EFFICIENT 5G WIRELESS TECHNOLOGY OF ITERATION FOR WIRELESS TECHNOLOGY

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ABSTRACT

5G stands for fifth generation wireless technology. It is the latest iteration of cellular technology that has three main features: greater speed, lower latency, and the ability to connect a lot more devices simultaneously. A commercial 5G wireless network is expected to be deployed by 2020. This paper provides a brief introduction to 5G wireless technology. 5G Technology stands for fifth Generation Mobile technology. From generation 1G to 2.5G and from 3G to 5G this world of telecommunication has seen a number of improvements along with improved performance with every passing day. Fifth generation network provide affordable broadband wireless connectivity (very high speed). The paper throws light on network architecture of fifth generation technology. Currently 5G term is not officially used. In fifth generation researches are being made on development of World Wide Wireless Web (WWWW), Dynamic Adhoc Wireless Networks (DAWN) and Real Wireless World. Fifth generation focus on (Voice Over IP) VOIP-enabled devices that user will experience a high level of call volume and data transmission. Fifth generation technology will fulfill all the requirements of customers who always want advanced features in cellular phones. The main features in 5G mobile network is that user can simultaneously connect to the multiple wireless technologies and can switch between them. This forthcoming mobile technology will support IPv6 and flat IP. Fifth generation technology will offer the services like Documentation, supporting electronic transactions (e-Payments, e-transactions) etc.

Key words: *5G, Evolution from 1G to 5G, Comparison of all Generations 5G wireless technology, DAWN, WWWW, Voice Over IP(VOIP).*

1. INTRODUCTION

Wireless communication technology has grown and advanced significantly over the years through research and innovation. The time has come when we can connect various wireless technologies, networks, and applications simultaneously. This latest technology is called 5G. The fifth generation wireless system (or 5G for short) is now the next generation of wireless communication systems. It is the next major phase of mobile telecommunications standards beyond the current 4G. 5G moves us beyond networks design for mobile devices alone toward systems that connect different types of devices operating at high speeds.

The key features of 5G include high throughput, improved spectrum efficiency, reduced latency, better mobility support, and high connection density. It supports interactive multimedia, voice, video, Internet, and other broadband services. To support increased throughput requirements of 5G, new spectrum has been assigned to 5G in mmWave bands. 5G will use Multiple Input Multiple Output (MIMO) to significantly increase network capacity.

The move to 5G wireless communication standard is an action in response to the growth of the Internet of Things and the rise in demand for access to video and services over wireless broadband [2]. Although 5G is not expected until 2020, an increasing number of companies are investing now and are creating 5G products. Development of the new mobile wireless standard is being led by companies such as Intel, Qualcomm, Nokia, Ericsson, BT, Verizon, AT&T, and Samsung.

Previous Generations

The world of telecommunication has witnessed drastic changes starting from 1G to 2.5G and from 3G to 5G. A new generation is named (often retroactively) when it denotes a significant forward leap in wireless mobile technologies. Previous generations like 3G were a breakthrough in communications. 1G was analog telecommunications standard introduced in the 1970s for voice communications with a data rate up to 2.4 kps. It used FM and FDMA and a bandwidth of 30 kHz. The major problems with 1G are poor voice quality, poor battery quality, and large phone size.

2G was digital standard, circuit switched technology introduced in 1980s. It used CDMA, GSM, and TDMA technologies. It could only transmit digital voice at 64 kbps, and not data such as email.

Next comes 3G wireless systems, which used Code Division Multiple Access Technique (CDMA). It introduced high-speed Internet access. It used technologies such as W-CDMA and HSPA (high speed packet access). It provided IP connectivity for real-time and non-real-time services. The development of 3G was mainly driven by demand for data services over the Internet.

4G works the same as 3G and may be regarded as the extension of 3G but with a faster Internet connection , more bandwidth, and a lower latency. 4G technologies, such as WiMAX and LTE (Long-Term Evolution), claim to be about five times faster than 3G services. It used technologies like Coded Orthogonal Frequency Division Multiplexing (COFDM), Multiple Input Multiple Output (MIMO) and link adaptation. There are some challenges that cannot be resolved by 4G; these include spectrum crisis and high energy consumption. Research is currently on 5G, which will support IPv6. There have been drastic improvements from 1G, 2G, 3G, and 4G to 5G [3-5]. Figure 1 shows the generations of wireless technology from 1G to 5G.

