5G Mobile Communication Technology

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ABSTRACT: ***The aim of this article is a thorough analysis of 5G mobile communication technologies. Existing scientific effort is linked with 5G technology in mobile communication. 5G's research involves developing the WWW, the Dynamic Ad-hoc Wireless Networks (DAWN), and Real Wireless Communications. Research has been conducted over the years. 802.11 wireless local area networks (WLAN) and 802.16 Wireless metropolitan area networks (WMAN), ad-hoc wireless network personnel area networks (WPAN), and Wireless digital communications networks are the most significant technologies for 5G technologies. 4G technology will cover a number of standards in a common 3G-like environment with IEEE 802.xx integrated mobile wireless network from the beginning. The main input of this article are the main provisions of mobile communication technology of 5G (Fifth Generation). Mobile users have given maximum emphasis in 5G technology compared to others. 5G Technology represents mobile technology for the fifth generation. 5G technology is designed to make very high bandwidth usage of mobile phones. The customer never has the highest technology of value as 5G. 5G technologies contain all kinds of state-of-the-art characteristics, making 5G technology the leader in the near future.***

KEYWORDS: ***5G Mobile, 5G Technology, Architecture, Mobile Terminal, Wireless Networks.***

1. INTRODUCTION

Over the last few years, mobile and wireless networks have developed remarkably. Many mobile phones currently feature a Wi-Fi adaptor as well. It may be assumed that, in addition to their 3G, 2G, WLAN, and Bluetooth and so on, many mobile phones also have wax adapters. For both generations, we have increased the research of integration with IP 2.5G and the 3G Public Land Mobile Networks (PLMN) on the one hand and WLAN on the other. With regard to 4G, its aim is to include mobile phone network like GSM and 3G perfectly. Multi-mode consumer terminals are considered to have 4G, but additional security measures and compatibility for certain wireless technologies continue to be a challenge. However, integration across multiple wireless networks (e.g. PLMN and WLAN) is still being done today in practice.

Although various wireless networks from a single terminal are utilized, different wireless access methods are not used for the same session (e.g., FTP download). The expected OWA is designed to give open baseband processing modules with open interface settings. The OWA is linked to future (4G) mobile MAC/PHY layers. The 5G terminals have radio software and modulation methods established, and the Internet may download new error control systems. The improvement is viewed as a concentration on 5G mobile networks in consumer terminals. The 5G mobile terminals will simultaneously have access to several wireless technologies. Special flows from multiple technologies should be merged with the 5G mobile terminal. The network is trustworthy for user mobility management. The 5G terminal is the ultimate choice for a given service by various mobile network access providers. The article provides the notion of a smart Internet telephone that mobile phones can prefer [1].

1.1.Challenges in Migration from 4g:

1.1.1. Multi-mode user terminals:

With 4G, a single user terminal will have to be designed to run across several wireless networks and overcome design problems such as device size constraints, cost and power usage. The radio method can address this problem.

1.1.2. Choice among various wireless systems.

The specific properties and functions of each wireless system. The best technology to choose for a certain service at a particular location at a given time. This will be done by selecting the customer quality of service needs according to the best possible match.

1.1.3. Security:

Reconfigurable, adaptive and lightweight protection mechanisms should be designed.

1.1.4. Network infrastructure and QoS support

Integrating the current non-IP and IP-based systems and providing QoS assurance for end-to-end services that engage different systems is a challenge.

1.1.5. Charging and Billing

It is hard to accumulate, handle and accumulate the Consumers' account information from many service providers. In the same way Consumers' billing is also a difficult task.

1.1.6. Attacks on Application Level

Software applications which will offer a new feature to the consumer but will commence new bugs.

1.1.7. Jamming and spoofing

Spoofing is fake GPS signals being sent out, in which case the GPS receiver considers that the signals arrives from a satellite and computes the wrong coordinates. Criminals can make use of such techniques. Jamming occurs when a transmitter sending out signals at the same frequency shifts a GPS signal.

