

THE IMPLEMENTATION OF 5G SYSTEM TO MEASURE ENERGY EFFICIENCY AND THROUGHPUT IN END-TO-END COMMUNICATION IN THE INFRASTRUCTURE NETWORKS

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Abstract – 5G expanded as fifth generation wireless technology. The latest iteration of cellular technology has three main features which is greater speed, lower latency, and the ability to connect a lot more devices simultaneously. 5G system will be compatible with existing technologies such as 4G, 3G, 2G, Wi-Fi etc. and will support more than ten thousand times data traffic compare to 4G and data downloading more than thousand times compare to 4G. Where 5G will run on Ultra High Spectrum Band that will carry the future internet, it is not only evolution but it is a revolution in communication era. From this, we present several emerging technologies that support 5G standard along with challenges and research problems for 5G systems.

Key Words: 5G Challenges, 5G Connectivity

1. INTRODUCTION

The fifth-generation wireless system is now the next generation of wireless communication system. The time has come when we connect various wireless technologies, network and application simultaneously. This latest technology called 5G. It supports interactive multimedia, voice, video, internet and other broadband services. 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 service over wireless broadband. Whereas 5G is not expected until 2020, an increasing number of companies are investing now and are creating 5G products. Communication scheme in 5G network will support full duplex mode (FD). By using FD communication scheme, spectral efficiency will be doubled at the physical layer. Radio Frequency (RF) signals carry energy and information simultaneously. Also 5G network will optimize the energy. Cloud-based radio access network (CRAN) will be used to reduce the capital expenditure and operational expenditure. C-RAN will make scheduling relatively easy. Sharing the common

resources like network infrastructure and licensed spectrum, RAN is possible by using wireless network virtualization (WNV) to reduce capital as well as operational expenditure.

ULTI-ANTENNA TRANSMISSION (MIMO): MIMO technology already plays an important role for 4G wireless communication system and will play important role in the 5G communication system, i.e., for operation at higher frequencies as well as the use of MIMO System for beam forming to support the system at high as well as low frequency.

ULTRA RADIO ACCESS DESIGN (RAN): It will be used to transfer high data rate from device to device, it will also include synchronization mechanism for signals, network acquisition and estimation techniques.

2. WORKING OF 5G

As any other cellular network, 5G networks will consists of cells divided into sectors and send data through radiowaves. Each cell is connected network backbone through a wired or wireless connection. It promises a smarter, faster, and efficient network. The network which are wireless, we normally divide them into parts. So that we can send the data using radio waves. The previous technology was using the less frequency of order. The industry is also using the less frequency collaboration connection. Less frequency will get bigger distance. The order of connection between to 20 to 400 GHZ for high speed and to reach the destination in less distance. As I said in 5G technology we will have multiple connection so that we can cover the area and for millimeter waves order as well.

In millimeter waves we face a problem with area means how much area we have to cover, using 5G, accordingly less frequency collaboration network could be used to

build their network. We have mentioned that in 5G technology we use antenna to cover the whole area or any other location, in that case we use small-small cells to cover. Before we were not using that but in today's Date, we do this. By every cell when we move from one to another then we get another cell network that is how antenna or cells are working in 5G technology.

2.1 STATUS OF 5G

In the four countries- china, japan, south Korea and united states. In these few countries 5G technologies are available. In these countries much and more money business has invested for 5G. many countries where 5G is not available yet even. Now in case we have 5G technology in our country than we should we have a 5G smart phone as well. In the market Samsung and apple are the only two companies are there who provide 5G phone. So, if we want to use 5G technology than we must have to buy a 5G phone as well.

2.2 WILL WE HAVE 5G

We already have 5G, but we don't have the smart phones yet. We are not able to use 5G technology. The 5G technology has been launched already in the countries, so there is some condition as well we have. Like as I said in the market only more than 2 mobile phones are available for 5G technology. With that phone only we can use 5G technology otherwise not, because these cell phones are compatible with 5G technology

3. LITERATURE SURVEY

[1] **Bego Blanco**, discusses current standardization situation of 5G and the role network softwarization plays in order to address the challenges the new generation of mobile networks must face. This paper surveys recent documentation from the most stakeholders to choose out the utilization cases, eventualities and rising vertical sectors which will be enabled by 5G technologies, and to spot future high-level service needs. Driven by those service needs 5G systems can support various radio access technology eventualities, meet end-to- user seasoned needs and supply capability of versatile network preparation and economical operations.

