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QoS Based Selection of Network with 4G Systems.

N.Sreephani sujaya sheela

Asst.professor ,cse dept,Narayana engineering college,A.P,INDIA.

Abstract*: 4G Refers to the fourth generation of cellular wireless standards.it is a successor to 3G and 2G families of standards. the goal of 4G systems such as high rate communications has increased its use and evolution. selection of application as per the user preference based on (QoS) Quality of service is one salient feature of 4G.. If 4G is implemented correctly, it will truly harmonies global roaming, super high speed connectivity on every mobile communication device in the world. 4G is set to deliver 100mbps to a roaming mobile device globally and up to 1gbps to a stationary devices.. the evolution from 3G to 4G will be driven by services that offer better quality (video or sound) i.e greater bandwidth, more sophistication in the association of a large quantity of information. Technology.*

Key words:— QoS,WIMAX,Broadbandwireless,MAN Standard,QoS using 4G.

Introduction

In mobile communication systems, after 2G and 3G, the Fourth Generation (4G) was originally expected as ultra-high speed broadband wireless system. Further, it was assumed that the network will have a cellular structure which implies that it will be built on existing architecture of the preceding generations. A final agreement on what features characterize 4G mobile system, is yet to be reached. Sharing the 4G objective within research community is still open and lot of features and applications have been suggested by the researchers. Delivery of services to users in different location, under different conditions with quality of service (QoS) available in fixed environment, The European Commission (EC) foresees that from the service point of view, 4G will be mainly a personalized services network. As any service/application/system is to be used by the end user, the system has to be designed taking into account the needs of the user. One of the main features of fourth generation handoff is discussed and implemented how it works for wireless systems.

OBJECTIVES:

The current trend in mobile communications is not one network technology replacing another, but the interoperability between different networks. That's why it is expected that many wireless networks will coexist and compliment each other in an all-IP based heterogeneous wireless network. In fact, it will provide mobile users with seamless Internet access and IP connectivity at all times, and in all places, while using the "best" available network.

This is mainly because different mobile networking technologies have their own advantages and limitations. Such a variety of wireless access systems results in heterogeneous networks that can offer multiple overlapping coverage with different technologies.

For example, inexpensive high performance Wi-Fi connectivity will be available within limited range of "hot-spot" areas and will be complimented with more traditional cellular connectivity offering wide area coverage such as WiMAX. By consequence, several fundamental problems must be solved in order to allow users to navigate a 4G wireless landscape while maintaining their connectivity.

An area of interest is the development of MS equipped with multiple interfaces to handle different technologies. Furthermore, applications running on multi-mode terminals in a 4G environment must be able to switch between different connections without deteriorating the quality of the link. However, the Internet routing model forces mobile hosts to acquire a new IP address for an interface when roaming to another network. Assuming that applications can manage mobility and cleverly handover to the best network, some method is still needed to adapt media streams to the currently available bandwidth.The overall purpose presented in this project is to gain a better understanding about the main transformations faced by both network and MN during handover process and investigate its implications on different services.

Throughout this project, I focused on the solution provided by the new standard developed as known IEEE 802.21 which was selected as a platform for managing heterogeneous handover. Meanwhile, I studied the behaviour of Wi-Fi and WiMAX networks when exchanging flows during the period of handover. Different applications used for this topic are FTP, Telnet, CBR (video traffic) and VoIP.

In fact, this project consists of four chapters; the first one is a presentation of wireless broadband to introduce WiMAX network and its major characteristics. The second chapter takes in account Wi-Fi network and the general important specification about handover in each network, then main solution to provide interoperability between both WiMAX and Wi-Fi. The third chapter is designed to explain the features of the new solution provided by 802.21 purposes. Additionally, this chapter presents also the focal steps of the handover's algorithm and the environment of work. Also, the diverse scenarios of simulation were explained. Details concerning parameters were provided for the different simulated services. Finally, the last chapter contains the result's summary of simulations and analyses the features shown in the curves of different simulated applications.

The need for mobility with higher speeds in an ever-changing environment has been of supreme importance. The prospect of broadband Internet access, anywhere at any time, has seemed to be a distant dream and far from reality for the majority of PC, laptop and handheld users. However, with WiMAX, one of the hottest wireless technologies around today, the impossibility to achieve this dream became actually accessible. By consequence, this chapter will define some features of Broadband Wireless Access. Then, it introduces WiMAX technology and its different standards specifications to conclude with the quality of service (QoS) in this network.