1.1.8. Data Encryption

If a GPS receiver will communicate with the main transmitter then the communication link between these two is not tough to break and consumer must use encrypted data.

1.2.Theoretical Framework:

5G Technology is a term for the next most significant stage in mobile communications standards beyond 4G standards used in different research papers and initiatives. 5G is currently not an official word used for any precise requirements. 3GPP version beyond 4G and LTE. It is expected that standards will be implemented under a 5G umbrella by 2020 [2].

2. LITERATURE SURVEY

T. Janevski presented in the article that with the 2.5 generation of mobile cellular networks, integration of mobile networks with the Internet has begun. Today, internet traffic is internationally dominating. For the development of future wireless networks, the requirement for greater data rates for data traffic and new IP-based services is important. Even 3G with up to 2 Mbit/s did not deliver data rates utilized by Internet users using fixed broadband or wired local area networks. In this circumstance, data rates were not supplied. Wireless LAN was the answer to offer better speeds in the wireless network, but was first created to expand the wired wireless LAN to the wireless domain. We suggest a solution for interoperability between the mobile cellular network and the WLAN in this article. This is a solution. Authentication, authorization, and accounts, i.e. AAA, for the integration of the two networks, cellular and WLAN, are carried out. For this aim, we have created a Wi-Fi access controller and a Wi-Fi AAA gateway to offer gateway access control, charging and accounting functionality for the Wi-Fi service. We have examined the existing stage of development of all network entities and protocols necessary for the growth of these parts. The solution is an economical and easy to use PLMN-WLAN Internetworking scenario [3].

J. McNair *et al.* presented in the article that revolutionary 4G drivers include push-through seamless personal and end-station mobility towards universal wireless access and all-round computing. The design of a vertical handoff protocol for users moving between different types of networks is one of the key difficulties for seamless mobility. Habits, policy metrics and radio link transfer procedures traditionally for handoff detection policies cannot adapt or react to changing user inputs and network accessibilities to dynamic handoff criteria. They cannot provide context-conscious services or provide interoperability for network operations. New approaches are therefore needed to control user movement among various types of networks. This article offers a tutorial on design and vertical handoff performance concerns in an imagined fourth-generation multi-network system. Various 3G and beyond network topologies, such as wireless LANs, cellular, satellite and Mobile IPs are discussed. In a varied network environment, the problem of vertical handoff is then described. Finally, research activities are being investigated to tackle outstanding challenges, including novel approaches for dynamic decision-making and algorithm identification and contextual transmission of radio links [4].

W. Lu presented in the article that this article presents a mobile terminal open-label wireless architecture (OWA), which concentrates on an open baseband processing platform, which supports various existing and future wireless

communication standards by multi-dimensional open baseband processing modules and baseband management systems. The paper offers a multi-layered open architectural platform for system flexibility to maximize and limit terminal power consumption so that wireless and mobile terminal communication systems are integrated and convergent next-generation. For full openness and simplicity, the OWA platform is completely compatible with computer architecture and interface rather than system architecture based on transmission [5].

M. R. Bhalla *et al.* presented in the article wireless communication is the remote transmission of information without using improved electric conductors or "wires." The distance might be minimal (a couple of meters as on TV), or lengthy (thousands or millions of kilometers for radio communications). The word is typically abbreviated to 'wireless' when the context is apparent. It includes several forms of two-way, fixed, mobile and mobile radio, cellular telephones, PDAs, and wireless networking. In this article, we will highlight the history and development of mobile technology in successive generations and their importance and advantages throughout the world. Mobile wireless technologies have undergone the technological revolution and evolution of 4 to 5 generations during the past few decades, specifically from 0G to 4G. Mobile wireless research is now focused on advancing 4G technology and 5G technology implementation. 5G word is not currently used officially. 5G investigation is being undertaken on the evolution of the WWW, the Adhoc Wireless Networks Dynamics (DAWN) and the WWW [6].

