Mobile Broad Band and the Multi-Network Path to 4G

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Abstract— This paper the field of wireless broadband multimedia communications is given following two lines: on one side evolution in Second and Third creation of mobile communications, on the additional face development of multimedia data road and rail network. These two evolutions will merge in to a new concept of communications: the Mobile Broadband Systems, or fourth creation (4G) of mobile multimedia communications The survey of mobile IT medium (in the year 2005-06) was separated into five categories of terminals, transport, service platform, applications as fine as functions to respond to social and environmental requirements. This paper presents an overall idea of the 4G features framework and combination of mobile communication .The features of 4G systems can be summarized with one word integration .The 4G systems are about impeccably integrating terminals networks and applications to convince the user needs. The 4G-infrastructure machinist will mix more than a few technologies, each of which has its optimal usage. The connections to one of them will result in a real time trade of, which will offer the user the best possible service. An approximate of 6 billion users at the end of 2006 justifies the study and research for the 4G systems.

Key words: Mobile Broad Band, 4G

I. INTRODUCTION

The future 4G (fourth generation) mobile communication systems are expected to solve still-remaining difficulty 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 channel the term 4G is used largely to include several types of broadband wireless access message systems, not only cellular phone systems.

One of the terms used to describe 4G is MAGIC Mobile multimedia, anywhere, anytime, 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 permanent wireless networks. The first generation systems had a low capacity and hit the saturation soon. This forced development of (2G) systems in the 1980's, which took two directions, while the global systems for mobile communication (GSM) was chosen by Europe and the US And Korea adopted the code division multiple access (CDMA) technology.

II. CELLULAR EVOLUTION

The first generation systems are implemented in early 80's they used direct analoge voice modulation and be based on a cellular architecture. Transmission rates were around 2.4 kbps and there were different systems working at different countries. The 2G cellular systems were designed as the technical evolution of microelectronics use of full digital communication over the radio channel with portable devices.

From Europe the standards (global structure for mobile communications) has emerged as an European standard and has become the main mobile system all over the world providing services to 70 million users in Europe and over 100milion users worldwide not only in Europe but in110 countries with over 200 networks all over the world The un precedent growth of world wide mobile and Wireless markets, coupled with advances in communication technology and the accelerated development of services taking place in fixed net possibilities: GSM evolution and the opening of a third generation mobile communication system.

III. GSM EVOLUTION

The initial transmission rate of GSM system is 9.6kilo bits per second (Kbps) with a possible increase to 14.4 kbps by altering the error protection coding. High-speed circuit switched data (HSCSD) allows the combination of multiple time slots and offers a raw data of up to 64 kbps (38.4kbps user data rate).

This high speed data functionality is available in the GSM networks without base station hard ware modifications, only the software upgrade is needed next step will go up to 164 kbps by using packet switch resource allocation; this means that resources allocated only when data are to be sent or received this technique is known as general packet radio service (GPRS) also known as (GSM2+), although this may become visible to be a perfect evolution from GSM, it is not as it is not possible to "commute" between high -speed circuit switched data and general packet radio service, because each of them requiring a dedicated specialized radio.

A development upon the former system is improved data rate for GSM evolution (EDGE) also known as evolved GSM. It is used in advanced mobile service (D-AMPS). It uses high- level modulation and transmits data at rate of 384Kbps. MOBILE SYSTEM CONVERGENCE Nowadays mobile communication can be defined in 5 groups: cordless, cellular, satellite, paging, and personal mobile radio systems.

These mobile communications will be included at a common system; the universal mobile telecommunications systems (UMTS).While the first and second generation cellular systems were all deployed at 1GHZ spectrum domain with same extension to higher frequencies as the earlier allocations have become congested.

Radio directive the system did allocate new spectrum for mobile use in the 2 GHz area, initial broadcast will be at 2 GHZ with a rate of 2 Mbps in low mobility conditions, in parallel of the environment. This rate will be only between 144 and 384 Kbps for wide area services. 144 Kbps is the minimum achievable user bit rate in any

mobility condition and the UMTS system will have to support user speed up to 500 Km/sec.

IV. MULTIMEDIA DATA COMMUNICATION

Multimedia communication points out a communication with multiple ways of protecting the information as a grouping of text, data, graphics, animation, images, sound, speech and still or moving video. Interesting characteristics added to multimedia communication definition, are the media flexibility for different applications and the possibility of interaction between the communication subjects.

