



## **A STEP AHEAD FROM THIRD GENERATION MOBILE WIRELESS TECHNOLOGY**

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### ***Abstract***

*According to the present study market is captured by 3G mobile technology but according to the study 4G and 5G technology is emerging in the market, presently 4G mobile technology is at determining and standardization stage and 5G technology may emerge in near future. 4G mobile technology has high data rates since mobile network has ability to roam across multiple wireless networks therefore it has become more popular in the market. 3GPP LTE is an UMTS standard and WiMax is an IEEE standard. These technologies have characteristics which meet 4G characteristics. Present study discusses the comparative study of different generations of mobile networks and the advancement in 3G technologies which leads to fourth generation mobile technology and can be followed by fifth generation mobile technology.*

### **Introduction:**

Since mobile networks become more popular in the market therefore there is immense advancement in the mobile wireless technology.

In the growing world of communication people are approaching towards fast media of communication regardless of the location of each individual. In continuous development of mobile environments, the major service providers in the wireless market kept on monitoring

the growths of 4<sup>th</sup> Generation (4G) mobile technology. In 2015 the total mobile subscriber base in north America, Europe and Asia Pacific is expected to grow up to 800 million and penetration will be over 90% [1]. This kind of demand growth will require the support of higher capacity networks. Given the technology at large, 4G mobile technology as an example, will give people a more convenience and ease in lifestyle, with the “anytime anywhere, anything”, capability, 4G wireless technology will benefit every individual regardless of time and place. Considering global standpoint, this technology stands to be the way to communicate and connect all the time with more ubiquitous means.

**3G**, short for **third Generation**, is the **third generation of mobile telecommunications technology**.<sup>[3]</sup> This is based on a set of standards used for mobile devices and mobile telecommunication use services and networks that comply with the **International Mobile Telecommunications-2000 (IMT-2000)** specifications by the International Telecommunication Union.<sup>[4]</sup> **3G** finds application in wireless voice telephony, mobile Internet access, fixed wireless Internet access, video calls and mobile TV.

3G telecommunication networks support services that provide an information transfer rate of at least 200 kbit/s. Later 3G releases, often denoted 3.5G and 3.75G, also provide mobile broadband access of several Mbit/s to smartphones and mobile modems in laptop computers. This ensures it can be applied to wireless voice telephony, mobile Internet access, fixed wireless Internet access, video calls and mobile TV technologies.

**4G**, short for *fourth generation*, is the fourth generation of mobile telecommunications technology succeeding 3G. A 4G system, in addition to usual voice and other services of 3G system, provides mobile ultra-broadband Internet access, for example to laptops with USB wireless modems, to smartphones, and to other mobile devices. Even though 4G is a successor technology of 3G, there can be signification issues on 3G network to upgrade to 4G as many of them were not built on forward compatibility. Conceivable applications include amended mobile web access, IP telephony, gaming services, high-definition mobile TV, video conferencing, 3D television, and cloud computing.<sup>[5]</sup>

## **2. 4G FEATURES:**

Approach from different services:

The Idea of convergence means that the creation of the atmosphere that can eventually provide seamless and high reliable and quality broadband mobile communication service and ubiquitous service through wired and wireless convergence networks without the space problem and terrestrial limitation, by means of ubiquitous connectivity. Convergence among industries is also accelerated by formation of alliances through participation in various projects to provide convergence services.

### **3. COMPARATIVE STUDY OF DIFFERENT GENERATIONS IN WIRELESS TECHNOLOGY:**

#### **What is 1G?**

First generation refers to the analog “brick phones” and “bag phones” as they were first introduced for mobile cellular technology. Cell phones began with 1G and signify first generation wireless analog technology standards that originated in the 1980s. 1G was replaced by 2G wireless digital standards [2].

