DEVELOPMENT TRACKING AND AREA MANAGEMENT OF 5G TECHNOLOGY

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ABSTRACT

This technology is the future of current LTE technology which would be a boost to the future of wireless and computer networks, as the speeds would be way higher than the current LTE networks, which will push the technology to a new level. This technology will make the radio channels to support data access speeds up to 10 Gb/s which will turn the bandwidth radio channels as WiFi. Comparing it with other LTE technology's it has high speed and capacity, support interactive multimedia, voice, internet and its data rate is 1 Gbps which makes it faster than other LTE's . This is much more effective than other technology's due to its advanced billing interfaces. This paper provides detail explanation of 5G technology, its architecture, challenges, advantages and disadvantages, issues and ends with future of 5G technology.

1.INTRODUCTION

The world has seen a lot of changes in the realm of communication. Today we no more use landlines. Everyone possesses a mobile phone that functions nine to seven. Our handsets not only keep us connected with the world at large but also serve the purpose of entertainment gadget. From 1G to 2.5G and from 3G to 5G this world of telecommunications has seen several improvements along with improved performance with every passing day. 5G technology is on its way to change the way by which most of the users access their handsets. Users will go through a level of call volume and data transmission with 5G pushed over a VOIP enables gadget. With increasing awareness of customers with respect to upcoming technologies, affordable packages and good looks; it is very important that mobile producers must give an altogether decent package for keeping up the customer loyalty.

The most important and leading motive of leading mobile phone manufacturers is the creation of best and latest technology to compete with innovative market giants. We have seen great cell phones one after another, with unbelievable traits. Apple has remained successful in shivering the electronic world by putting forth its latest iPhone 7 has taken the market by storm. In such a small electronic piece, huge features are getting embedded. There are very few mobiles left without mp3 player or/and camera. People are focusing on getting everything without spending a penny more. Keeping in mind the user's pocket, economic cell phones are introduced with maximum features. With 5G technology you can hook your mobile phone to your laptop for broadband internet access.

The characteristics especially video player, camera, mp3 recorder, messengers, photo treatment and games have made

today's mobile phone a handheld computer. The developed world is already utilizing 4G and it is beyond imagination that what will be engulfed in 5G as everything is already embedded such as smallest mobile phones, speed dialing, largest memory, audio and video player, 2 Microsoft office, etc. Pico net and Bluetooth technology has made data sharing a child's play. Initially infrared kept us bound for properly aliening two handset devices for data sharing. We still remember the disturbance and irritation caused in transferring data but the advent of Bluetooth changed the history. It enabled us to share data between two gadgets within a range of 50 meters. With the swiftness in data sharing the cell phone manufactures focused on mobile broadband that can open a new window of communication and navigation in the world of telecommunication.

2.LITERATURE SURVEY

It's time to move from services to multiservice approach. The transformation will be moving from LTE to LTE Advanced and the features would be added as pervasive networks where users can be concurrently being connected to several wireless accessed technologies and seamlessly move between them. Group Cooperative Relay: This technique is used to avail high data rates below over a wide area of a cell. Cognitive radio technology would enable the user equipment to look at the radio landscaping it 7 is located to choose the optimum Radio Access Network, Modulation scheme and other parameters to configure to get the best connection in optimum performance. Smart Antennas will be redirected for better connection provided to the user. Furthermore, 5G will leverage on the strengths of both optical and wireless technologies. 5G will be driven by software Network Functions Virtualization (NFV) and Software-Defined Networking (SDN), IoT, IoE and Mobile Content Delivery Networks(CDN).

The 5G (Fifth Generation Mobile and Wireless Networks) can be a complete wireless communication without limitation, which bring us perfect real world wireless – World Wide Wireless Web (WWWW). 5G denotes the next major phase of mobile telecommunications standards beyond the 4G/IMT-Advanced standards.

