication aspect of the library, the library is still relevant. According to Akintunde (2004), IT focuses on the computer, ICT; a phenomenon of the library, focuses on the use of computer and other technologies such as telephones etc, to process, transport, transfer voice/video and other data singularly or mixed with least interference.

From a marketing communications perspective, the challenge to most libraries is to attract users to the library and to retain them. Ekpenyong (2003) asserts that if libraries wish to remain relevant, they must focus on the information provider/user relationship. In line with this, Popoola (2001) suggests that the library must ensure a closer relationship with its clientele and publicize their information products and services to arouse user interest.

4. Conclusion

GSM mobile communication is one of the most explosive developments ever to have taken place in the telecommunications industry (Wojuade, 2006 cite in Ajiboye et al., 2007). The last few years have witnessed a phenomenal growth in the wireless industry, both in terms of mobile technology and its subscribers. There has been a clear shift from fixed to mobile cellular telephony, especially since the turn of the century. The new mobile generations do not pretend to improve the voice communication experience but try to give the user access to a new global communication reality with aim to reach communication ubiquity (every time, everywhere) and to provide users with a new set of services.

While information has long been describe as a basis to the life of man just as air, water, food, and shelter (Adeyemi, 1991), the provision and communication of this information which the library is known for is therefore an important issue. Information on various aspects of life abounds in journal publications and such are in form of research reports and bulletins and the Library is known for the capabilities to identify and acquire such materials. Considering the fact that information from scientific findings are needed by individual of all work of life, couple with the fact that GSM subscribers has hit billions of individuals, mobile networks can collaborate with the library in making these resources accessible, and available with users spending less time to locate them.

The relevance of wireless communication services has recently managed to infiltrate the educational industry in an effort to improve learning and information delivery services such as lecture notes, examination results, admissions, bursary, and several other uses. The Library as the central organ of information dissemination to community can utilize similar opportunity from GSM to experience transformation of services and processes.

It is now time to explore new demands and to find new ways to extend the mobile concept. In this regards, a question is raised- "why not explore how GSM can be harness in the collection, processing, preservation and dissemination of recorded information in the various formats most convenient to its target users"?, thus a call for an innovation that can include the library among the advancement in GSM. In line with this call, Iwhiwhu et al. (2010) stated that just as the GSM Communication has revolutionized the daily lives of individuals; it can also be harness to enhance library operations. Before the advent of Information and Communication Technologies (ICTs), communication in the library was done through books, newspapers, microforms, slides. Today, some forms of GSM applications; such as computers, internet services and telephones, have been programmed in the library and no doubt this has bring more efficiency to library services and its processes. However, there is need to exploit innovation in the library to improve users' satisfaction in relation to GSM technology application.

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