[2] **Rupendra NathMitra** , discussed all new 5G expected to be operational by 2020. This time, it is therefore crucial to know the direction of research and developments enabling 5G technology. This paper provides an inclusive and comprehensive analysis of recent developmental endeavors toward 5G. It highlights salient features, i.e., flexibility, accessibility, and cloud based service offerings; those are going to

ensure the futuristic mobile communication technology as the dominant protocol for global communication.

3. TECHNICAL CHALLENGES

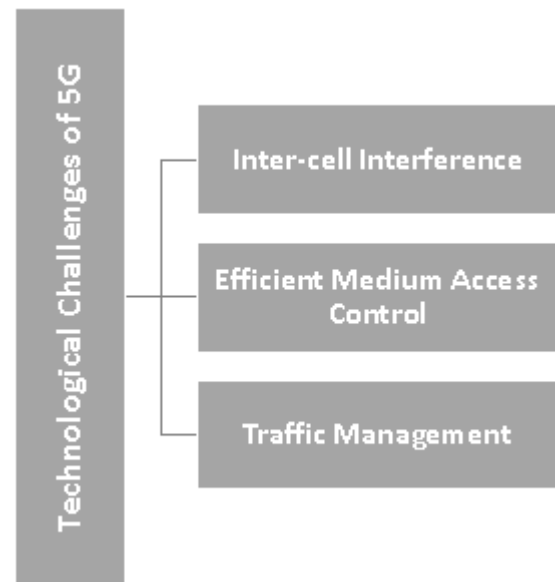


Fig 1: Technological Challenges in 5G

- **Inter-cell Interference** – this is often one in all the most important technological issues that require to be solved. there's variations in size of traditional macro cells and concurrent small cells that may cause interference.
- **Efficient Medium Access Control** – in an exceedingly situation, where dense deployment of access points and user terminals are required, the user throughput are going to be low, latency are high, and hotspots won't be competent to cellular technology to supply high throughput. It must be researched properly to optimize the technology.
- **Traffic Management** – as compared to the quality human to human traffic in cellular networks, a wonderful variety of Machine to Machine (M2M) devices in an exceedingly} very cell might cause serious system challenges

4 .COMMON CHALLENGES



Fig -2: Common Challenges in 5G

- Multiple Services – not like different nonparticulate radiation services, 5G would have a massive task to provide services to heterogeneous networks, technologies, and devices operational in many geographic regions.
- Communication, Navigation, & Sensing – These services for the most part depend upon the availability of spectrum, through that signals square measure transmitted. although 5G technology has sturdy procedure power to method the large volume of data returning from completely different and distinct sources, however it desires larger infrastructure support.
- Security and Privacy – typically this can be often one in every of the foremost vital challenges that 5G needs to make certain the protection of personal information. 5G can ought to outline the uncertainties related to security threats as well as trust, privacy, cybersecurity, that square measure growing across the globe.
- Legislation of Cyberlaw – law-breaking and different fraud might increase with the high speed and present 5G technology. Therefore, legislation of the Cyberlaw is to boot a crucial issue, that for the most part is governmental and political (national more as international issue) in nature.

5. APPLICATIONS OF 5G

Some of the significant applications of 5G Connectivity are

- The 5G Connectivity makes the whole world a global standard for all the people

- There will always be Network availability which will facilitate the people to use their laptops, pc and other kind of mobile devices as well in any location at their preferred usage time.
- Since the usage of IPv6 technology in 5G Networking, it is now much easier to assign mobile IP address as per the connected network in the perfect geographical position.
- It will make the whole region as a Wi Fi zone based on 5G Connectivity.
- The cognitive radio technology available in the 5G Technology will make use of variety of versions of available radio technologies to share the same signal spectrum efficiently.
- Peoples located in the higher altitudes can now access the 5G connectivity as well

6. CONCLUSION

5G systems are seemingly to be way more numerous and accustomed encapsulate all existing technologies for all time accessibility, higher coverage space and better network density with relevance cell and devices, and can support quite 10 thousand-fold knowledge traffic compare to 4G and knowledge downloading is quite one thousand times compare to 4G. However, the implementation of 5G system has to measure; the way to optimize energy potency and turnout in end-to-end communication within the infrastructure networks, the way to portion the whole transmission energy into parallel coded channels of the multiple input multiple output (MIMO) system, so upper-bound turnout will be achieved and the way to cope with the correlate channel within the MIMO system and additionally has to live the important co-relation by some existent or newer recursive implementations.

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