Wireless and Data Communication

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Abstract — **Thispaper discusses about 4G-the big revolution. WWRF defines it as a network that operates on internet technology combining with other applications and technologies like Wi-Fi, and runs at high speeds. 4G is introduced because if research is not carried out now, it will not be possible to keep up with customer demand.**

Special features of 4G:
1) **4G data rates up to 100mbps.**
2) **Goal of 4G is expansion on the 3G goals to provide a wider range of new and improved multimedia services.**
3) **Integration of broadcast, cellular, cordless, WLAN, short range and fixed wire systems to appear as a single seamless network.**
4) **It helps to develop the IMT-2000 CDMA technologies to make more efficient use of the available frequency spectrum.**
5) **Make significant advances on the security and scalability of 3G.**
6) **Some of its characteristics are fully converged services, Software dependency, diverse user devices, Autonomous networks, 4G services, WLAN integrations, Hiper LAN 2 and Blue tooth.**

4G-Next generation biggest revolution

4G could usher in the next big revolution in communications. But it is extremely important not to be carried away with technological development alone. We do need to consider social, economic, ethical and health related issues as well.The advantages offered by wireless networks lure the users around the world to switch to wireless networks. But users have to compromise with the speed limitations offered by wireless networks.

Keywords - 4G, Characteristicsof4G, 4G services, Social Implications, Economic implication.

I. INTRODUCTION

I even before 3G cellular technologies have had the time to establish itself service providers are already touting 4G technology. It was not too long ago that the wonders of 3G services – high speed wireless internet access that would allow us to use our mobile phones to do everything from making home videos to surfing the web – were being hard sold to an eager worldwide customer base. But the technology dished out has not really been bug-free and has often turned out to be rather clumsy. So, even before 3G has had the time to steady itself we are on to 4G.

II. 4G

WWRF defines it as a network that operates on Internet technology, combines it with other applications and technologies such as Wi-Fi, WiMAX, and running at speeds ranging from 100mbps to 1Gbits. 4G is an attempt to evolve integrate and amalgamate the current 2G, the still to be steadied 3G, broadcast, WLAN, short-range and fixed wire systems into a single, fully functional, seamless Internet network.

4G is not a complete overhaul of all old technology. It involves a mix of current concepts and technologies in making. Some of these are derived from 3G and hence are evolutionary, while others are totally new concepts and can be thought of as revolutionary.4G will feature scalable, flexible, efficient, autonomous, secure, and feature-rich backbone to existing and new services and to interface with many different types of networks.

III. CHARACTERISTICS OF 4G:

Fully converged services:A wide range of services will be available to the mobile user conveniently and securely via the 4G-core network. Personal communications, information systems and entertainment will be merged into the seamless pool of content.

A. Ubiquitous Mobile Access:

4G aims to provide access to multimedia services anytime anywhere. Devices will not simply rely on cellular reception. Improved radio access technology as well as integration of all types of communication networks allows for virtually constant connectivity to the 4G-core backbone. Mobile handsets will be intelligent and software-reconfigurable on the fly to allow them to interface with different types of network on the move. Also, there will be

full cross compatibility on a worldwide scale since each type of network has a gateway to the IP backbone.

B. Software Dependency

Advanced software systems are employed for all purposes-network operation, service provision, interfacing and integration, etc. not only the core network but also the mobile devices will be highly intelligent as well as re-configurable via software.

C. Diverse user devices:

A defining feature of 4G will be the proliferation of a vast array of devices that are capable of accessing the 4G-backbone. Wireless capabilities will be embedded into devices that we wouldn't even consider today-not only personal devices like phones, PDA's, laptops, etc. But also sensors, embedded controllers and other specialized equipment. The point behind this is to allow them to autonomously communicate with each other. By building in sophisticated software, they will be able to automatically initiate timely actions. While 2G enabled mobile person-to-person communications, 3G opens door to person-to-machine communication with mobile internet. 4G, on the other hand, introduces another dimension with machine-to-machine communication.

IV.   4G SERVICES

Legend:

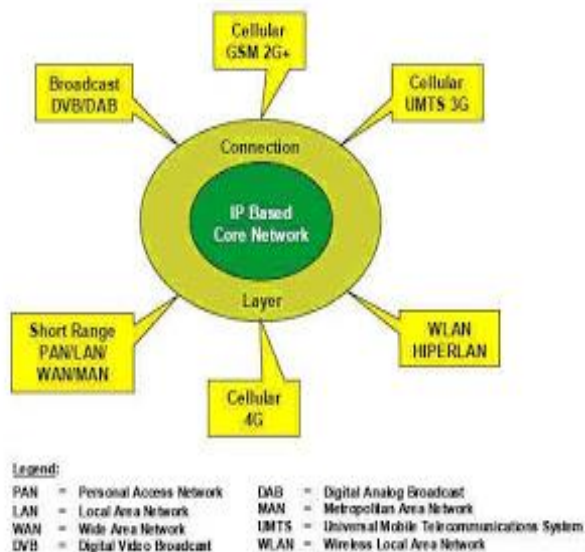|			
PAN	= Personal Access Network	DAB	= Digital Analog Broadcast
LAN	= Local Area Network	MAN	= Metropolitan Area Network
WAN	= Wide Area Network	UMTS	= Universal Mobile Telecommunications System
DVB	= Digital Video Broadcast	WLAN	= Wireless Local Area Network

Fig 2: *4G services*

4G data rates will range from few Mbps to 100Mbps hence the level of service that can be offered is tremendous. Apart from 3G services like World Wide Web, email, and wireless E-commerce this data rate is quite adequate to support the quality of service levels required for high-revolution multimedia traffic. Broadcast services will most likely become on-demand infotainment services. Video-conferencing services will be of high quality and almost as good as meeting in person. Ad-hoc networking i.e. dynamic formation of wireless networks between wireless devices

without any central infrastructure or administration will allow for personal area networks, in-house networks and the like, which allow wireless devices to perform various activities autonomously. Alarm notification, sensor data acquisition and remote control of home appliances are some of the possibilities. It is more than likely that mobile services that have not even been envisaged will exist in 4G.