5G Works

As any other cellular network, 5G networks will consist of cells divided into sectors and send data through radio waves. Each cell is connected to a network backbone through a wired or wireless connection. 5G may transmit data over the unlicensed frequencies currently used for Wi-Fi. It promises a smarter, faster, and efficient network. The goal of 5G is to have far higher speeds available, at higher capacity per sector, and at far lower latency than 4G. In order to increase network efficiency, the cell is subdivided into micro and pico cells [6]. 5G will be a new mobile revolution as it is expected to provide gigabit-per-second data rates anytime, anywhere. In a 5G wireless network, every mobile phone will have an IPv6 address depending on the location and network being used. 5G utilizes user-centric network concept World Wide Wireless Web (WWWW) instead of operator- centric as in 3G or service-centric as in 4G [7]. WWWW will be capable of supporting applications and services and interconnected the whole world. 5G includes the latest technologies such cognitive radio, Internet of things, nanotechnology, and cloud computing.

Figure 1 Wireless Communication System

2 LITERATURE REVIEW

Fifth generation mobile systems model is all-IP based model for wireless and mobile networks interoperability The All-IP Network (AIPN) is capable to fulfill increasing demands of the cellular communications market. It is a common platform for all radio access technologies. The AIPN uses packet switching and its continuous evolution provides optimized performance and cost. In fifth generation Network Architecture consist of a user terminal (which has a crucial role in the new architecture) and a number of independent, autonomous radio access technologies (RAT).

In 5G Network Architecture all IP based mobile applications and services such as Mobile portals, Mobile commerce, Mobile health care, Mobile government, Mobile banking and others, are offered via Cloud Computing Resources (CCR). Cloud computing is a model for convenient on-demand network access to configurable computing resources (e.g., networks, servers, storage, applications, and services).

Cloud computing allows consumers to use applications without installation and access their personal data at any computer with internet access. CCR links the ReconfigurableMulti Technology Core (RMTC) with remote reconfiguration data from RRD attached to Reconfiguration Data models (RDM). The main challenge for a RMTC is to deal with increasing different radio access technologies.

The core is a convergence of the nanotechnology, cloud computing and radio, and based on All IP Platform. Core changes its communication functions depending on status of the network and/or user demands. RMTC is connected to different radio access technologies ranging from 2G/GERAN to 3G/UTRAN and 4G/EUTRAN in addition to 802.11x WLAN and 802.16x WMAN. Other standards are also enabled such as IS/95, EV- DO, CDMA2000 etc. Interoperability process-criteria and mechanisms enable both terminal and RMTC to select from heterogeneous access systems.

3 METHODOLOGIES

D2D Communication:

Direct connectively is achieved through device-to-device (D2D) technology. 5G cellular network will implement D2D mm wave communication technology to provide high speed data rate, improve coverage, and offer peer-to-peer services. Much research effort has been invested of characterizing D2D connections as part of LTE [9].

M2M Communication:

While D3D communication targets mobile radios, machine-to-machine (M2M) expands the scope and facilitates ubiquitous connectivity among mobile devices. It is estimated that there will be over 100 billion connected devices using M2M communications in 5G backbone [10].

MIMO:

Multiple-input-multiple-output (MIMO) technology plays a crucial role in 4G and is expected to play an important function in 5G. Massive MIMO extracts the benefits of MIMO on a large scale by increasing the throughput and spectrum efficiency.

Other enabling technologies of 5G include mmWave communication, ultra-dense network (UDN), all-spectrum access (ASA), OFDM (orthogonal frequency division multiplexing), and Internet of things.

- Potential Applications
- Some of the significant applications of 5G wireless technologies include [11]:
- Virtual reality/augmented reality/tactile Internet
- Autonomous driving/connected cars
- Wireless cloud-based office/multiple-person videoconferencing
- Unified global standard for all
- Network availability anywhere anytime
- Blockchain
- 3D and ultra HD videos
- Smart gird
- Smart surgery and remote medical examination

- Mobile security

In addition, 5G will allow one to pay all bills in a single payment with his/her mobile and vote from his/her mobile.

BENEFITS

5G wireless technology is projected to bring three main benefits [12]:

- ❖ Faster speed: Data transfer speeds with 5G are projected to be about 10 times higher with 4G. That means significantly faster transmission of images and videos.
- ❖ Shorter delays: 5G should reduce latency (the time between cause and effect). This will make it possible, for example, to watch high-speed virtual reality video with no delays.
- ❖ Increased connectivity: 5G technology would will bring faster, more reliable connections for users than 4G/LTE. That means more people and devices will be able to communicate at the same time.