1-Defining Wireless Broadband

Broadband wireless Access is a technology that promises high-speed connection over the air [2]. It uses radio waves, first to transmit data directly to the potential users and second to receive it from them. Moreover, BWA is a point-to-multipoint system which is made up of base station and subscriber equipment. Instead of using the physical connection between the base station and the subscriber, the base station uses an outdoor antenna to send and receive high-speed data and voice to subscriber's equipments. Typically, BWA is deployed to supply a wide area. It may be used as wireless backhaul for fixed or mobile networks, backhaul for connecting hot spots of Wi-Fi, or wireless local loop for broadband customers in place of copper-based DSL [1], co-axial cable or optical fibre connections. Furthermore, BWA technologies may operate in various frequency bands, counting the licence-exempt bands in the 2.4 GHz and 5 GHz bands [2] as well as other licensed bands in the 1.9 GHz, 2.0 GHz, 2.3 GHz, 2.5 GHz and 3.5 GHz bands [2]. There is no internationally harmonised frequency band .

2-IEEE 802.16: Broadband Wireless MAN Standard

The IEEE 802.16 defines the wireless metropolitan area network technology [4]. The IEEE 802.16 Working Group has developed point-to-multipoint broadband wireless access standard for systems in the frequency ranges 10-66 GHz and sub 11 GHz. Additionally, the standard covers both the Media Access Control and the physical layers and includes two sets of standards [4], 802.16-2004 (802.16d) for fixed and 802.16-2005(802.16e) for mobile version.

IEEE 802.16 standards are concerned with the air interface between a subscriber's transceiver station and a base transceiver station including a common MAC layer and physical layers. At the beginning, the IEEE 802.16 MAC was designed to support point to multipoint BWA system [IEEE Standard 802.16-2001]. Later mesh mode is added to support operating in mesh networks.

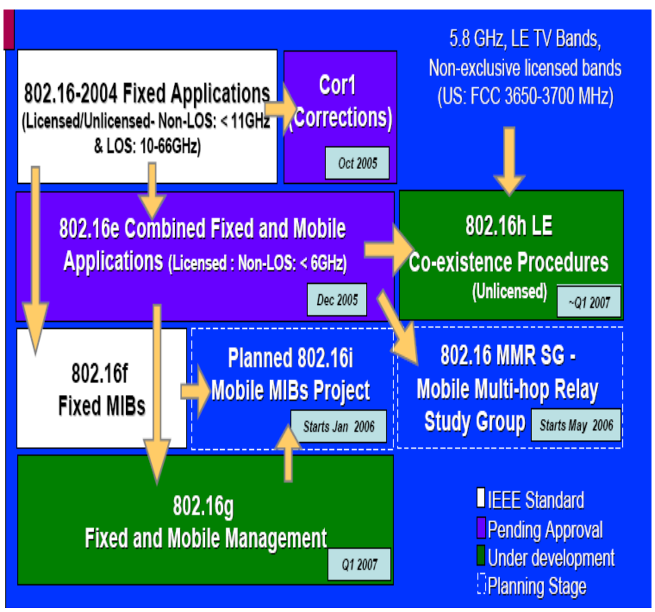

Figure 1.1: Evolution of IEEE 802.16 standards.

2.1-The IEEE 802.16-2001

This standard is the primary version of the IEEE [4]. It defines the MAC and Physical Layers for PMP BWA systems. The MAC structure is planned to support multiple physical specifications. A system can serve multiple services for its subscribers through PMP connections. It operates in the 10-66 Ghz bands. Because of its high frequencies, the standard can work only in LOS environments to diminish multipath distortion.

2.2-The IEEE 802.16a-2003

This standard supports operating at the 2-11 GHz frequencies [4]. It introduces several characteristics for MAC functionality such as automatic retransmission request to improve end to end performance. Because low frequencies have an ability to infiltrate barriers, it can operate in LoS and NLoS environments.

2.3-The IEEE 802.16-2004

In 10-66 GHz band, it requires LoS environment, while, in frequencies below 11 GHz it provides the ability to support NLoS environment [4]. The MAC supports both PMP and Mesh modes.

2.4-The IEEE 802.16e-2005

The 802.16e standard provides mobility and supports the most flexible and efficient usage of the radio channels by combining the advanced OFDM scheme with the SOFDMA technique [4]. OFDM is an optimum solution for robust radio wave transmission under the selective fading conditions that are typical of the non-line-of-sight environment with multipath propagation, for very high data rates using low complexity modulators and demodulators. SOFDMA provides additional resource allocation flexibility in the time and frequency domains. Dynamically assigning the number of subchannels (SOFDMA) makes capacity allocation more flexible. The standard allows various bandwidths to be allocated to the radio channel [4]: 1.5 MHz (or 1.75 MHz in Europe) and multiples up to about 20 MHz.

