

5g technology. technical report

Business



A Technical Report on Atul Chavan Presented by Sri Sunflower College Of Engineering & Technology (Approved by AICTE, Affiliated to JNTU) Lankapalli - 521 131 Submitted By: 1. Sudha Madhuri. Sattiraju 2nd M. C. A Sri Sun Flower Col Of Eng & Tech Lankapally 2.

Asha Jyothi. Koganti 2nd M. C. A Sri Sun Flower Col Of Eng & Tech Lankapally Contents 1. Introduction 2. Pre-4G Wireless Standards 3.

parameters of 3G &4G 4. Architecture of 4G 5. Challenges: 6. Development: 7. 4G mobile technologies: 8.

Future of 4G: 9.

Conclusion. 10. Bibilography Abstract: Mobile devices are getting smaller, lighter, and more powerful; they have bigger screens and longer battery life, more features and more capabilities. Things like watching the football game on your mobile device, watching movies, videoconferencing, paying your bills and downloading music to the palm of your hand will become second nature in the near future.

Bandwidth will always be the limiting factor in the development of applications and devices, be it wired, or wireless.

At the moment the wireless world doesn't have a large-cell, high bandwidth standard, that is capable of delivering the much needed speeds to a mobile device. The short fall of 3G networks is clear, it's just not fast enough, offering 384kbps doesn't meet the requirements of what the end user has come to expect these days. Some people see 3G as a stop-gap, until a fully integrated IP network is created; some countries have even chosen to

bypass 3G and head straight to 4G, a method which has its advantages, and its disadvantages. 4G is set to be available around 2010, getting it right first time will make it a general winner with the one billion mobile users around the world.

The end user can expect low cost per data bit, as well as speed and reliability, something which is greatly. Technology Companies with 4G networks are knocking on the door and mobile operators are beginning to answer. 4G networks and Next Generation Networks (NGNs) are becoming fast and very cost-effective solutions for those wanting an IP built high-speed data capacities in the mobile network.

IP is pushing its way into the mobile wireless market," said Visant Strategies Senior Analyst Andy Fuertes, author of " The Road to 4G and NGN: Wireless IP Migration Paths. " By 2010, the just-published study finds, there will be 113 million NGN and 4G users, with the market starting to take effect 2006 and 2007. Introduction: 4G is an initialize of the term Fourth-Generation Communications System.

- A 4G system will provide an end-to-end IP solution where voice, data and streamed multimedia can be served to users on an " Anytime, Anywhere" basis at higher data rates than previous generations.

No formal definition is set as to what 4G is, but the objectives that are predicted for 4G can be summarized as follows • 4G will be a fully IP-based integrated system of systems and network of networks wired and wireless networks (e. g. : computer, consumer electronics, communication technology...) • Providing 100 Mbit/s and 1 Gbit/s, respectively, in outdoor

and indoor environments • End-to-end quality of service • High security • Offering any kind of services anytime, anywhere • Affordable cost and one billing • The following are some possible features of the 4G systems : Support interactive multimedia, voice, video, wireless internet and other broadband services. • High speed, high capacity and low cost per bit.

• Global mobility, service portability, scalable mobile networks. • Seamless switching, variety of services based on Quality of • Service (QoS) requirements • Better scheduling and call admission control techniques. Ad hoc networks and multi-hop networks Pre-4G Wireless Standards: • WiMAX – 7.2 million units by 2010 (May include fixed and mobile) • Flash-OFDM – 13 million subscribers in 2010 (only Mobile) 3GPP Long Term Evolution of UMTS in 3GPP – valued at US\$2 billion in 2010 (~30% of the world population) • UMB in 3GPP2 parameters of 3G & 4G: | Attribute | 3G | 4G | | Major | Predominantly voice- | Converged data and VoIP | | Characteristic| data as add-on | | Network | Wide area Cell based | Hybrid – integration of Wireless | | Architecture | | Lan (Wi-Fi), Blue Tooth, Wide Area| | Frequency | 1.6 – 2.