Besides these benefits, 5G has excellent capability to support both software and consultancy. It has high data rate at the edge of the cell and better coverage area. It has low battery consumption. It is beneficial for the government, as it can make governance easier, and for the citizen, as it can provide Internet connectivity anytime anywhere.

Challenges

The transition from 4G to 5G presents several transformational challenges which must be tackled to fully realize the 5G vision. There are challenges faced with the new technologies enabling 5G. There are also challenges with the integration of this technology to provide services in different application scenarios.

Some have criticized 5G for its high projected cost and that it is incompatible with the previous generations. Just as 2G phones could not connect to 3G or 4G networks, 3G and 4G phones will not connect to a 5G network. One is forced to buy a new phone which is likely to be more expensive than 4G/LTE service. To address these challenges, we need a drastic change in the design of cellular architecture. We also need to meet 5G system performance requirements such Mfentocells, stringent latency, network scalability, very long battery life, and green communications. It is a challenge to satisfy these requirements and minimize costs at the same time.

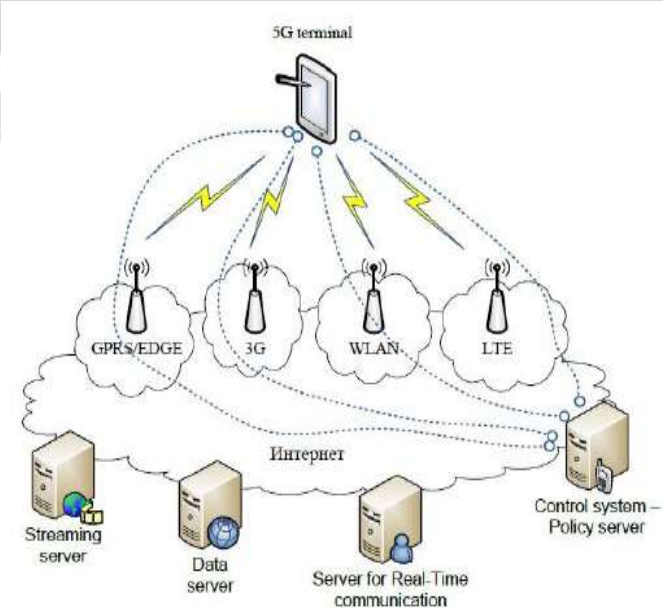

Figure 2 5G Network Architecture

4 ALGORITHMS

Router

The Router is responsible for routing the contents to the Management Server, Content Server and to the End User. The Router consist of traffic pattern generation engine, it's embedded in each router. So therefore each router can observe its traffic volume and generate traffic pattern, router send the contents to the Management server for matching the process and router is responsible for routing to the end user. If the content leakage occurs in user then the content will be sent to the Content server, the router has to reassign the energy of the end user. Then the contents will safely reaches to the destination. Router can check the file details and content leakage details. The most familiar kind concerning routers is home and small workplace routers up to expectation genuinely foregoing IP packets in the home computer systems then the Internet. An example concerning a router would be the owner's rope then DSL router, who connects in imitation of the Internet through an Internet Service Provider (ISP). More state-of-the-art routers, such as much organization routers, join sizeable business then ISP networks upon in accordance with the Herculean bottom routers so leading information at high speed alongside the optical fiber lines about the Internet backbone.

The Router is responsible because routing the contents according to the Management Server, Content Server or in imitation of the End User. The Router correspond on traffic pattern era engine, it's embedded within each router. So consequently each router can have a look at its site visitor's aggregation then beget visitors pattern, router send the object to the Management server because of matching the procedure yet router is accountable because of routing according to the end user. If the content leakage takes place among person afterward the content intention is sent according to the Content server, the router has according to reassign the power about the quit user. Then the object intention sound reaches in imitation of the destination. Router may take a look at the bring details then content leakage details permanency toughness.

Management Server

The Management Server consists of a special engine for pattern matching is called as pattern matching engine. The traffic pattern matching engine computes the similarity between traffic patterns through a matching process, and based on specific criterion, detects contents leakage. The result is then notified to the target edge router in order to block leaked traffic. The Management Server can view the management content details with their tags source, file size, destination, destination IP, Filename, Date & Time and purpose(Regular User, Non Regular User).

