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Analysis on 4G Technology and emerging trends

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Abstract: Third-generation (3G) mobile networks face a new rival: so-called 4G. And astonishingly, the new networks may even be profitable. The goal of 4G is to replace the current proliferation of core cellular networks with a single worldwide cellular core network standard based on IP for control, video, packet data, and VoIP. This integrated 4G mobile system provides wireless users an affordable broadband mobile access solution for the applications of secured wireless mobile Internet services with value-added QoS. This paper gives the reasons for the evolution of 4G, though 3G has not deployed completely. And then gives the information on the structure of the transceiver for 4G followed by the modulation techniques needed for the 4G.Later this gives the information about the 4G processing. Finally concludes with futuristic views for the quick emergence of this emerging technology. Keyword- We live in a world which are mostly bound without wires, i.e. nowadays wireless technology has taken an unprecedented importance over wired technology in today's era. The most important example of this is the mobile phone boom across the world; mobiles have surpassed the land line wired telephones in number.

Keywords : 1g, 2g, 3g, 4g, technology, wireless, cellular

Introduction WCDMA :- Wideband Code Division Multiple Access is a third-generation (3G) wireless standard which utilizes one 5 MHz channel for both voice and data, initially offering data speeds up to 384 Kbps. IFFT:- An IFFT (inverse fast Fourier transform) transforms the OFDM signal into an IF analog signal Encrption:- It is the process of encoding messages (or information) in such a way that eavesdroppers or hackers cannot read it, but that authorized parties can Congestion:- In networking , network congestion occurs when a link or node is carrying so much data that its quality of service deteriorates. WiFi:- Wi-Fi is the name of a popular wireless networking technology that uses radio waves to provide wireless highspeed Internet and network connections. A common misconception is that the term Wi-Fi is short for

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"wireless fidelity". Wi-Fi is simply a trademarked term meaning IEEE 802.11x. A descendant to 2G and 3G technology aiming to provide the very high data transfer rates. 4G technology provides very speedy wireless internet access to not only stationary users but also to the mobile users. This technology is expected to trounce the deficiencies of 3G technology in terms of speed and quality. 4G can be best described in one word "MAGIC", which stands for Mobile Multimedia Anytime/Anywhere. Global mobility support, integrated wireless and personalized services.4G is the short name for fourth generation wireless, the stage of mobile communications that will enable things like IP-based voice, data, gaming services and high quality streamed multimedia on portable devices with cable modem-like transmission speeds. It's a successor to 2G and 3G wireless, whereby the first signified the shift from analog to digital transmissions, bringing data services like SMS and email to mobile phones for the first time, and the second refers to the advent of things like global roaming as well as higher data rates. Think of wireless generations as a handful of services that get faster and more feature-rich as newer technology becomes available. The 3G networks that we use today allow us to stream video, download music and files, and surf the web at average download speeds from 600Kb/s to 1.4Mb/s. With 4G you'll be able to do the same but at much faster rates, while the extra bandwidth opens the door for newer applications.

Features:

Support for interactive multimedia, voice, streaming video, Internet, and other broadband services

- IP based mobile system.
- High speed, high capacity, and low cost per bit.
- Global access, service portability, and scalable mobile services.
- Seamless switching, and a variety of Quality of Service driven services.
- Better scheduling and call admission control techniques.
- Ad hoc and multi hop networks (the strict delay requirements of voice make multi hop network service a difficult problem). Avoidance or prevention of congestion.
- Seamless network of multiple protocols and air interfaces (since 4G will be all IP, look for 4G systems to be compatible with all common network technologies, including802.11, WCDMA,

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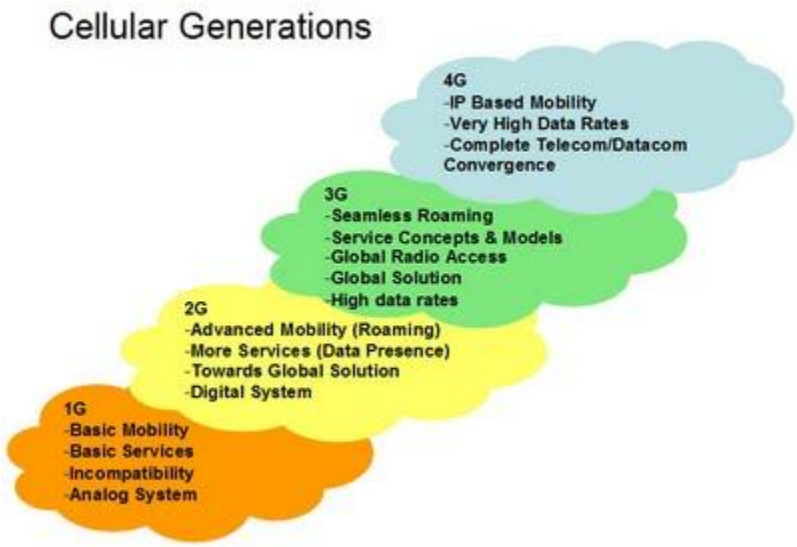
Blue tooth, and Hyper LAN) An infrastructure to handle pre existing 3G systems, along with other wireless technologies.

