

ADVANCED 4 G MOBILE TECHNOLOGY

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Abstract: An approaching 4G (fourth generation) mobile communication systems are projected to solve still-remaining problems of 3G (third generation) systems and to provide a wide variety of new services, from high-quality voice to high-definition video to high-data-rate wireless channels. The term 4G is used broadly to include several types of broadband wireless access communication systems, not only cellular telephone systems. One of the terms used to describe 4G is MAGIC-Mobile multimedia, anytime anywhere, Global mobility support, integrated wireless solution, and customized personal service. As a promise for the future, 4G systems, that is, cellular broadband wireless access systems have been attracting much interest in the mobile communication arena. The 4G systems not only will support the next generation of mobile service, but also will support the fixed wireless networks. This paper presents an overall vision of the 4G features, 4G evolution, generation of wireless communication, needed to build 4G networks, limitation of 4G, difference between 4G and 5G of mobile communication. The features of 4G systems might be summarized with one word-integration. The continuous expansion of mobile communication and wireless networks shows evidence of exceptional growth in the areas of mobile subscriber, wireless network access, mobile services, and applications.

Keywords: 4 G generation, Wi Max (wire less), Security.

1. INTRODUCTION

4G is the fourth generation communication technology. The evolution from 3G [2] to 4G will be driven by services that offer better quality (eg. Video and sound) thanks to greater bandwidth, more sophistication in the association of a large quantity of information and improved personalization. Convergence with other network (enterprise, fixed) services will come about through the high session data rate. Machine to machine transmission will involve two basic equipment types: sensors and tags (which are generally read/write equipment). It is expected that users will require high data rates similar to those one fixed network for data and streaming application. Mobile terminal usage (laptops, personal digital assistant, handheld) is expected to grow rapidly as they become more users friendly. Fluid high quality video network creacitivity are important user requirements. Key infrastructure design requirement include: fast response, high session rate, high capacity, low user charges, rapid return on investment that is in line with the growth in demand and simple autonomous terminals. As a comparison, the expected best performance of 3G is around 10bits/Hz/km² using High speed Downlink packet Access (HSPDA).

2. UP GRADE TECHNOLOGY

In a world of increasing technological needs, the mobile

Internet can play a significant role resolving the users capacity and connectivity needs. There is lots of recharge and suggestion around the 4G concept, where vendors and operators are trying to define it based on their preferred technology and strategic planning. 4G [2] is the next generation of wireless networks that will replace 3G networks sometimes in future. 3G is based on primarily a wide-area concept. The 4G system was originally envisioned by the Defence Advanced Research Projects Agency (DARPA). 4G is intended to provide high speed, high capacity, low cost per bit, IP based services. This integrated 4Gmobile system provides wireless users an affordable broadband mobile access solutions for the applications of secured wireless mobile Internet services with value-added quality of service.

3. QUALITY OF SERVICES

QoS (quality of service) of cellular networks. Wi MAX is a wireless digital communications 4G services are supposed to provide real time and internet similar services. These services could be categorized into 2 distinct parts. Guaranteed services and better than best services. Because of the provision of these services, 4G can be classified into the high quality of services category. The quality of 4G based on LTE and WIMAX. LTE is long term evolution LTE. 4G LTE is a standard for wireless communication of high-speed data for mobile phones and data terminals. It is based on the GSM and HSPA network technologies, increasing the capacity and speed using a different radio interface together with core network improvements. Data speed of LTE peak download 100Mb/s and peak upload 50Mb/s. Wi MAX is an IP based, wireless[4] broadband

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access technology that provides performance similar to 802.11/Wi-Fi networks with the coverage and system, also known as IEEE 802.16, that is intended for wireless “metropolitan networks”. The mobile Wi MAX (IEEE 802.16) mobile wireless broadband access (MWBA) standard. (also known as Wi Bro in South Korea) is sometimes branded 4G, and offers peak data rates of 128 Mbit/s downlink and 56 Mbit/s uplink over 20 MHz wide channels.

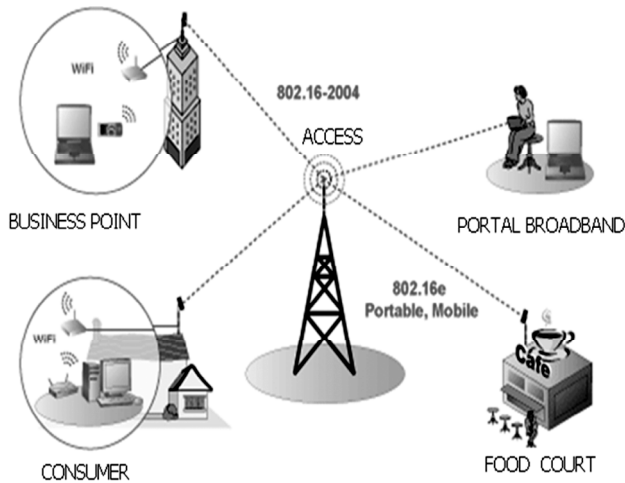


Figure 1: Fourth Generation Evolution

4. GENERATION OF WIRELESS COMMUNICATION

- 1G: These first generation mobile systems were designed to offer a single service that is speech.
- 2G: These second generation mobile systems were also designed to offer speech with a limited capability to offer data at low rates.
- 3G: These third generation mobile systems are expected to offer high quality multimedia services and operative different environments. These systems are referred to as universal mobile telecommunication systems (UMTS).
- 4G: This is user-driven, user controlled services and context aware applications.

Compared to 3G - ,4G has higher data rates and it has QOS which is the main criteria in 4G wireless[5] communication. The current defined objective or evolution from first generation to fourth generation is defined in given figure.