2.5-The IEEE 802.16f-2005

It is an amendment of the IEEE 802.16-2004 [4]. This version defines a management information base and management procedures for the MAC and Physical layers.

Table 1.1 summarizes some of the key technical features of the fixed and mobile forms of 802.16. Two basic characteristics are a radio interface that uses adaptive modulation to adapt performance to the prevailing channel conditions of the user, and OFDM techniques to condense the impact of multipath interference.

This makes WiMax suitable for near- and non-line-of-sight environments, such as urban areas.The WiMAX Forum is a nonprofit organization established in compatibility and interoperability of products conforming to the IEEE 802.16.

3.WiMAX

WiMAX which stands for Worldwide Interoperability for Microwave Access is a technology based on the IEEE Standard 802.16 [4]. It has been developing by the WiMAX Forum working groups. The WiMAX Forum is a nonprofit organization established in compatibility and interoperability of products conforming to the IEEE 802.16.

WiMAX plays a role as a complement of the IEEE Standard 802.16. The IEEE 802.16 working group defines the standard for operating, whereas the WiMAX Forum coordinates companies to ensure that equipment from each company can properly operate with one another. The main components of a WiMAX system are the CPE and the base station (BS).

The main standards of 802.16:

Table 1.1: Some Features of Fixed & Mobile WiMax [3].

3.1-WiMAX Base Station

A WiMAX BS can cover up to a radius of 6 miles (theoretically, a BS can cover up to a 30 miles; however, practical considerations limit it to about 6 miles) [5].. The WiMAX BS use the MAC layer defined in the standard, a common interface that makes the networks interoperable, and allocate UP and downlink bandwidth to subscribers according to their needs.

Figure 1.2: WiMAX base station.

Each BS provides wireless coverage over an area called a cell. The maximum radius of a cell is theoretically 50 km (depending on the frequency band chosen); however, typical deployments will use cells of radius from 3 to 10 km [5]. As with conventional cellular mobile networks, the BS antennas can be Omni directional, giving a circular cell shape, or directional to give a range of linear or sectoral shapes for point-to-point use or for increasing the network's capacity by effectively dividing large cells into several smaller sectoral areas.

QoS using 4G

Mobile phone usage began with the launch of the First Generation (1G) mobile.

technology in the early 1980s [FAG95]. The main design objective of 1G mobile networks was to provide a wireless architecture that allows subscribers to place mobile calls and maintain connectivity as they moved from one coverage area (cell) to another. 1G standards include the Analogue Mobile Phone Service (AMPS) in the United States, Total Access Communications System (TACS) in the United Kingdom, in addition to the C-450 in West Germany, Portugal and South Africa. The second generation (2G) on the other hand, witnessed the introduction of digital mobile communications [ZAB99]. Digitised voice signals have the advantage of being

compressed and multiplexed much more efficiently than analog signals, thus resulting in a significant increase in link capacity utilisation. Although this was the main driving force behind the development of 2G, an all-digital system also has the capability of delivering some data services such as the Short Messaging System (SMS) and email. Another key advantage is that digital mobile calls are much more less to eavesdropping [SMMA06]; thereby making 2G phone communications immensely more private than their predecessors. 2G standards include GSM (Global Systemfor Mobile telecommunications) [GSMb], originally from Europe but used worldwide and CDMA1 (Code Division Multiple Access) [CDM] used in the Americas and parts of Asia. With the massive success of 2G technology, the number of mobile subscribers increased from 214 million in 1997 to 1.162 billion in 2002 [ITU02]. It is predicted that this figure will continue to grow, reaching 1.7 billion by 2010 [KJC+03]. This indicates that voice-oriented mobile technology is approaching its saturation point (as depicted in Figure 1.1 [IR02]). With this notion in mind, service providers started exploring ways of creating new demand by introducing new (and more bandwidth hungry) services, including faster Internet access and the Multimedia Messaging Service (MMS) [Ope]. To explore the pickup rate of these new services and demand potential with minimal financial risks, intermediate generations were introduced as add-ons to the existing 2G infrastructure to facilitate packet-switched connections (thereby improving data transfer capability). A popular 2.5G standard is GPRS (General Packet Radio Services) offering an average data rate of 40 kbps [GSMa]. Another standard is the 2.75G Enhanced Data rates for GSM Evolution (EDGE) [Glo] capable of delivering data at a theoretical maximum rate of 384 kbps, although actual data rates average at around 100 kbps. While 2.5G and 2.75G offered basic data services, the most significant feature offered by the third generation (3G) mobile technology is its broadband capabilities to support the increasing demand for high data rates.

