

5G : A Future Network Society

S.nandhini

Assistant Professor, SRMIST

Abhishek , Rahul Kumar and Rahul Kumar

*Student, Computer Science and Engineering,
SRM Institute of Science and Technology (SRMIST), Ramapuram,
Chennai, Tamil Nadu, India.*

Abstract

In the current generation of digital world all industries are totally dependent on computers and mobiles which is directly dependent on internet. Business model across industries have changed almost overnight through innovative applications of internet technologies. As we know internet is inter connected with each type of technologies and industries hence as new formation of internet is definitely needed because if industries are developing and dependent on internet so, off course evolution in internet will be required in each interval of time. As currently all types of wireless based technologies which is already existing , for example like the broadband, 3GPP ,LTE technology, wifi and HSPA, will be regularly adapting new technology tools that will be very much helpful to derive the needs of the future internet society. This evolution from 4th generation to 5th generation will positively effect on iot , virtual reality, cloud connectivity, digitalization in wide range of growth towards their industries.

Keywords: 5g vision, future of networking : 5g

CONFRONTATION AND CONCERN

The basic needs and technologies of making wireless 5g networks are follows:

- The network bandwidth of 5g will be in range of approx 40 gigahertz to 380 gigahertz and for that various no. of small cell will be needed.
- large wideband of full duplex will be needed.
- Apart from variable Wave-forms, multiple accessing waveform is also needed.
- Definitely MIMO will play vital role for multiple input and output conversion
- In the life which is full of data so input-output data analysis is required for that MSA(measurement system analysis) is needed.

EVOLUTION IN INTERNET

In coming 20 to 30 years each and every devices will be dependent on internet, millions of computer will be connected through internet .So, connectivity that run on variable frequency and bandwidth will be accomplished by high speed network.

And that high speed networking will be provided by 5g network. As recent one of the most famous technology which is LTE booming in networking area that will definitely help 5g evolution in intensive way of networking globalization .All home devices or appliances like fan ,ac ,not just our mobiles and computer anymore, apart from this Home appliances like locks, security cameras, wearable's, and so many other devices are will going to connect to the web. Its been predicted that approx of 21 billions of device will be connected to web source in upcoming time.

Smart Cities

A city which will be smartly equipped with the technologies such that worked will not be dependent on humans it will provide abundance way of automation in field of working such as government sector , private sector which have their office work and that work can be easily done with smart automating technologies and for that type of technologies we need high speed networking technology and that will be fulfilled by 5g.

ARCHITECTURE OF 5G NETWORK

The system consists of different layers i.e.

Application layer,presentation layer,Session layer,Transport layer.Application layer is connected to the spectrum.presentation layer is connected to open transport protocol,Session layer is having massive MIMO(multiple input multiple output) and the transport layers has small cells.there are different cells present in this transport layer i.e. femto cell,pico cells,macro cells.the architecture having D2D,M2M,and full duplexler which is absent in current network .The current network uses only half duplexer which makes tha data traffic because at a time only one process can be executed but 5g uses full duplexer so the problem of network traffic can be eliminated.The spectrum used in 5g has capacity 1000 times greater than that of use din present.The cost is also sustainable.Data rate fluctuates between 10 to 100 times that of present network.The end to end latenct is less than 5ms.