This new communication system will provide flexibility and mobility and will enable interoperability between many different consumer electronic devices from different manufacturers. A new protocol is being developed; it is called the Shared Wireless Access Protocol (SWAP). The system is calculated to carry both voice and data traffic and to interoperate with the Public Switched Telephone Network and the Internet. It operates in the 2.4

GHz band and uses a digital frequency hopping (FH) spread spectrum (SS) radio. It support a Time Division Multiple Access (TDNA) service to provide delivery of interactive voice and other time –critical services, and a Carrier Sense Multiple Access Collision Avoidance (CSMA/CA) service for delivery of high-speed packet data.

The system data rate will be 1 or 2 Mbps and use 2 or 4 FSK modulation (Frequency Shift Keying) and it will support up to 127 devices per network. Blue tooth technology will allow the replacement of the many proprietary cables that attach one device to another with one universal short – range radio link. Blue tooth "A Global Specification for Wireless Connectivity", will replace the cable used today to connect printers, desktops, fax machines, cellular phones, laptops, key boards, joy sticks and virtually any other digital device Feature systems will create use of both technologies and a new concept for communication will become a reality. This feature message system is the so-called "Mobile Multimedia Communication".

V. EVOLUTION OF TELECOM NETWORK

4G-VISION 4G CHARACTERISTICS No circuit switching(since it has an IP core network) Distributed architecture, a decentralized network (pushes intelligence away from the canter Improved spectral efficiency Significantly lower cost per bit than 3G Flexible allocation Seamless network of multiple air interfaces and protocols Higher data band widths (>100Mbps) End-to-end and context aware services Location and orientation –dependent applications Layered architecture allowing for independent evolution of underlining parts as they are transferred to the applications _ Key elements of 4G Application flexibility and being highly dynamic are the main features of 4G services of interest to users.

These mean services can be delivered and be available to the personal favourite of different users and support the user's traffic, air-interface, radio environment and quality of service. The leading methods to access to this pool of information will be the mobile telephone, PDA, laptop and to seamlessly access the voice communication high speed of information services and entertainment broadcast services. The 4G systems will interoperate with 2G and as well as with digital (broadband) broad casting systems.

In addition it will be fully IP based wireless network. SURVEY BY MOBILE IT FORUM (MITF) The check stage WG under the system sub-committee of mobile it forum carried out a survey on relevant trends of 4G technologies to be implemented around the year 2010.

In the survey the entire system was divided into five categories: they are terminal, transport, service platform, application, internetworking related technologies. Terminal related technologies Mobile terminals have achieved functional enhancements at remarkable speeds, as the development of handsets can be realized in many independently from this infrastructure.

In addition to this intrinsic communication features many new capabilities such as cameras, videos, and Ic chips and other functions are provided through mobile terminals in the recent years. In 4G mobile communications the following functions are likely to be implemented through terminals. Image processing: in near feature, character recognition in mega-pixel resolution quality and face recognition technologies are probable to be implemented in mobile terminals.

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Terminal-related technology map 2005, 2007, 2010 Max transmit rate 1Mbps 10Mbps 100mbps Display VGA LCD 360 degree 3D display High-resolution 3D display Battery NIH, L+ Solar battery Fuel cell Transported related technologies Transport related technologies realize a network environment suited to the needs of higher platforms, by giving adequate instruction to the IP core network and radio access, which are the elements that form the 4G mobile infrastructures.

4G mobiles are studied in the direction to transmit all types of data including voice, over packets and expected to realize not only voice mail but also video and large variety of other services. Therefore excellence of service (QOS) is necessary for each service. QOS techniques are broadly classified into two types: INT SERV This technique that gurantees the quantitative performances Egg bandwidth and delay and its typical technique involve RSVP (resource reservation protocol).

In this each router secures bandwidth and gurantees the maximum delay by performing packet scheduling when the flow by RSVP is delayed. DIFF SREV This technique is designed as the load on the routers increases in a large-scale network. Here it divides the packets transmitted on the

network into classes and performs priority control of packets based on the class of information to realize a relative QOS.

VI. SERVICE PLATFORM TECHNOLGIES

Service platform is positioned to enable the provision of services. The basis of this technical foundation is considered to consist of the authentication platform, location platform (here, acquisition of location is decided out at the service platform level and functions beyond are left to application), and semantic web platform

VII. AUTHENTICATION AND SECURITY

A. Techniques

The conventional authentication and security techniques have mainly been applied to the radio access, conforming that the access has been made from the authorized user and performed encrypt and decrypt to prevent illegal hijacking or eaves dropping.