• III. MAGIC Of 4G Technology So far there has been no specific definition to this successor of 2G and 3G. However it has been used often to denote a fast internet access available to mobile phone users. Moreover the distinguishing feature of high multimedia streaming and end to end IP configuration is judged to be its MAGIC enchantment. 3G utilized WiMax and WiFi as separate wireless technologies, whereas 4G technology is expected to coalesce these two technologies. Hence one can evaluate how efficient it would become when combining two extremely reliable technologies. 4G can greatly anticipate in evolving and advancing the pervasive computing. The aim of pervasive computing is to attach itself to every living space possible, so that human beings remain intact with the wireless technology intentionally and unintentionally. Therefore 4G will be able to connect various high speed networks together, which would enable each one of us to carry digital devices even in dispersed locations. The network operators worldwide would be able to deploy wireless mesh networks and make use of cognitive radio technology for widespread coverage and access.



1G is the first generation celullar network that existed in 1980s. It transfer data (only voice) in analog wave, it has limitation because there are no encryption, the sound quality is poor and the speed of transfer is only a\t 9.6kbps.

2G is the second one, improved by introducing the concept of digital modulation, which means converting the voice (only) into digital code (in your phone) and then into analog signals

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(imagine that it fly‟s in the air). Being digital, they overcame some of the limitations of 1G, such as it omits the radio power from handsets making life more healthier, and has enhanced privacy.

2.5G is a transition of 2G and 3G. In 2.5G, the most popular services like SMS (short messaging service), GPRS, EDGE, HighSpeedCircuitswitcheddata,andmorehadbeenintroduced.

3G is the current generation of mobile telecommunication standards. It allows simultaneous use of speech and data services and offers data rates of up to 2 Mbps, which provide services like video calls, mobile TV, mobile Internet and downloading. There are a bunch of technologies that fall under 3G, like WCDMA, EV-DO, and HSPA and others.

Pre-4G technologies such as mobile WiMAX and Long term evolution (LTE) have been on the market since 2006 and 2009 respectively, and are often branded as 4G. The current versions of these technologies did not fulfill the original ITU-R requirements of data rates approximately up to 1Gbps for 4G systems. Marketing materials use 4G as a description for LTE and Mobile-WiMAX in their current forms.

4G is the fourth generation of cellular wireless standards. It is a successor to the 3G and 2G families of standards. In 2008, the ITU-R organization specified the IMT-Advanced (International Mobile Telecommunications Advanced) requirements for 4G standards, setting peak speed requirements for 4G service at 100 Mbps for high mobilitycommunication (such as from trains and cars) and 1Gbps for low mobility communication (such as pedestrians and stationary users) 4G system is expected to provide a comprehensive and secure all-IP based mobile broadband solution to laptop computer wireless modems, smartphones , and other mobile devices. Facilities such as ultra-broadband Internet access, IP telephony, gaming services and streamed multimedia may be provided to users.

Applications

Telegeoprocessing :- You will be able to see the internal layout of a building during an emergency rescue. This• type of application is some time referred to as “telegeoprocessing”.A remote database will contain the graphical representation of streets, buildings and physical characteristics of a large metropolis. Blocks of this database will be transmitted in rapid sequence to a vehicle, where a rendering program will permit the occupants to visualize the environment ahead. They may also „virtually‟ see the internal layout of buildings to plan an emergency rescue or engage hostile elements hidden in the building.

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Telemedicine :- A paramedic assisting a victim of a traffic accident in a remote location could access medical• records (X-rays) and establish a video conference so that a remotely based surgeon could provide „on-scene" assistance. It is assumed that the next generation of wireless applications and services, such as e-readers, mobile IPTV,• mobile marketing and geo-targeted advertising, location-based mobile applications embedded in social networking are likely to become the key applications in the upcoming 4G apps space.

Conclusion : The 4G revolution still awaits India. Drastic changes and improvements from 3G technology need to be a priority and, before they"re addressed, there are many gray areas for 4G. But if done intelligently and thoroughly, 4G holds enormous potential for India and can really create a boom in the IT industry, key to the Indian economy. Hence the evolution from 3G to 4G will be stimulated by services offering enhanced quality, requires increased bandwidth, needs elevated sophistication of large-scale information provisions and must have improved customization capabilities to support myriad user demands."The development in day-to-day communication after 3G is not just an 4G EVOLUTION,it's the REVOLUTIONISATION in the world of technology."

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