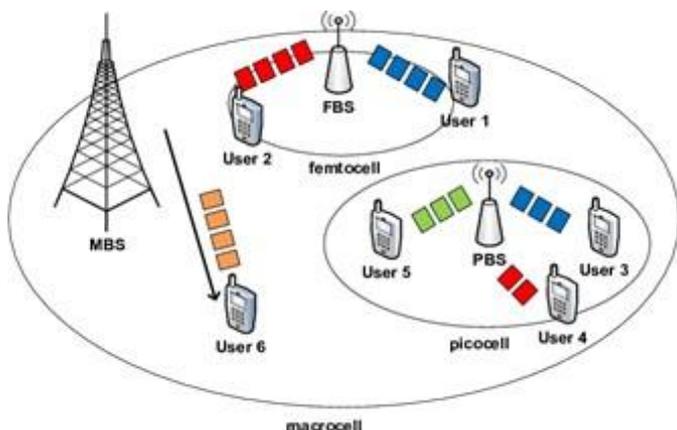


Figure 1. Cell architecture

There will be massive no of connections. The one of the most underlying feature of this new network is that the QoS i.e. (Quality of service) is consistent. The system has user at one end and various radio technologies on other end. The IP tunnels are created to provide the network abstraction level. With the implementation of this architecture there will be larger coverage area, low battery uses, traffic fees will be less because the traffic fees increase due to poor infrastructure deployment and higher user capacity

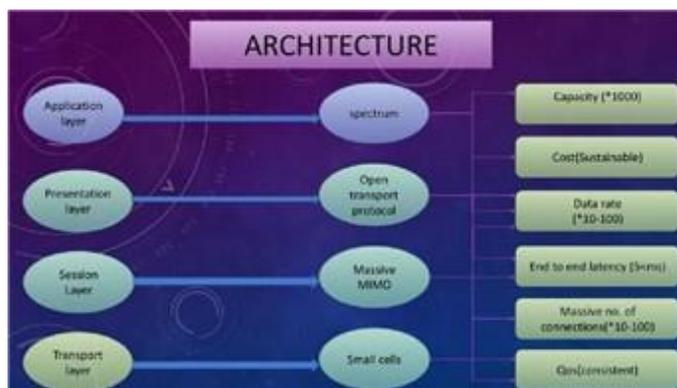


Figure 2. Architecture of cellular 5g

TIMEFRAME

In the present generation of 4g which is approx 10 times slower than how fast 5g will be there. Right now 5g is under developing categories, it is expected that in coming of 1-2 years it will be definitely launched.

As we know LTE which is running vast in current industry hence upgrade part of LTE is categorized as LTE-A, LTE-B, LTE-C.

a Variable technologies will be needed which will fulfill this evolution such as milli-range wave, Imt

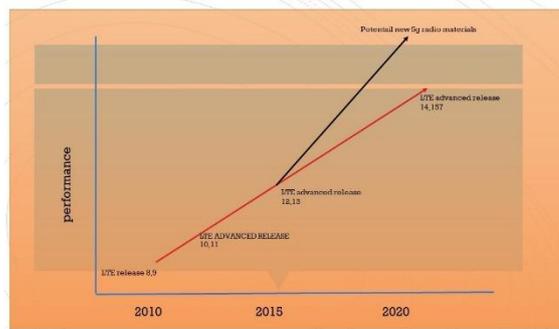


Figure 3. Time graph of networking

HOW 5G WILL BE USED

The scientist are working really clever to bring the revolution in the field of radio frequencies. the project they say is called 5G. currently with development in new technologies there has been great conflicts in between the frequencies of various devices. It is predicted that by 2020, 50 billion people will be connecting through wireless network so one can imagine the mess at that time. So this is the perfect time to come-up with solution to a problem which has not yet developed. Developing 5g network is just like widening a already constructed road so that more no of cars can be accommodated. The same concept is used for this development also here scientist are developing the bandwidth so that more no of devices can be connected without any ambiguity. According to researcher, 5g will work at 100 times faster speed than the network existing currently. It is expected that the average speed of 5g network will be 800Gbps that is merely equivalent to downloading 30 HD movies in a second. Another use of 5g will be in IOT domain. This is the domain which is highly potent to make the life much easier and convenient and relaxed. In iot concept, all thing will be connected to a wireless system hence making it more secure and convenient to use.

So the day is no too far when problems like video faltering, app stalling, low speed net connectivity, lost signal will be portrayed as history. Scientists are expecting the network to be launched by 2020. it will be great to live in a fully functional wireless society.