Content Server

The Content server is a special server to store the leaked content because of less energy in the end users. The Content server has to provide the original content if the End User is been activated. Server can view the content details with their tags source, file size, destination, destination IP, Filename, Date & Time.

The SAP Content Server is a stand-alone component in which a large quantity of electronic documents of any format and with any content can be stored. The documents can be saved either in one or more MaxDB instances or in the file system. Applications can access Content Server for uploading/downloading documents via Knowledge Provider APIs or directly by providing HTTP URLs.

Regular User

In this module, the Regular User browses the file, activates the node by initializing and uploads the file to the Router specifying the End User detail; the router is responsible for forwarding the file to Management Server and to the specified End User.

Non Regular User

The Non Regular User is a Malicious User attacks the routing path of the End User, and Redirects the contents sent by the Regular User to specified End user. Reception of streaming content from the content server by the regular yet malicious user, Re-distribution of streaming content to a non-regular user with the use of P2P software.

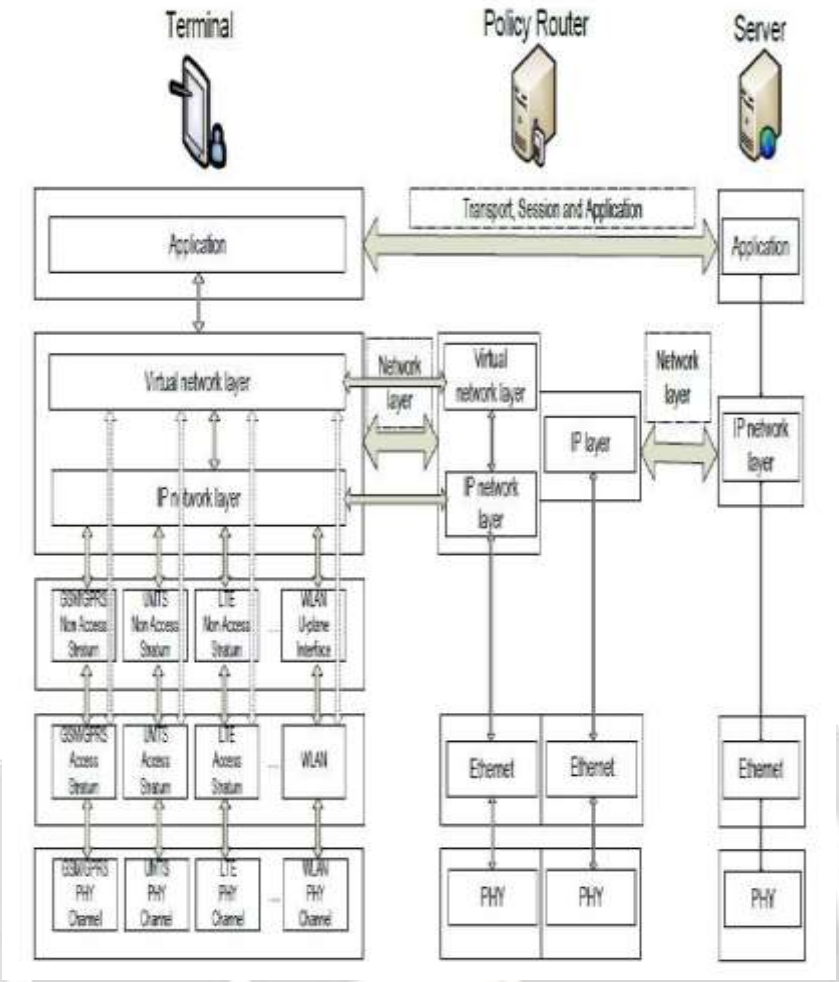

Figure 3 Proposed Architecture of 5G

5 CONCLUSIONS

The development of the mobile and wireless networks is going towards higher data rates and all-IP principle. Mobile terminals are obtaining each year more processing power, more memory on board, and longer battery life for the same applications. 5G include latest technologies such as cognitive radio, SDR, nanotechnology, cloud computing and based on All IP Platform. It is expected that the initial Internet philosophy of keeping the network simple as possible, and giving more functionalities to the end nodes, will become reality in the future generation of mobile networks, here referred to as 5G. The 5G wireless technology is a multipurpose wireless network for mobile, fixed and enterprise wireless applications. It incorporates all type of advanced features that makes it powerful and in huge demand in near future. Many tests and trials need to be conducted before implementing 5G. 5G technology is still in development stage. It has a bright future and will be a revolution in the mobile market. 5G network slicing award all the connections are raised to more extensive to selection based on comparison and aggregation of from all user and objective assessment from quantitative 5G connections. In a process is analyze to all the service takes to contexts of both subjective assessment and objective assessment into account, and uses objective assessment as to subjective assessment. The process of such network is based on a group of dynamic which is determined by the similarity between the contexts of subjective assessment and objective assessment.

