

5G Wireless Technology in Cellular Networks

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Abstract— Considerably faster than existing technologies, 5G holds the promise of applications with high social and economic value, leading to a ‘hyper connected society’ in which mobile will play an ever more important role in people’s lives. Discussion around 5G falls broadly into two schools of thought: a service-led view which sees 5G as a consolidation of 2G, 3G, 4G, Wi-Fi and other innovations providing far greater coverage and always-on reliability. A user can also link their 5G technology cell phone with their Laptop to get broadband internet access. 5G technology including camera, MP3 recording, video player, large phone memory, dialing speed, audio player. If 5G appears and reflects these projections, the major difference from a user point of view between 4G and 5G techniques must be something other than increased peak bit rate. As the customer become more and more aware of the mobile phone technology, he or she will look for a decent package all together including all the advanced features a cellular phone can have. Hence the search for new technology always the main motive of the leading cell phone giants throughout innovate their competitors. The goal of a 5G based telecommunication network would ideally answer the challenges that a 4G model would present once it has entered widespread use.

Key words: 5G, Wireless, Communication, IP Network

I. INTRODUCTION

The present cell phones have it all. Today phones have everything ranging from the smallest size, largest phone memory, speed dialing, video player, audio player, and camera and so on. Recently with the development of Pico nets and Bluetooth technology data sharing has become a child's play. Earlier with the infrared feature you can share data within a line of sight that means the two devices has to be aligned properly to transfer data, but in case of blue tooth you can transfer data even when you have the cell phone in your pocket up to a range of 50 meters. The creation and entry of 5G technology into the mobile market place will launch a new revolution in the way international cellular plans are offered. The global mobile phone is upon the cell phone market. Just around the corner, the newest 5G technologies will hit the mobile market with phones used in China being able to access and call locally phones in Germany.

Truly innovative technology changing the way mobile phones will be used. With the emergence of cell phones, which are similar to a PDA, you can now have your whole office within the phone. Cell phones will give tough competitions to laptop manufacturers and normal computer designers. Even today there are phones with gigabytes of memory storage and the latest operating systems. Thus one can say that with the current trends, the industry has a real bright future if it can handle the best technologies and can produce affordable handsets for its customers. Thus you will get all your desires unleashed in the near future when these smart phones take over the market. 5G Network's router and switch technology delivers Last Yard Connectivity between the Internet access provider and building occupants. 5G's technology intelligently distributes Internet access to individual nodes within the building.

II. PROPOSED METHODOLOGY

Cell phones are used millions and billions of users worldwide. How many of us know the technology behind cell phones that is used for our communication? I have also intrigued about the type of technology used in my phone. What are 1G, 2G, 3G and 4G technologies? 1G, 2G, 3G & 4G ("G" stands for "Generation") are the generations of wireless telecom connectivity. In 1945, the zero generation (0G) of mobile telephones was introduced. Mobile Telephone Service, were not officially categorized as mobile phones, since they did not support the automatic change of channel frequency during calls. 1G (Time Division Multiple Access and Frequency Division Multiple Access) was the initial wireless telecom network system. It's out-dated now. The analog “brick phones” and “bag phones” are under 1G technology. Cell phones era began with 1G. The next era, 2G has taken its place of 1G. Cell phones received their first major upgrade when they went from 1G to 2G. This leap effectively took cell phones from analog to digital. 2G and 2.5G were versions of the GSM and CDMA connections. And GSM is still the most popular technology, but with no internet. Fortunately, GPRS, an additional service, is provided over GSM for the purpose of internet access. GPRS has been developed and thus, EGPRS was created. It's more secure and faster than GPRS. memory, dialling speed, audio player and much more you never imagine. For children rocking fun Bluetooth technology and Pico nets has become in market.

Then 3G came, the new Wireless CDMA technology. It is the first wireless telecom technology that provides broadband-speed internet connection on mobile phones. It has been specially made for the demand of internet on smart phones. Further development led to the creation of 3.5G, which provides blazing fast internet connection on phones, up to the speed of 7.2 MBPS. A smart phone can be connected to a PC to share its internet connection and 3G and 3.5G are ideal for this. But, as

this WCDMA technology is not available in all regions, it's not as popular as GSM yet. Before making the major leap from 2G to 3G wireless networks, the lesser-known 2.5G was an interim standard that bridged the gap. Following 2.5G, 3G ushered in faster data-transmission speeds so you could use your cell phone in more data-demanding ways. This has meant streaming video (i.e. movie trailers and television), audio and much more. Cell phone companies today are spending a lot of money to brand to you the importance of their 3G network. The above systems and radio interfaces are based on kindred spread spectrum radio transmission technology. While the GSM EDGE standard ("2.9G"), DECT cordless phones and Mobile Wi MAX standards formally also fulfil the IMT-2000 requirements and are approved as 3G standards by ITU, these are typically not branded 3G, and are based on completely different technologies.

4G, which is also known as "beyond 3G" or "fourth-generation" cell phone technology, refers to the entirely new evolution. Developers are now going for 4G (OFDMA), which will provide internet up to the speed of 1 GBPS! It is said to be able to overcome the problems of weak network strength and should provide a much wider network, making sure that the users get high-speed connectivity anytime anywhere. No doubt, 4G will open new doors of revolutionary internet technologies, but for now, 3G and 3.5G are the best. 4G will allow for speeds of up to 100Mbps. 4G promises voice, data and high-quality multimedia in real-time form all the time and anywhere.