Marketing of 3G services often focused on video telephony, although upon roll-out, music downloading and video streaming proved to be the most popular. The two dominant 3G standards are CDMA2000 in the United States, and Wide-band CDMA (WCDMA) [UMT] in Europe and Asia. Despite its promising potential, 3G adoption has been largely underwhelming; part of the reason is the separate standards maintained for 3G such as the 3rd Generation Partnership Project (3GPP) [Thea] and 3GPP2 [Theb]. The initial speculation was that 3G would serve as a universal standard, although from an economic point of view, it was far more cost-effective for service providers to make 3G networks backwards compatible with their existing 2G infrastructure. This propagated the incompatibility of the competing 2G standards into 3G, and hence 3GPP was based on GSM, while 3GPP2 on CDMA1.

Another drawback is the financial costs of launching 3G systems, which include the billions of dollars invested in acquiring 3G licenses alone. As a result, the reluctant Telecom industry slowed down the roll-out of 3G networks (confining coverage to metropolitan areas) and relied on the intermediate 2.5G and 2.75G technologies to meet demand for greater bandwidth.

FEASIBILITY ANALYSIS:

All projects are feasible, given unlimited resources and infinite time. Before going further in to the steps of software development, the system analyst has to analyze whether the proposed system will be feasible for the organization and must identify the customer needs.

4G FEATURES:

1) It is easy to say, based on the developing trends of mobile communication, that 4G will have broader bandwidth, higher data rate, smoother and quicker handoff, wider mobile area, more various service, lower cost, etc.

2)Other than the words "more", "any" and/or "all" are preferred over expressions used by previous generations, e.g. anyone can communicate with anyone else, anywhere and anytime,or enjoy any service of any network operator, through any network of any network service provider

3)DoCoMo introduced the concept of MAGIC for the vision of 4G Mobile multimedia; Anytime, anywhere, anyone; Global mobility support; Integrated wireless solution; and Customized personal service, which mostly focused on public systems and treat 4G as the extension of 3G cellular service.

4) European Commission (EC) presented a perspective focusing on ensuring seamless service provisioning across a multitude of wireless systems and networks, and providing for optimum delivery via the most efficient network available e.g. private systems and ad-hoc networks, optimal resource utilization, multiple radio interfaces, WLAN use, standards for interoperability, etc. Thus 4G will encompass all systems from public to private,operator driven to Adhoc, broadband to personal area and Ad-hoc networks.it will focus mainly on personalized service.

4. CONCLUSION AND FUTURE ENHANCEMENT

4.1 CONCLUSION:

The paper proposes a novel algorithm for optimal network selection based on multiple user preferences under heterogeneous network. As 4G system supports multi-mode and reconfigurable devices to support inter-working of heterogeneous networks. The algorithm selects appropriate network during handoff based on user preferences and interests. The user can opt for multiple QoS parameters like bandwidth, cost of service, security level, call drop probability etc.,to select appropriate networks.

The proposed algorithm uses a distance function to generate an ordered list of various available access networks in aparticular region according to the multiple user preferences and level of interest The results clearly show that the proposed algorithm always best connect the user, as per his preferences of QoS parameters in a 4G System.

4.2 FUTURE ENCHANCEMENT:

In a fourth-generation wireless system, cellular providers have the opportunity to offer dataaccess to a wide variety of devices. The cellular network would become a data network on which cellular phones could operate — as well as any other data device. Sending data over the cell phone network is a lucrative business. In the information age, access to data is the "killer app" that drives the market. The most telling example is growth of the Internet over the last 10 years. Wireless networks provide a unique twist to this product: mobility. This concept is already beginning a revolution in wireless networking, with instant access to the Internet from anywhere.To ensure that the security features are compatible with world-wide availability.

REFERENCES

[1]E. Bohlin, S. Lindmark, J. Bjrkdahl, A. Weber, B. Wingert, P. Ballon, "The Future of Mobile Communications in the EU: Assessing the Potential of 4G", ESTO Publications, February, 2004.

[2] Lee SK, Sriram K, Kim K, Lee JH, Kim YGolmie N (2007) Vertical handoff decision algorithms for providing optimized performance in heterogeneous wireless networks. In: IEEE GLOBECOM 2007 ,Washington DC, November.