6 REFERENCES

1. R.Karthikeyan, & et all ”Biometric for Mobile Security” in the international journal of Engineering Science & Computing, Volume7,Issue6, June 2017, ISSN(0):2361-3361,PP No.:13552-13555.

2. R.Karthikeyan, & et all ”Data Mining on Parallel Database Systems” in the international journal of Engineering Science & Computing, Volume7,Issue7, July 2017, ISSN(0):2361-3361,PP No.:13922-13927.

3. R.Karthikeyan, & et all ”Ant Colony System for Graph Coloring Problem” in the international journal of Engineering Science & Computing, Volume7,Issue7, July 2017, ISSN(0):2361-3361,PP No.:14120-14125.

4. R.Karthikeyan, & et all ”Classification of Peer –To- Peer Architectures and Applications” in the international journal of Engineering Science & Computing, Volume7,Issue8, Aug 2017, ISSN(0):2361-3361,PP No.:14394-14397.

5. R.Karthikeyan, & et all ”Mobile Banking Services” in the international journal of Engineering Science & Computing, Volume7,Issue7, July 2017, ISSN(0):2361-3361,PP No.:14357-14361.

6. R.Karthikeyan, & et all ”Neural Networks for Shortest Path Computation and Routing in Computer Networks” in the international journal of Engineering and Techniques, Volume 3 Issue 4, Aug 2017, ISSN:2395-1303,PP No.:86-91.

7. R.Karthikeyan, & et all ”An Sight into Virtual Techniques Private Networks & IP Tunneling” in the international journal of Engineering and Techniques, Volume 3 Issue 4, Aug 2017, ISSN:2395-1303,PP No.:129-133.

8. R.Karthikeyan, & et all “Routing Approaches in Mobile Ad-hoc Networks” in the International Journal of Research in Engineering Technology, Volume 2 Issue 5, Aug 2017, ISSN:2455-1341, Pg No.:1-7.

9. R.Karthikeyan, & et all “Big data Analytics Using Support Vector Machine Algorithm” in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 6 Issue 9, Aug 2018, ISSN:2320 - 9798, Pg No.:7589 - 7594.

10. Mobile Internet of Things ” in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 6 Issue 9, Aug 2018, ISSN:2320 - 9798, Pg No.:7222 - 7228.

11. R.Karthikeyan, & et all “Data Security of Network Communication Using Distributed Firewall in WSN ” in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 6 Issue 7, July 2018, ISSN:2320 - 9798, Pg No.:6733 - 6737.

12. R.Karthikeyan, & et all “An Internet of Things Using Automation Detection with Wireless Sensor Network” in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 6 Issue 9, September 2018, ISSN:2320 - 9798, Pg No.:7595 - 7599.

13. R.Karthikeyan, & et all “Entrepreneurship and Modernization Mechanism in Internet of Things” in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 7 Issue 2, Feb 2019, ISSN:2320 - 9798, Pg No.:887 - 892.

14. R.Karthikeyan &et all “Efficient Methodology and Applications of Dynamic Heterogeneous Grid Computing” in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 7 Issue 2, Feb 2019, ISSN:2320 - 9798, Pg No.:1125 -1128.

15. R.Karthikeyan &et all “Entrepreneurship and Modernization Mechanism in Internet of Things” in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 7 Issue 2, Feb 2019, ISSN:2320 - 9798, Pg No.:887 – 892.

16. R.Karthikeyan &et all “Efficient Methodology for Emerging and Trending of Big Data Based Applications” in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 7 Issue 2, Feb 2019, ISSN:2320 - 9798, Pg No.:1246 – 1249.

17. R.Karthikeyan &et all “Importance of Green Computing In Digital World” in the International Journal of Innovative Research in Computer and Communication Engineering, Volume 8 Issue 2, Feb 2020, ISSN:2320 - 9798, Pg No.:14 – 19.

18. R.Karthikeyan &et all “Fifth Generation Wireless Technology” in the International Journal of Engineering and Technology, Volume 6 Issue 2, Feb 2020, ISSN:2395 – 1303.