A. Ubiquitous Computing

5G would be about "ubiquitous computing", that is, having the ability to access the applications want from any platform, anywhere, any time. To create such an environment, one needs to integrate various applications, emerging from various engineering practices. Human life will be surrounded by intelligent sensors, which will bring radical change to human life's daily approaches of doing things, as:

- Your intelligent car will send SMS to your cell phone, from your car.
- Your home security camera is attached to secured internet. So that you can view your sitting room on your laptop/mobile phone screen, by accessing secure website.
- You are receiving regular MMS from your hospital about your medication need and next doctor appointment.

B. Aggregator

Existing telecom networks are fashioned in hierarchical way, where subscriber traffic is aggregated at aggregation point (BSC/RNC) and then routed to gateways. (As shown in figure). Flat IP architecture will lessen burden on aggregation point and traffic will directly move from Base station to Media gateways. Vision of Super Core is based on IP platform. All network operators (GSM, CDMA, Wimax, and Wireline) can be connected to one Super core with massive capacity. This is realization of single network infrastructure. The concept of super core will eliminate all interconnecting charges and complexities, which is right now network operator is facing. It will also reduce number of network entities in end to end connection, thus reducing latency considerably.

C. Flatter IP Concept

At regular interval, semiconductor manufacturers advance to a new generation with smaller feature sizes. This allows them to incorporate more functions into a given area of silicon and, hence, more features or new capabilities into electronic devices like cell phones, Increased processing capacity will be allowing Mobile devices (cell phones, PDAs, etc) to do more tasks (instructions per minute) then before. This will lead to even the Flatter IP network. As Flat IP has shifted some of the BSC/RNC's radio resource functions to Base station, Flatter IP will shift some of the RR functions, to Mobile devices from Base station. Finally, your cell phone will not be just access device but, it will also perform some of the Radio Resource Management functions.

With the shift to flat IP architectures, mobile operators can

- Reduce the number of network elements in the data path to lower operations costs and capital expenditure.
- Partially decouple the cost of delivering service from the volume of data transmitted to align infrastructure capabilities with emerging application requirements.
- Minimize system latency and enable applications with a lower tolerance for delay; upcoming latency enhancements on the radio link can also be fully realized.
- Evolve radio access and packet core networks independently of each other to a greater extent than in the past, creating greater flexibility in network planning and deployment.
- Develop a flexible core network that can serve as the basis for service innovation across both mobile and generic IP access networks.
- Create a platform that will enable mobile broadband operators to be competitive, from a price/performance perspective, with wired networks.

III. BLOCK DIAGRAM FOR PROPOSED METHODOLOGY

A. Description of Block Diagram

Figure shows the system model that proposes design of network architecture for 5G mobile systems, which is all-IP based model for wireless and mobile networks interoperability. The system consists of a user terminal (which has a crucial role in the new architecture) and a number of independent, autonomous radio access technologies. Within each of the terminals, each of the radio access technologies is seen as the IP link to the outside Internet world. However, there should be different radio interface for each Radio Access Technology (RAT) in the mobile terminal. For an example, if want to have access to four

different RATs, need to have four different access - specific interfaces in the mobile terminal, and to have all of them active at the same time, with aim to have this architecture to be functional.

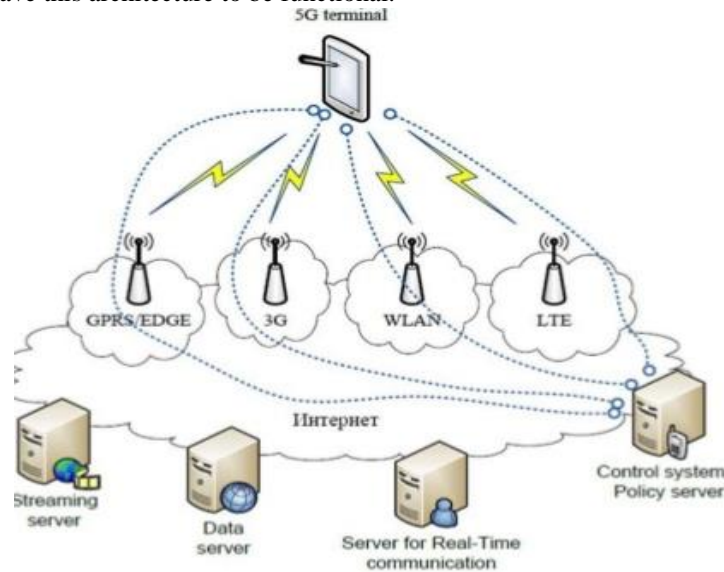


Fig. 1: Block Diagram

IV. ADVANTAGES OF 5G COMMUNICATION

- High speed, high capacity, and low cost per bit.
- Support interactive multimedia, voice, streaming video, Internet, and other broadband services, more effective and more attractive, Bi directional, accurate traffic statistics.
- Global access, service portability, and scalable mobile services.
- The high quality services of 5G technology based on Policy to avoid error.
- 5G technology is providing large broadcasting of data in Gigabit which supporting almost 65,000 connections.
- 5G technology offer transporter class gateway with unparalleled consistency.
- Through remote management offered by 5G technology a user can get better and fast solution.

V. CONCLUSION

The development of the mobile and wireless networks is going towards higher data rates and all-IP principle. Currently, there are many available radio access technologies, which provide possibility for IP-based communication on the network layer, as well as there is migration of all services in IP environment, including the traditional telephony and even television, besides the traditional Internet services, such as web and electronic mail as most used among the others. On the other side, mobile terminals are obtaining each year more processing power, more memory on board, and longer battery life for the same applications (services). 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 proposed architecture for future 5G mobile networks can be implemented using components of the shelf (existing and standardized Internet technologies) and its implementation is transparent to the radio access technologies, which makes it very likeable solution for the next generation mobile and wireless networks.

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