#### **What is 2G?**

2G signifies second generation wireless digital technology. Fully digital 2G networks have replaced analog 1G, which originated in the 1980s. 2G networks first commercially began on the Global System for Mobil Communications, or GSM, standard. 2G on GSM standards was first used in commercial practice in 1991 by Radiolinja, a Finnish GSM operator that was founded on September 19, 1988. Radiolinja is now part of Elisa, which was known in the 1990s as the Helsinki Telephone Company. In addition to the GSM protocol, 2G also utilizes various other digital protocols, including CDMA, TDMA, iDEN and PDC. GSM is based on TDMA.[2]

#### **What is 3G?**

3G is the third generation of mobile phone standards and technology. 3G supersedes 2G technology and precedes 4G technology. Current 3G systems have been established through ITU’s project on International Mobile Telecommunications 2000 (IMT-2000).

3G technologies have enabled faster data transmission speeds, greater network capacity and more advanced network services. In May 2001, NTT DoCoMo (Japan) launched the first pre-commercial 3G network – branded as FOMA. Following the first pre-

commercial launch, NTT DoCoMo again made history on October 1, 2001, with the first commercial launch of 3G in Japan.

UMTS-HSPA is the world's leading 3G technology. By 2015, UMTS-HSPA and LTE 3G technologies are expected to account for 3.9 billion global subscriptions, compared to 569 million CDMA EV-DO subscriptions and 59 million WiMAX subscriptions.[2]

### **What is 4G?**

4G is the term used to refer to the fourth generation of mobile wireless services that has been defined by the ITU and its Radiocommunication Sector (ITU-R) and established as an agreed upon and globally accepted definition in IMT-Advanced.

The ITU has developed requirements for a technology to be considered IMT-Advanced, which is the next-generation wireless technology. An IMT-Advanced cellular system must fulfill the following requirements. [2]

#### **4G IMT Advanced**

“4G” is the term used to refer to the International Mobile Telecommunications-Advanced (IMT-Advanced) technology family of mobile wireless services, which has been defined and ratified by the International Telecommunication Union (ITU). In an October 2010 meeting, The ITU's Radio communication Sector (ITU-R) Working Party 5D, which is responsible for defining the IMT-Advanced global 4G technologies, completed the assessment of six candidate technology submissions for the global 4G mobile wireless broadband technology. Of the proposals, two technologies, LTE-Advanced and WirelessMAN-Advanced, were each determined to have successfully met all of the criteria established by ITU-R for the first release of IMT-Advanced and were accorded the official designation of IMT-Advanced, qualifying them as 4G technologies. Final ratification of the full IMT-Advanced technology family took place at the ITU-R Study Group meeting on November 22 and 23, 2010, in Geneva, Switzerland.

As background for this IMT-Advanced project, ITU published a document, “Recommendation ITU-R M.1645: Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000.”

These technologies will now move into the final stage of the IMT-Advanced process, which provides for the development in early 2012 of an ITU-R Recommendation specifying the in-depth technical standards for these radio technologies.



#### **4. THE SERVICES BEYOND 3G:**

##### **3GPP LTE:**

As hype about multiple standards paths in the wireless technology has caused significant confusion in the market, the initiative in 3GPP LTE of the so-called third generation partnership program – long term evolution is the name given to a project develops the universal mobile telecommunications system (UMTS) mobile phone standard to cope and manage with future requirements in terms of wireless technology. Objectives include improving efficiency, lowering costs, improving services, making use of new spectrum opportunities and better integration with other open standards, since the project is currently in progress, it has put itself some specific goals, much of which is learning around upgrading UMTS to a technology name fourth generation mobile communications technology, essentially a wireless broadband internet system with voice and other services built on top. The aim of the project comprises of [6].

1. Download rates of 100 Mbps, and upload rates of 50 Mbps for every 20 Mhz of spectrum 5 latency of small packets
2. Increased spectrum flexibility, with spectrum slices as small as 1.6Mhz.
3. Coexistence with legacy standards 3GPP LTE is planned as a development to existing 3GPP standards. The project was aimed as the standard technology for 2.5 Ghz “3G extension band.” Compared to UMTS, 3GPP LTE is exclusive and solely packet-switched and IP based which means that circuit switched core network does not exist.