GLOBAL IMPACT

The question is no complex and obvious because when we are implementing new technology by enhancing the older one than the reasons need to be justified which cause the shift. The reason here in the case of g technology is simple that with increase in population there is a mess created at cloud side of network. The bandwidth is no more sufficient to provide accommodation further. So shift is obvious. What's going to be changed in 5g? might be the question.

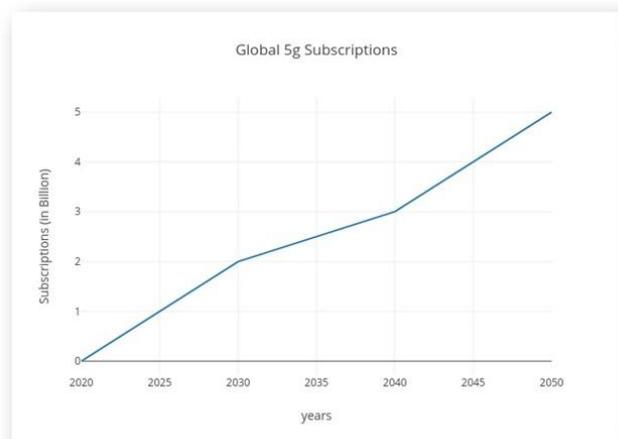


Figure 4. Growth of 5g in upcoming years

so answer will be 5g will come at much higher speed approximately 100 times faster. It will use less cellular battery of cellphones, it will provide larger bandwidth, there will be no conflicts in between communication of different wireless devices because the radio frequencies will be assigned M2M by their IP addresses which will reduce the conflict above the network bandwidth. There will be real wireless world with no limit zone. The QoS will be consistent. 5g will be supporting about 65,000 connections. The connectivity speed will be increased to 25Mbps which is definitely huge as compared to now. The downloading and uploading speed will be highest. So summarising the perks of 5g network we can say one thing that it is going to be huge, magneus, pleasant and comfortable stay for people in the world of 5g wireless connections.

CONCLUSION

The two main designing objectives for 5G Implementation of mass capacity and mass connectivity.

In the massive generation of services, applications and for assisting it all users require to fulfill his all requirements.

Moreover advanced and effective utilization of every available non-contiguous spectrum (NCS) for variable network development statistics are-



Figure 2: Maximum theoretical downlink speed by technology generation, Mbps (*10 Gbps is the minimum theoretical upper limit speed specified for 5G)

Figure 5.

In upcoming years of developments in internet many fundamental technologies that will be need of fo implementing commercialized -ready 5G network solutions:

- Advanced form of waveform technologies..
- Management of interface..
- Access protocols
- Mass-scale multiple input and multiple output (MIMO).
- Recognized Service architecture.
- 5G devices.
- Cloud-based and virtualized radio access infrastructure

ACRONYM:

Gb/s-	Giga Bits per Second
GSM -	Global System for Mobile Communications
HSPA -	High Speed Packet Access
ICT-	Information and Communications Technology
IMT-	International Mobile Telecommunication
IoT-	Internet of Things
ITU -	International Telecommunication Union
LTE-	Long Term Evolution
M2M -	Machine to Machine
NFV -	Network Function Virtualization
RAT -	Radio Access Technology
RAN-	Radio Access Network RF -Radio Frequency

REFERENCE

- [1] A. gupta, R.k. jha "A Survey of 5G Network: Architecture and Emerging Technologies", in IEEE Accesson july
- [2] Mamta agrawal, Abhishek roy, Navrati saxena "Next Generation 5G Wireless Networks: A Comprehensive Survey", in IEEE communications society on 19 february 2016
- [3] Rupendra Nath Mitra, Dharma p. Agrawal, "5G mobile technology: A survey", published on science direct in December 2015
- [4] Shekhar yarrabothu, Dr j. mohan A Survey Paper On 5G Cellular Technologies- Technical & Social Challenges
- [5] "5G: Personal Mobile Internet beyond What Cellular Did to Telephony", Gerhard Fettweis, Siavash Alamouti, IEEE Communication Magazine, February 2014.