At present, 5G is not a term officially used for any particular specification or in any official document yet made public by telecommunication companies or standardization bodies such as 3GPP, WiMaxForum, or ITU-R. Each new release will further enhance system performance and add new capabilities with new application areas. Some of the additional applications, benefiting from mobile connectivity are home automation, smart transportation, security, and e-books [2]. IEEE 802.16 is a series of Wireless Broadband standards authorized by the Institute of Electrical and Electronics Engineers (IEEE). It has been commercialized under the name "WiMAX" (from "Worldwide Interoperability for Microwave Access") by the WiMAX Forum industry alliance. IEEE 802.16 standardizes the air interface and related functions associated with wireless local loop [12]. 5G mobile technology has changed the means to use cell phones within very high bandwidth. User never experienced ever before such a high value technology.

The 5G technologies include all type of advanced features which make 5G mobile technology most powerful and in huge demand in near future. For children rocking fun Bluetooth technology and Pico nets has become available in market. Users can also hook their 5G technology cell phones with their Laptop to get broadband internet access. 5G technology includes camera, 8 MP3 recording, video player, large phone memory, dialing speed, audio player and much more one can never imagine [13]. In fifth generation, Network Architecture consists of a user terminal (which has a crucial role in the new architecture) and a number of independent, autonomous radio access technologies (RAT) [14]. 5G mobile system is all-IP based model for wireless and mobile networks interoperability. Within each of the terminals, each of the radio access technologies is seen as the IP link to the outside Internet world.

3. ARCHITECTURE OF 5G TECHNOLOGY

The main challenges to focus on is the challenges of 1000 times higher traffic volume and 100 times higher user data rate. This explosive traffic growth and the user data rate can be controlled by many technologies but we can focus on the three which can control such a high ratio. They are, the Physical layer(PHY) technologies which include the massive Multiple Input and Multiple Output(MIMO), Filter Bank Multi-Carrier(FBMC), Non-Orthogonal Multiple Access(NOMA), etc. It mainly focuses on the improvement of spectrum efficiency to enhance the network capacity. Furthermore, the exploitation of underutilized spectrum at the millimeter(mm) Wave Frequency can be very useful to improve the network capacity.

However, network densification is the most dominant ingredient contributing to the capacity of wireless communication system. It is believed that the capacity of the network using Universal Domain Network(UDN) can increase in the linear ratio of the number of cells. Considering the network densification, Heterogeneous Network(HetNet) including macro ENodeB(eNB) and low-power eNB(micro eNb, pico, eNB, etc.). Furthermore, Device-to-Device(D2D) Communication, a substitute to HetNet is capable to improve the peak data rate and spectrum efficiency. The load balancing among multi-Radio Access Technology(RAT) systems is still able to enhance the network capacity through improving the efficiency of the network resource. Although the network densification can enhance the network capacity by reducing the path loss between the user and base station it increases both the interfering and the desired signals and effectively dwarfing the impact of the thermal noise. It would be considered equivalent to say that the system becomes interference limited, and the interference migration would be an improvement for link efficiency. Additionally, the interference becomes more complex as the density of the complex cells increases.

At the receiver side, the advanced interference cancellation is required, the network architecture should also support the efficiency and the coordination among the different cells. Since the amount of control signaling in distributed coordination mechanism will increase quadratically with the increase of small cell intensity. The centralized coordination

would be the first important priority feature for 5G architecture. Based on the centralized processing, the network performance can be further improved through joint resource coordination and management across multiple cells and multiple RAT systems. Besides, due to the limited coverage area of small cell and user mobility, fast moving user will undergo frequent handover. To provide the efficiency of seamless mobility, multiple small cells must be managed in the centralized way. It is clearly seen that the centralized coordination and management is necessary for Radio Access Network (RAN) of 5G mobile network. Meanwhile, the cellular Core Network (CN) should also be considered to manage the explosive growth of traffic volume.