GHz | 2 – 8 GHz | | Band | | | Component | Optimized antenna; | Smart antennas; SW multi-band; | | Design | multi-band adapters | wideband radios | | Bandwidth | 5 – 20 MHz | 100+ MHz | | Data Rate | 385 Kbps – 2 Mbps | 20 – 100 Mbps | | Access | WCDMA/CDMA2000 | MC-CDMA or OFDM | | Forward Error| Convolution code 1/2, | Concatenated Coding | | Correction | 1/3; turbo | | | Switching | Circuit/Packet | Packet | Architecture of 4G One of the most challenging problems facing deployment of 4G technology is how to access several different mobile and wireless networks. There are three possible

architectures for 4G. •Multimode devices •Overlay network •Common access protocol. Multimode devices

This architecture uses a single physical terminal with multiple interfaces to access services on different wireless networks. It may improve call completion and expand effective coverage area.

It should also provide reliable wireless coverage in case of network, link, or switch failure. The user, device, or network can initiate handoff between networks. The device itself incorporates most of the additional complexity without requiring wireless network modification or employing inter working devices. Each network can deploy a database that keeps track of user location, device capabilities, network conditions, and user preferences.

Figure-1 The handling of quality-of-service (QoS) issues remains an open research question. Overlay network

In this architecture, a user accesses an overlay network consisting of several universal access points.

These UAPs in turn select a wireless network based on availability, QoS(Quality of Service) specifications, and user defined choices. A UAP performs protocol and frequency translation, content adaptation, and QoS negotiation-renegotiation on behalf of users. Figure-2 A UAP stores user, network, and device information, capabilities, and preferences. The overlay network, rather than the user or device, performs handoffs as the user moves from one UAP to another. Common access protocol This protocol becomes viable if wireless networks can support one or two standard access protocols.

One possible solution, which will require inter working between different networks, uses wireless asynchronous transfer mode. To implement wireless ATM, every wireless network must allow transmission of ATM cells with additional headers or wireless ATM cells requiring changes in the wireless networks. Figure-3 Challenges:

- v 4G definition - A global consensus on the 4G definition is needed before the standardization starts. - Despite efforts there still are too many diverging approaches to 4G.
- Seamless connectivity - Inter- and intra-network connectivity is fundamental to the provision of temporally and spatially seamless services. - Vertical and horizontal handovers are critical for 4G.

In the former case, the heterogeneity and variety of networks exacerbate the problem.

- Latency - Many 4G services are delay sensitive. - Guaranteeing short delays in networks with different access architecture and coverage is far from straightforward.
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Development: [pic]

A Japanese company has been testing a 4G communication system prototype at 100 Mbit/s while moving, and 1 Gbit/s while stationary. Recently

- reached 5 Gbit/s moving at 10 km/h, and is planning on releasing the first commercial network in 2010.

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- An Irish company has announced that they have received a mobile communications license from Irish Telecoms regulator. This service will be issued the mobile code 088 in Ireland and will be used for the provision of 4G Mobile communications.
- Sprint plans to launch 4G services in trial markets by the end of 2007 with plans to deploy a network that reaches as many as 100 million people in 2008

4G mobile technologies:) Open Wireless Architecture (OWA) 2) Spectrum-efficient High-speed wireless mobile transmission

1. Open Wireless Architecture (OWA) A single system architecture characterized by a horizontal communication model providing common platform to complement different access technologies in an optimum way for different service requirements and radio environments is called the converged broadband wireless platform or open wireless architecture (OWA). OWA will be the next storm in wireless communications, fueled by many emerging technologies including digital signal processing, software- definable radio, intelligent antennas.

The open wireless platform requires:

- Area and power-efficient broadband signal processing for wideband wireless applications
- Highest industry channel density (MOPS pooling) in flexible new BTS signal processing architectures
- BTS solutions scalable to higher clock rates and higher network capacity

Space-Time Coding and MIMO(Multiple-Input-Multiple-Output) Increasing demand for high performance 4G broadband wireless mobile calls for use of multiple antennas at both base station and subscriber ends. Multiple antenna technologies enable high capacities suited for Internet and multimedia services and also dramatically increase range and reliability.. [pic] Figure-4 The target frequency band for this system is 2 to 5

GHz due to favorable propagation characteristics and low radio-frequency (RF) equipment cost. Advantages

Spatial diversity and coding gains for large link budget gains (> 10 dB).

Disadvantage Multiple antennas at the transmitter and receiver provide diversity in a fading environment.