3. DISCUSSION

3.1.Physical/MAC Layers:

Table 1 sets the wireless technology and the layers for physical and media access control, i.e. OSI Layers 1 and OSI Layers 2. The 5G mobile networks are probably built on open wireless architecture for these two tiers.

Table 1: Concept of 5G Technology explaining protocol stack for 5G.

<table>
<tr><td>Application layer</td><td rowspan="2">Application (Services)</td></tr>
<tr><td>Presentation layer</td></tr>
<tr><td>Session layer</td><td rowspan="2">Open Transport Protocol (OTP)</td></tr>
<tr><td>Transport layer</td></tr>
<tr><td rowspan="2">Network layer</td><td>Upper Network Layer</td></tr>
<tr><td>Lower Network Layer</td></tr>
<tr><td>Data link layer (MAC)</td><td rowspan="2">Open Wireless Architecture (OWA)</td></tr>
<tr><td>Physical Layer</td></tr>
</table>

3.2.Network Layer:

The network layer will be IP, as there is no competition at that level presently. The global IPv4 (version 4) has numerous issues including limited address space, and no meaningful QoS support per flow. These problems are resolved with IPv6, but are exchanged with a much larger packet header. Mobility is still an issue. The Mobile IP standard is available on one side as are various options for tiny mobility (e.g., Cellular IP, HAWAII etc.). The mobile IP is used for all mobile networks at 5G, each mobile terminal being FA (foreign agent) and maintaining the CoA mapping (Care Of Address) for the present wireless network between its fixed IPv6 and CoA Address.

However, many mobile or wireless networks can simultaneously be connected to a cellphone. In this instance, distinct IP addresses will be maintained on each radio interface while the IP addresses of the FA installed on the

mobile phone will be each CoA. 5G phone manufacturers will integrate the fixed IPv6 on the mobile phone. The 5G mobile telephone has a multi-wireless virtual network environment. The network layer should be separated into two sublayers of 5G mobile devices for this purpose i.e. the lower network layer (for each interface) and the upper network layer (for the mobile terminal). This is because the Internet was initially designed and the whole routing is dependent on the IP addresses which in every IP network globally should be different. The Upper-Level-Network (Table 1) intermediate software must maintain the Upper Network Address Translation (IPv6) into various Lower Network IP Addresses (IPv4 or IPv6), and versa.

3.3.Open Transport Protocol (OTA) layer:

Mobile and wireless networks differ in terms of transport layer from wired networks. In all TCP versions it is assumed that lost segments are the result of network connectedness, however in the case of network wireless losses because of greater radio interface bit error. TCP amendments and adaptations for mobile and wireless networks are therefore proposed, which broadcast the missing or affected TCP segments solely via the wireless channel. Mobile terminals for 5G are suited for downloading and installing transport layers. The versions of those mobiles (e.g. the TCP, RTP and so on or the New Transportation Protocol) that are aimed for a specific wireless technology installed at base stations should be available for the download. This is termed the Open Protocol to Transport (OTP) [7].

3.4.Application layer:

The final request from the 5G mobile terminal is that intelligent QoS management be provided across a range of networks with regard to the applications. Today, consumers pick the wireless interface for their particular Internet service manually on mobile phones without using QoS history in order to purchase the best wireless connection for a certain service. 5G telephone offers the opportunity to assess service quality and save measurement information in mobile terminal information bases. The QoS characteristics, such as delay, jitter, losses, bandwidth, reliability, are kept in a 5G mobile phone data base to make the best wireless connection with the needed QoS and personal cost restrictions available via clever algorithms that operate in a mobile terminal. 4G will be able to provide a variety of new services and models. For their interface with 4G systems architecture, these services and models need to be further studied.