5. FEATURES OF 4G

Incomparable Speed: The majority of internet users choose a particular ISP over another because of the speed it offers. Even though I’ve used some slow and frustrating internet

connections before I’ve also used a lot of super fast internet connections and I’m a great fan of the 3G technology. With all I’ve read so far the 4G mobile internet technology will be at least 10 times faster than the 3G mobile internet technology and that alone is enough speed than any individual will need. If your major reason for using the internet is speed, then there is no reason why you wouldn’t love the 4G internet technology.

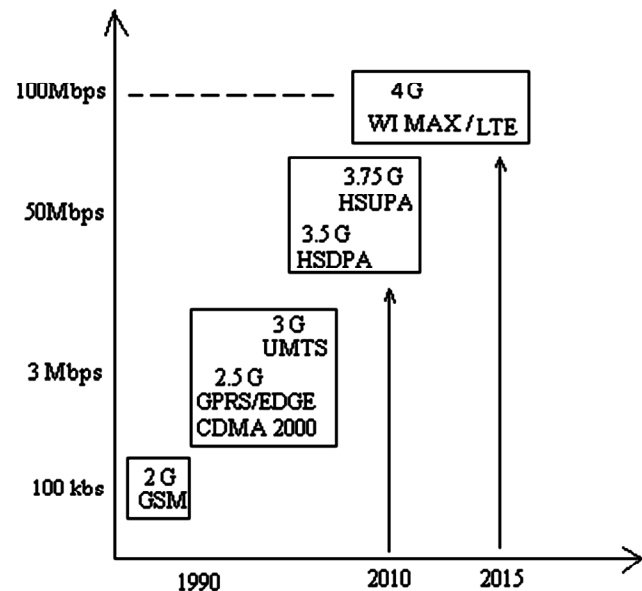


Figure 2: 4 G Evolution into Convergence Figure 2.

Advanced Security: One thing about most forms of broadband internet technology despite their great speed is their security weakness. A lot of them have one or two features that make them highly vulnerable and even though the 4G internet technology is not perfect when it comes to security it has been designed in a way that makes it cover the weakness of other technologies. If you’re an internet user concerned a lot about security, with 4G, you really have no need to worry.

Reliability and Effectiveness Irrespective of the Weather Condition: The final thing , the most about the 4G mobile internet technology is how reliable it is and also the fact that it isn’t affected by the weather. It can be really frustrating to be enjoying your broadband internet connection only to start experiencing problems due to harsh weather conditions. The 4G technology addresses all these and it won’t in any way be affected by the weather.

Technologies used in 4G is a multipurpose and versatile technology hence it can utilize almost all of the packet switched technologies. It can use both orthogonal frequency division multiplexing (OFDM) and orthogonal frequency division multiple access (OFDMA). OFDM mechanism splits a digital signal into different narrowband and

frequencies. The reason why 4G makes use of this technology lies in its ability to minimize the intervention among symbols and channels associated to data streaming. 4G is also capable of using multiple inputs / multiple output technology (MIMO). This antenna technology is used to optimize the data speed and reduce the errors in the networks. Universal Mobile Telecommunication Service (UMTS) which is basically a broadband 3G technology is also a part of 4G. This broadband [6] technology transfers data in the form of frames or packets. Hence it is capable of carrying voice, video, text and other types of multimedia datagram with the speed of 2Mb. UMTS is part of 4G because it can enable 4G to make use of international mobile phone roaming via using GSM (Global system for Mobile Communications). Another wireless telecommunication technology known as time division synchronous code division multiple access (TD-SCDMA) provides support to 4G to transfer both circuit switched data like video and voice and packet switched data.

Advantage of 4G

- Quickly download files over a wireless network
- Extremely high voice quality
- Easily access Internet, IM, Social Networks, streaming media, video calling, etc.
- Higher bandwidth
- 4G is 10 times faster than 3G

Disadvantage of 4G

- New frequencies means new components in cell towers.
- Higher data prices for consumers
- Consumer is forced to buy a new device to support the 4G
- It is impossible to make your current equipment compatible with the 4G network
- 4G is only currently available in certain cities within the United States.

6. FIFTH GENERATION

5G is not officially defined term or technology but people refer technologies that can deliver the speed beyond 4G as 5G. It's expected to be finalized somewhere in 2012 or 2013. New standard proposals or releases beyond 4G are networks rather than end user access. Submitted to standard bodies like 3GPP, Wi MAX [7] Forum or ITU-R. Ideal 5G model

should accommodate the challenges and accommodate the short falls of the 4G Technology and 4G deployment experiences. To understand the necessities and uses of 5G could be raised once the 4G rollout is completed and experienced. Thus typical 5G concept would be raised in somewhere around 2013-2015. Expected speed may be multiple of Gigabit Ethernet. This technology would be mainly used in backhauling telecom.

7. 4G VS 5G NETWORKS

4G and 5G are both mobile wireless access technologies offers Ethernet speed on mobile devices to experience the triply play services. Currently 4G is being deployed in several countries in Europe and North America. LTE and Wi MAX are two different technologies to achieve 4G defined speeds. Whereas 5G is a concept only and not officially defined.

8. CONCLUSION

This study provided an overview of the 4G evolution and technologies. It also described the features, technologies used in 4G, limitation and 5G technology. To achieve the goals of 4G, technology will need to improve significantly in order to handle the intensive algorithms in the baseband processing. Projected 4G systems offer this promise of a standard that can be embraced worldwide through its key concept of integration. The fourth generation promises to fulfil the goal of PCC (personal computing and communication) a vision that affordably provides high data rates everywhere over a wireless network. We discussed the simple Quality of service concept.

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