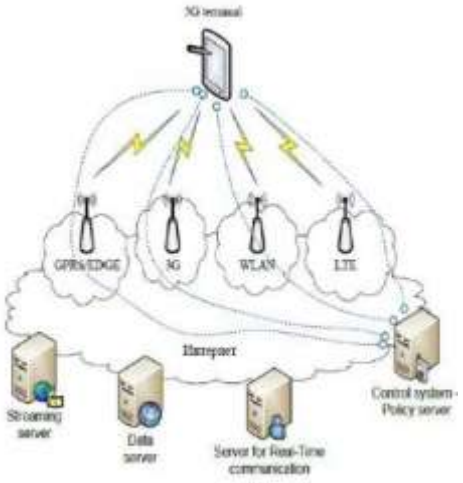

Figure 1: 5G Basic Architecture

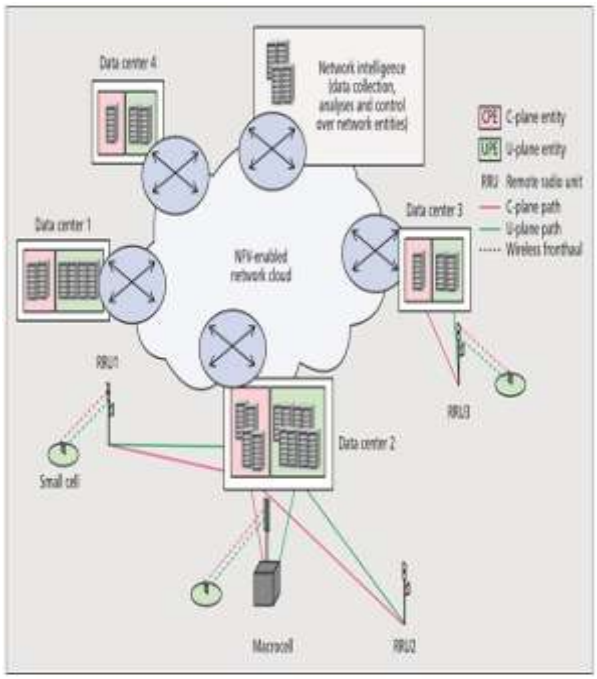

Figure 2: Network Architecture of 5G

The traditional way which centralizes the data-plane function at the boundary with the Internet and forces all traffic to flow through the P-GW in LTE network complicates the realization of P-GW, and yields the bottleneck at P-GW. Besides the function of data-plane, P-GW also performs a wide variety of functions like traffic monitoring, billing, access control, etc.

With so much functionality in P-GW, results in lower flexibility and scalability. Then the operator can not enhance the data and control function individually. Additionally, the traditional network does not support to flexibly direct a chosen subset of traffic through the necessary middle boxes(e.g. firewall, DPI, etc.) according to the network state and user's individual requirements. Therefore, it is necessary to separate the control plane from data plane and logically centralize the control plane. Obviously, it can be concluded that separating the control plane 14 from data plane and centralizing

processing (e.g. joint scheduling, centralized interference mitigation, etc) are important features of 5G mobile network for further improving the network capacity.

Lower Latency: Some services and applications related to healthcare, security, vehicle-to-vehicle and mission-critical control may have strict requirements on latency, in which the most challenging demand is on the order of 1ms [4]. Fortunately, one PHY scheme named Generalized Frequency-Division Multiplexing (GFDM) is designed to overcome the real-time challenge for 5G network [7]. Besides, technologies including content local caching [8] and D2D also have the potential to dramatically decrease the end-to-end latency. For example, caching the popular content within EPC is able to reduce the duplicate content transmission and the response latency. In addition, caching at eNB can further eliminate the latency and traffic growth in EPC. Considering the limited caching space of eNB and small number of users served by individual eNB of small cell, the hit ratio becomes smaller, thereby resulting in longer latency.

Therefore, the 5G network architecture should support cooperative caching policy among different eNBs, and optimize the caching resource utilization globally in a centralized manner. Furthermore, the caching policy among multi-RAT systems also needs to be considered. Additionally, although the D2D can directly reduce the end-to-end latency, the interference problem in D2D scenario is also necessary to be handled in centralized way. Briefly speaking, the end-to-end latency can be directly reduced by proper caching and D2D, which need a logically centralized controller to coordinate and manage the corresponding resources.