By the time 4G is implemented, the process of IPv4 Address Extension should be finished. IPv6 support for 4G is therefore required to support a high number of wireless devices. By raising the IP number, IPv6 eliminates the necessity of NAT (Network Address translation). A large range of new coding systems may be designed for 4G units and applications, which can help with the implementation of the 4G network and services with available space and addressing bits in IPv6. The fourth generation aims to meet PCC's objective – a vision that delivers high data speeds in all wireless networks affordable. There must be low implementation complexity and an efficient negotiating method between end-users and the wireless infrastructure in future wireless networks. For mobile wireless users, the Internet drives the growth of data rates and speed access. This motivates a development of the fundamental mobile IP network [8].

3.5.5G Architecture:

The 5G mobile phone design is being developed to respond to the QoS and price needs of upcoming applications such as wireless broadband access and MMS, video chat, mobile television, HDTV content, Digital Video Broadcasting (DVB), minimum voice and data services and other bandwidth services. 5G has the definition of providing a sufficient RF, more bits/Hz and connecting all heterogeneous wireless networks to give the user with a smooth, consistent telecommunications experience [9].

3.6.Evolved Packet Core (EPC):

Packet Core Evolved is an IP based core network for LTE and other access technologies established by the 3GPP (Telecom Standard). The objective of the EPC is to enable easier access to different services, such as those provided by the IMS, across all IP core network topologies (IP Multimedia Subsystem). EPC is basically a Mobility Management Entity (MME) and user datagram's agnostic access portal fir routing. EPC will be a whole new wireless operator architecture which will imitate the IP data communication world rather than the voice-centered wireless world. The IP network theory is based on flat IP. IP architecture is flat.

To this stage, mobile networking for the circuit-changed voice has been designed. In order to combine, verify, manage and direct calls, wireless networks were hierarchically built. A BSC combines calls from numerous basic stations, assigns radio broadcasts, transfers from base stations to a more centralized mobile switching center. When the packet data networks were created the existing voice-centric architecture was layered, utilizing the BSC to control similar mobility, the SGSN and GGSN were added for GSM/UMTS, and for CDMA, PDSN to route and manage the data and to connect to the Internet or properly to the session. Due to the fast increase in data traffic, this voice-centric design with too many network companies has become loud and difficult to maintain. The flat network architecture removes the network's voice-centered structure. The independent and simplified data architecture that eliminates many parts of the network chain may be employed rather than overlaying a packet data core on a voice network. Both the BSC operations and the media gateway router are separated. The base station communicates directly with a media gateway via WAN over the 3GDT (3G direct tunnel) Carrier Ethernet, MW, DWDM etc.

Certain tasks of BSC/RNC, such as radio resource management, radio carrier control and resource dynamic distribution are handled on base stations, whereas features like paging messages distribution, security are handled in gateway routers by mobility managers. There are obvious advantages to this strategy. This will cut Capex and Opex significantly, as there are little hopes and fewer network entities for the service provider. Data moves between endpoints quicker by decreasing the number of network hops, which significantly lowers network Latency to enable real-time apps like voice over IP (VoIP), gambling and video-conferencing. WiMAX created flat IP designs, which will be flat by definition in future LTE networks [10].

4. CONCLUSSION

We examined 5G mobile communication technologies in this study. The 5G technology is an open platform for many levels from the physical layer to the application. Presently, the present work is carried out in modules which offer one or more wireless technologies from one mobile 5G simultaneously the best operating system, with the lowest costs for a defined service. A new revolution in 5G technological development is set to start, since 5G technology will make it hard to complete standard computers and laptops that impact their market worth. In the mobile communications sector, there are several advances from 1G, 2G, 3G and 4G to 5G. The new 5G technology is offered on the market at low prices, with high expectations, and great dependability. 5G mobile communications network technology will open up a new century. The 5G mobiles will have access to several wireless technologies at the same time, and different fluxes of different technologies can be merged between the terminals. For enthusiastic mobile consumers, 5G technology provides high-resolution solutions. Without any disruption, we may see an HD TV channel on our mobile phones. A Tablet PC will be available on 5G mobile phones. There will be a number of mobile technology incorporated.

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