A. Wireless LAN (WLAN) integration:

One of the major evolutionary steps on the path to 4G is the integration of WLAN so that they can access the IP backbone of 4G networks. The WLAN is an extension to wiredLAN where it uses electromagnetic airwaves for communication where as wired LAN uses cables. WLAN types include infrared technology, spread spectrum technology, frequency hopping, direct sequence and narrowband technology.

There are several advantages of using WLAN's offer productivity, convenience, and cost advantages over traditional wired networks such as increased installation speed, increased simplicity and flexibility, reduced cost-of-ownership and scalability. Also they combine data connectivity with user mobility, increasing flexibility as well as allowing ad-hoc and roaming access within a limited range.

Since the 4G-core network is basically an IP-waste network connecting a WLAN to 4G backbone is similar in principle to connecting wired LAN in wired Internet. This is done through a router with a radio transmitter capable of cellular access.

B. HiperLAN 2:

WLAN data rates are presently far lower than the expected data rates for 4G. Thus, wireless LAN technology will also need research to handle increased data rates. HIPER LAN 2 is one such broadband wireless technology. It operates in the 5GHz frequency band and is intended provides undeterred connectivity for mobile devices in cooperate, public, and home environments. It uses new radio technology called Orthogonal Frequency Division Multiplexing   (OFDM).

HIPER LAN will provide mobility and high speed transmission with a raw over-the-air data rate of 54Mbps at the physical layer as well as sustained throughput. For applications such as voice and video, the transmission speeds are somewhat lower at 20Mbps.

C. Blue tooth:

Bluetooth Smart technology   is   a   wireless communications system intended to replace the cables connecting many types of devices, from mobile phones and headsets to hear monitors and medical equipment. Learn more about how Bluetooth Smart increases opportunities for developers to make consumers' lives easier.

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The fact 4G networks will support Ad hoc networking has been made quite clear but how it will do this has not yet been elaborated upon. Blue tooth is more likely to be the standard that will be a part of the 4G standards allowing for this functionality. Blue tooth is a radio frequency standard that provides a low-cost, low-power solution with industry-wide support. It provides agreement at the physical level with specifications at both link layer and application layer. It enables wireless links between mobile computers, mobile phones, portable handheld devices, and connectivity to the Internet. The developers of blue tooth aim to bypass the problems that come with both infrared and cable synchronizing systems.

The main features of blue tooth includes the fact that it is wireless, it is inexpensive don't have to think about it because it work behind the scenes, and it communicates in an unlicensed frequency 2.45GHz radio spectrum, which was set aside by international agreement for the use of industrial, scientific and medical devices (ISM) ensuring communication compatibility worldwide.

These characteristics of blue tooth make it ideal standard to use for the support ad-hoc networking in 4G. Although present data rate for Bluetooth are not high enough to be 4G-capable, research into this technology is expected to improve on the present performance. In an Increasingly mobile phone-dependent society, we need to carefully consider what sort of social implications there could be as a result of the availability of such high level services practically anywhere, anytime

many might become totally hooked to their personal mobile device and it may affect their social skills. The availability of on-demand entertainment services will play a major role in this regard.

Also, with the level of intelligence and inter-connectivity that PDAs and other personal devices are likely to possess, they may end up running our lives more or less. We may become overly dependent on them to take care of all the details in our lives (control home appliances automatically, seek out location-dependent information and services, etc). Alternately, they may be viewed as helping hands that free up our time and resources. The line between the two interpretations, however, is quite thin.

The most important issue that is likely to come up time and time again is that of privacy. What personal information will be required to be stored, what part of this can be divulged publicly, what level of authentication and encryption will be required to secure communications-these are all questions that have to be stored, what part this can be divulged publicly, what level of authentication and encryption will be required to secure communications-these are all questions that have to be answered but there are no straightforward answers. Solutions will most probably be found in legislation and it is quite likely that not everyone will agree with these.

V. SOCIAL IMPLICATIONS

In a Increasingly mobile phone-dependent society, we need to carefully consider what sort of social implications there could be as a result of the availability of such high level services practically anywhere, anytime.

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VI. ECONOMIC IMPLICATIONS

Apart from the technological challenges there are a number of economic and political challenges that will also come into play. It is not just a case of 'best technology prevails'.

The situation in a decade's time could be such that strict adherence to standards is not practiced despite years of effort for a streamlined unified standard. In fact, it may not be practical for single unified standard to operate. Instead, quick and easy software solutions are found for continued interoperability. This is a very open situation where developments occur freely and uncontrolled. This can only be fuelled by the availability of software solutions and high user demand and support in all sectors.

Assuming that widely accessible and affordable systems are in place within the next decade, 4G systems will have a major effect on the economy and the way business is carried out. Higher levels of efficiency will be facilitated by the superior communications systems. For example, video telephony will eliminate or reduce the need for 'face-to-face' meetings and information and transaction services will be available on the move.

CONCLUSION

With this paper we conclude that, using 4G-technologies machine-to-machine communication is achieved along with the machine-to-person communication. According to

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estimates, by 2015 mobile traffic is expected to grow 23-fold that today, with 90% being multimedia. Hence there is a need to introduce 4G-technology in to mobile communications so as to satisfy the needs of the present generation.

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