**4G WIRELESS TECHNOLOGY**

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***Abstract:*****The recent revolution created by 3G technology paved the world to enter into a new fastest communication and fully flexible environment of internet at high speed. Now it’s time for even advanced technology for future generations called as the 4G technology. First-generation (1G) mobile phones had only voice facility. These were replaced by second generation (2G) digital phones with added fax, data, and messaging services. The third-generation (3G) technology has added multimedia facilities to 2G phones. And now talks are on for the next-generation mobile technology with more advanced features, i.e. 4G, which is expected to be available in the market by 2013.**

**With the rapid growth of user demands, and the limitations of third generation (3G) mobile communication systems, it is expected that fourth generation (4G) mobile systems are likely to reach the consumer market in another 4-5 years. 4G systems are expected to become a platform capable of providing increased bandwidth, higher data rates, and greater interoperability across communication protocols, and user friendly, innovative, and secure applications.**

***Index Terms****:-*1) Introduction 2) Overview of 3G 3) Overview of 4G 4) Evolution of 4G 5) Advance Key features of 4G 6) Advantages of 4G 7) 4G Concerns 8) Conclusion

1. INTRODUCTION

The recent advancements in the communication technologies with special reference to the wireless communication technology has paved the way for faster, more reliable modes of data transfer and communication means. And now it’s time for the deployment of even advanced wireless communication system called as 4G (4th generation) technology which was yet to emerge within months/years.

4G technology offers high rate of data transfer at low cost than in 3G and also accessing applications with a high degree of customization and personalisation of user applications.

2. OVERVIEW OF 3G

 3G or 3rd generation mobile telecommunications is a generation of standards for mobile phones and mobile telecommunication services fulfilling the International Mobile Telecommunications-2000 (IMT-2000) specifications by the International Telecommunication Union.

The 3G technology adds multimedia facilities to 2G phones by allowing video, audio, and graphics applications. Over 3G phones, you can watch streaming video or have video telephony. The idea behind 3G is to have a single network standard instead of the different types adopted in the US, Europe, and Asia. These phones will have the highest speed of up to 2 Mbps, but only indoors and in stationary mode. With high mobility, the speed will drop to 144 kbps, which is only about three times the speed of today’s fixed telecom modems. 3G promises increased bandwidth, up to 384 kbps when the device holder is walking, 128 kbps in a car, and 2 Mbps in fixed applications. In theory, 3G would work over North American as well as European and Asian wireless air interfaces. A new air interface called enhanced data GSM environment (EDGE) has been developed specifically to meet the bandwidth needs of 3G. EDGE is a faster version of GSM wire- less service. But the out- look for 3G is neither clear nor certain. Part of the problem is that network providers in Europe and North America currently maintain separate standards bodies. In addition to technical challenges, there are financial issues that cast a shadow over 3G’s desirability.

3. OVERVIEW OF 4G

 The 4G is a new generation of wireless that replaces the 3G systems. The key features of the 4G infrastructures are accessing information anywhere, anytime, with a seamless connection to a wide range of information and services, and receiving a large volume of information, data, pictures, video, and so on. The future 4G infrastructures integrate various networks using IP (Internet protocol) as a common protocol so that users are in control because they will be able to choose every application and environment. Based on the developing trends of mobile communications, the 4G focus on ensuring seamless service across a multitude of wireless systems and networks and have broader bandwidth, higher data rate, and smoother and quicker handoff. Integrating the 4G capabilities with all of the existing mobile technologies through advanced technologies is key concept. The main features of 4G services of interest to users are application adaptability and high dynamism. It means services can be delivered and available to the personal preference of different users and support the users traffic, radio environment ,air interfaces, and quality of service.

4. EVOLUTION OF 4G

In order to make smooth transition from 3G to 4G the mobile communication companies are promoting Super 3G/LTE. The companies are upgrading 3G Technology by initializing the introduction of High Speed Downlink Packet Access (HSDPA) service, which increases the downlink data rate of packet services, and by finalizing specifications for High Speed Uplink Packet Access (HSUPA), which enhances uplink speed. HSDPA and HSUPA cover area by 3-4 times relative to W-CDMA and by providing the high transmission rate with low cost per bit transmission. The main objective of the Super 3G is to construct simple, low cost system by removing the complexity from wireless network and mobile handsets. The 3G provides packet and voice services separately whereas Super 3G is based on ALL-IP network covering both packet and voice services. As from diagram we can infer that by the 2010 we would be able to achieve the 1 Gbps in motion at low speed and 100 Mbps at high speed. On December 25, 2006, NTT DOCOMO became the first in the world to achieve a packet signal speed of 5 Gaps in an outdoor test in a low-speed environment (10 km/h). The test was undertaken to demonstrate the expected maximum transmission speed in an actual cell environment, taking into account interference from peripheral cells.

5. ADVANCED KEY FEATURES

 a)Supports advance services and applications.

 b)Enhanced peak data rates (100 Mbps for high mobility and 1 Gbps for low mobility).

 c) Low latency, improving the consumer experience.

 d)Flexible network connections, efficient use of spectrum and impressive user applications.

 e)Worldwide roaming capability.

 f)Compatibility of services within IMT and with fixed Networks .

g) Capability of interworking with other radio access systems.

 h)High quality mobile services.

 i)User equipment suitable for worldwide use.

4G will have its challenges such as Next generation applications processors and modem technology will be necessary as well as higher levels of integration and power management.

6. ADVANTAGES OF 4G

4G technology offers high rate of data transfer at low cost than in 3G and also accessing applications with a high degree of customization and personalisation of user applications,

The user will be able to receive HD streaming of video, and the data range of 4G will be 100M/bits

and 1G/bits. Broadband applications may be like wireless broadband access, Multimedia Messaging Service (MMS), video chat, mobile TV, HDTV content, Digital Video Broadcasting (DVB) demands high data rate and the quality of service(QoS) but this type of data rate and QoS are not available in 3G technology.

The main objective of 4G technology is going to be based on OFDMA (Orthogonal Frequency Division Multiple access) modulations with MIMO (Multiple Input Multiple Outputs) and other smart antennae enhancements.

7. 4G TECHNOLOGY CONCERNS

One of the main concern about 4G is that due to high speed of the frequency, it will experience severe interference from multipath secondary signals reflecting off other objects. To counter this problem, a number of solutions have been proposed, including use of a variable spreading factor and orthogonal frequency code-division multiplexing.

8. CONCLUSION

4G technology being implemented in the global market, thereby, makes us to present a complete scenario of its past present and future possibilities.

Thus we conclude that due to rising urge for 4G it’s very needful to get known with what we are dealing with.

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