4.SIMULATION RESULTS

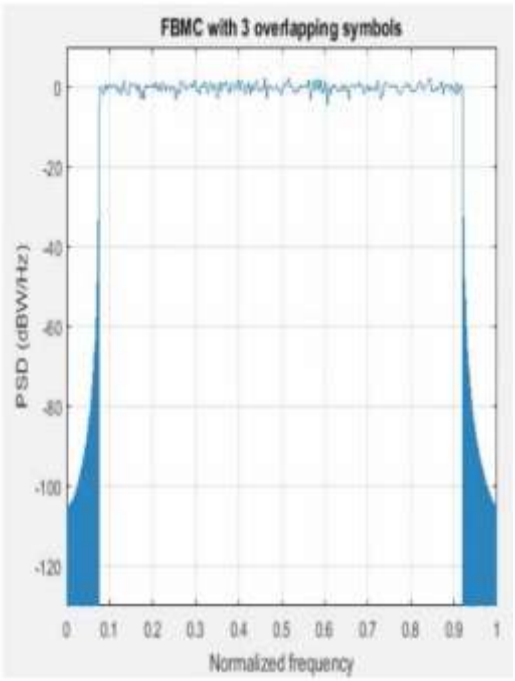

Figure 3: Waveform Generation for FBMC

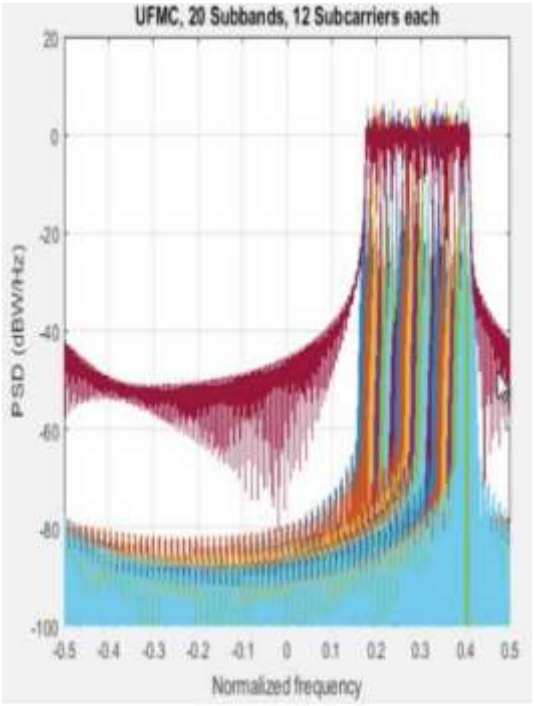

Figure 4: Waveform generated for UFMC

5. CONCLUSION

The many initiatives and discussions on 5G going on around the world by governments, vendors, operators and academia demonstrate the continuing ethos of collaboration and innovation across the industry. In these debates, we must ensure that we continue to co- ordinate with aligned goals to maintain momentum in completing the definition of 5G. The key 5G considerations at this stage are: When 5G arrives will be determined by what 5G turns out to be as discussed earlier, there are currently two differing views of what 5G is. The first view makes its implementation somewhat intangible – 5G will become a commercial reality when sufficient industry voices say so, but this will be difficult to measure by any recognizable metric. The second approach is more concrete in that it has a distinct set of technical objectives, meaning that when a service is launched that meets those objectives it will count as the advent of 5G. As the requirements identified for 5G are a combination of both visions, in some cases the requirement set is self-contradictory – for example, it would not be possible to have a new RAN with beam forming and meet a requirement for power reduction, because beam forming uses a lot more power than today's RAN. As a result, there must be an established answer to the question of what 5G is before there can be an answer to the question of when it will arrive. The case for a new RAN should be based on its potential to improve mobile networks. The principal challenge in the 5G specification is the sub-1ms latency requirement, which is governed by fundamental laws of physics. If, as discussed above, this challenge proves too much and the requirements for sub-1ms delay are removed from 5G, the need for a new RAN would be questioned. Whether a new air interface is necessary is arguably more of a question of whether one can be invented that significantly improves mobile networks, rather than on a race to the arbitrary deadline of 2020.

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