##### **Wi-Max and Wi-Bro:**

WiMax is Worldwide interoperability for microwave Access and this technology is a standard created by IEEE to form the IEEE 802.16 standard based pm this standard, WiBro is the service name for mobile WiMax in Korea. WiBro uses the Mobile WiMax system profile. The system profile contains a comprehensive list of features that the equipment is required or allowed to support as a result, WiBro offers the same capabilities and features of Mobile Wimax. It describes this technology as an alternative to cable and DSL and a standards-based technology enabling and allowing the delivery of last mile wireless broadband access. The aim of the project comprises of[7]

1. Peak downlink sector data rates up to 46 Mbps assuming a DL/UL ratio of 3:1 and peak uplink sector data rates up to 14 mbps assuming DL/UL ratio of 1:1 in a 10 Mhz channel.

2. Support end to end IP based QoS

3. Available different channelization from 1.25 to 20 Mhz to comply with varied world wide requirements.

4. In a prevailing market, operators are more interested and involved in using WiMax for low cost. Low expense voice transport and delivery of services. WiMax has a two stage evolution steps. First the expansion of the overall fixed wireless market will not going to happen as a result of WiMax technology. Slow migration of purchasing behavior from proprietary equipment to WiMax equipment. In adopting and implementing WiMax equipment, service providers will be skeptical pending and until prices drop to the point where service providers cannot manage to pay to disregard WiMax. Since 802.16e or the so called Broadband wireless Access standards was approved already, laptops and other mobile devices can now embed with WiMax chipsets, so the user can now have internet access ubiquitously with WiMax areas. Second stage might be very disruptive and upsetting to 3G operators and could drive a round of WiMax network overlays in urban areas.

## **5. MARKET RESEARCH & TRENDS**

Market acceptance and adoption of wireless data and deployments of 3GPP and WiMax networks around the world. 3GPP LTE and WiMax technologies encompass a huge range of evolving capability, but how well do these technologies actually address market needs. Basically, 3G operators have shown less interest in mobile WiMax and are more interested in upgrading their own networks that would enable them to compete with WiMax.

Global 4G devices market is expected to witness a substantial increase in subscriber base as end-users shift from 3G to 4G services. The expanding consumer base and gradual replacement of 3G handsets by LTE-capable handsets are likely to drive the market during 2013-2014. 4G technology represents the fourth generation of mobile communication. As a successor of the 3G standards, the 4G system is expected to revolutionize mobile wireless communication through ultra-broadband Internet access to mobile devices including smartphones and laptops[8].

The report analyzes and presents an overview of 4G Handsets market worldwide. The report in addition provides global market estimates and projections for 4G Handsets in US dollars

and units for years 2012 through 2017. Supported with 6 market data tables, the report highlights the ever increasing permanence of 4G Handsets all over the world. The report also discusses about the corporate developments including the takeover of Nokia by Microsoft, T-Mobile USA by AT&T, Samsung's partnership with Reliance, and Google's agreement with Motorola Mobility Holdings among others[8].

## **6. CONCLUSION:**

If we go through the 4G features and market trends the SWOT analysis out of this 4G technology, it is inevitable that 4G would replace 3G in the long term. 4G and 3G tend to keep a co-competitive relationship in a short run. For growing 4G in the future market. It is unavoidable to compete with 3G and acquire 3G's customers. As it was also analyzed and investigated through the scenarios. The comparison was made here that among three candidates for the 4G presented. Every service providers and manufacturers strategize towards high mobility and high data rates whether it is 3GPP. The service providers concern about regulation, uncertainty of market, and economic burden. There is also new spectrum allocation issue the technology feasibility. However there are plenty of opportunities for 4G. under these circumstances, to be flourished in the future telecommunication market, each technology should be finalized its standards soon and developed system to meet needs of consumer demands in the right time.

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