2. Spectrum-efficient High-speed wireless mobile transmission Wide-area wireless broadband systems spectral efficiency can yield a system capacity that allows that experience to be delivered simultaneously to many users in a cell, reducing the cost of service delivery for this mass-market broadband service. These systems are optimized to exploit the full potential of adaptive antenna signal processing, thereby providing robust, high-speed connections for mobile users with a minimum of radio infrastructure.

Reduced spectrum requirements, minimizing up-front capital expenses related to spectrum • Reduced infrastructure requirements, minimizing capital and operating costs associated with base station sites, translating into reduced costs per subscriber and per covered population element The acquisition of spectrum is a key component of the cost structure of wireless systems, and two key features of spectrum have great impact on that cost (the spectral efficiency of the wireless system and the type of spectrum required to implement the system. A fully capable and commercially viable mobile broadband system can operate in as little as 5 MHz of unpaired spectrum with a total of 20 Mbps throughput per cell in that amount of spectrum.

Factors contribute to the spectral efficiency of a system 1) Modulation formats, Air interface overhead 2) Multiple access method, Usage model.

The quantities just mentioned all contribute to the bits/second/Hertz dimensions of the unit. The appearance of a " per cell" dimension may seem surprising, but the throughput of a particular cell's base station in a cellular network is almost always substantially less than that of a single cell in isolation. Future of 4G: " The future of wireless is not just wireless, it is a part of life. " The future offers faster speeds and larger bandwidth. It is suggested that 4G technologies will allow 3D virtual reality and interactive video / hologram images.

The technology could also increase interaction between compatible technologies, so that the smart card in the handset could automatically pay for goods in passing a linked payment kiosk (i-mode can already boast this capability) or will tell your car to warm up in the morning, because your phone has noted you have left the house or have set the alarm.

4G is expected to provide high-resolution images (better quality than TV images) and video-links (all of these will require a band width of about 100MHz). Conclusion: ? From user driven perspective, the user has freedom and flexibility to select the service, at a reasonable QoS and price, anytime, anywhere Reconfigurability: Next-generation wireless network interfaces need to be able to switch seamlessly between different communications standards, in order to provide the most suitable level of service while the user moves across different environments. ? 4G, convergence of networks, technologies, applications and services, will offer a personalized and pervasive network to the users. ? Convergence is heading towards an advent <https://assignbuster.com/5g-technology-technical-report/>

of a really exciting and disruptive concept of 4th generation mobile networks. Bibliography: • Journals • IEEE Explore: IEEE journals and conferences <http://www.ieee.org>

• Ad Hoc Networks Journal • IEEE/ACM Transactions on Networking IEEE Transactions on Mobile Computing THE END As the technology grows day by day mobile device are also been developed by getting lighter, smaller and more powerful. Most of the mobile phones are been smart which are capable of doing all sort of operation done in computers, are able perform video conference, etc. For such high performance may not be capable to operate in 3G network until a fully integrated IP network is created. For this features the next generation network was introduced the 4G. It was set available around 2010, where the end user can expect low cost for data bits as well as reliability and speed which should be more efficient than 3G networks. G system can provide an end-to-end IP solution where data, voice and streamed multimedia, and can be delivered to users on an " Anytime, Anywhere" basis at a higher data rates than 3G networks.

It is designed as a fully IP-based integrated system of systems and network of networks wired and wireless networks, it is able to provide data rate of 100 MB/s than the previous generation networks, 4G provides end to end QoS (quality of service), it is able to provide high security, it provides integrated multimedia, video, voice wireless internet and other broad band services and Global mobility, service portability, scalable mobile networks, Better scheduling and call admission control techniques.

One of the main challenges faced in 4G development was how to access several wireless networks and different mobile phones, for this problems three main architecture are been designed they are, Multimode device, overlay network and the common access protocols these architectures are been briefly discussed in this paper. Some of the other main challenges faced during the development were seamless connectivity, latency. This paper also discuss about the technologies used in the 4G, Open wireless architecture (OWA), spectrum efficient high speed wireless mobile transmission. | | | Reference: <http://seminarprojects.com/Thread-4g-mobile-networking-full-seminar-report-download#ixzz2OuQ9qWjR>

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