This has enabled prevention of illegal use of communication systems by third parties and provided an environment in which user can communicate with sense of security. TRANSPORT RELATED TECHNOLOGY MAP 2005, 2007 ,2010 VPN function Implementation in mobiles Implementation in mobiles Network security Communication channel encryption Advanced encryption DOS counter messages Ad hoc network Realize basic protocols Realize inter terminal communication Support of emergency call DOS-DENIAL OF SERVICE VPN-VIRTUAL PRIVATE NETWORKSERVICEPLATFORM TECHNOLOGY MAP 2005, 2007, 2010 Authentication/encryption techniques AKA Next generation authentication frame work text generation authentication framework Heterogeneous network interconnecting Inter connecting between WLANS Internetworking with IEEE802 systems 3G(IEEE/4G internetworking) Location provision techniques Location sensor: GPS satellite/Bs triangle measurements Enhanced position accuracy where satellite signals cannot be received Provision of advanced signals Communication systems to enable people of all gender and age to utilize the communication environment more closely in their lives, application techniques are considered to play a greater role in future.

VIII. 4G SERVICE RELATED TECHNOLOGIES

Multi-interface; an interface that allows mobile terminals and various peripherals electronic input/output to mutually recognize and transmit information is necessary. In future dual band terminals combining cellular phones and wireless LAN capabilities have become available.

IX. EMERGENCY MEDICAL SYSTEM

In future voice only communication environment can be upgraded into a new environment that enables doctors to visually confirm the patient's condition by transmitting high-resolution images and body data over broadband connections.

APPLICATION TECHNOLOGY MAP 2004, 2007, 2010 Virtual reality Practical implementation of 3D image/sound reply Expanded linkage with external equipment Practical implementation of 3D virtual surround Information appliances & Wireless LAN Frequency allocation is 2.4 GHz Frequency allocation is 5GHz Increase frequency allocation Broad cast techniques Digital rights management standardization Content protection/security technology Nation wide deployment and expanding service plans With 4G, a range of new services and models will be available, these services and models need to be further examined for their interface with the design of 4G systems. The above figure demonstrates the seamless connectivity of networks.

X. REQUIREMENTS TO BUILD 4G NETWORKS

A number of spectrum allocation decisions, spectrum consistency decisions, spectrum availability decisions, technology innovations, component development, signal processing and switching enhancements and inter-vendor cooperation have to take place before the vision of 4G will appear. The researchers think that 3G experiences - good or bad, technological or business will be useful in guiding the industry in this effort.

The researchers are bringing to the attention of professionals in telecommunications industry following issues and troubles that must be analyzed and resolved: Lower Price Points Only Slightly Higher than Alternatives - The business visionaries should do some economic modelling before they start 4G hype on the same lines as 3G hype.

They should understand that 4G data applications like streaming video must compete with very low cost wire line applications.

The users would pay only a delta premium (not a multiple) for most wireless applications. More organization Among Spectrum Regulators around the World - Spectrum regulation bodies must get involved in guiding the researchers by indicating which frequency band might be used for 4G. FCC in USA must cooperate more actively with International bodies like ITU and perhaps modify its hands-off policy in guiding the industry.

When public interest, national security interest and economic interest (inter-industry a la TV versus Telecommunications) are at stake, leadership must come from regulators. At appropriate time, industry builds its own self-regulation mechanisms. More Academic Research: Universities must spend more effort in solving fundamental problems in radio communications (especially multiband and wideband radios, intelligent antennas and signal processing.

Standardization of wireless networks in terms of modulation techniques, switching schemes and roaming is an absolute necessity for 4G. A Voice-independent Business Justification Thinking: Business development and technology executives should not bias their business models by using voice channels as economic determinant for data applications. Voice has a built-in demand limit- data applications do not. Integration Across Different Network Topologies: Network architects must base their architecture on hybrid network thought that integrates wireless wide area networks, wireless LANS (IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.15 and IEEE 802.16, Bluetooth

with fibber-based Internet backbone. Broadband wireless networks must be a part of this integrated network structural design. Non-disruptive completion: 4G must allow us to move from 3G to 4G.

XI. CONCLUSION

As the history of mobile communication shows attempts have been made to reduce a number of technologies to a single global standard. Projected 4G systems offer this promise of a ordinary that can be embraced universal through its key concept of integration. Future wireless networks will need to support diverse IP multimedia application to allow sharing of resources among multiple users.

There must be a low complexity of implementation and an efficient means of negotiation between the end users and the wireless infrastructure. 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.

