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THE FIFTH GENERATION AND COMPARISON WITH EARLIER GENERATIONS

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***Abstract*-Over the year's technology has been changed in a rapid fashion. In similar fashion Generations has been changed. Take a look back in past decades, starting from the 1G in 1980's, 2G in 1990's, 3G in 2000's, 4G in 2010's and now 5G in near future in 2020's. Consumer and Industry for both 5G offers enormous potential that holds the promise of applications with high social and economic value. The main feature of 5G technology is that multiple wireless devices can connect easily with each other and also switch between them. This paper throws light on global researches made on 5G, Advantages and Disadvantages, Requirement and capabilities, and Key components for 5G.**

I. INTRODUCTION

Discussion around 5G most commonly falls in to two categories. The first one is service led view which sees 5G as consolidation of 1G,2G,3G,4G,WiFi and other innovation that provide greater coverage with reliability. The Second one is change in data speed and order of magnitude reduction change in end to end latency. When the word 5G comes in a mind, usually the one is think about data speed. But it's just not about data speed; it's about the innovation that will change people lives. It means opportunities for properly connected smart cities, remote surgery, driverless cars and the 'Internet of things'.

II. GLOBAL RESEARCHES MADE ON 5G

The scientist of all around the world is more excited to develop 5G. They say 5G will be different and very different. The global race is going on to develop 5G. while the 5G follows the blend of pre-existing technology covering 1G, 2G, 3G, 4G, WiFi and other to allow higher coverage and availability. Here the some of the activities that have been happened around the world:-

1. Ericsson predict that 5G's latency will be around one millisecond - unperceivable to a human and about 50 times faster than 4G.

2. In South Korea, which spearheaded work on 4G, Samsung hopes to launch a temporary trial 5G network in time for 2018's Winter Olympic Games.

3. Not to be outdone, Huawei is racing to implement a version for the 2018 World Cup in Moscow.

4. Docomo successfully conducts 5G trials in actual use environment with Nokia, Samsung, Ericsson, Fujitsu, and Huawei.

Despite such apparent rivalries and the huge sums each is investing in R&D, the bigger story is that they are co-operating to deliver 5G. And that in turn paves the way for potentially unmatched new technologies.

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Comparison of all Generations

Technology	Start/ Deployment	Data Bandwidth	Technology	Service	Multiplexing	Switching	Core Network
1G	1970-1980	2 Kbps	Analog Cellular Technology	Mobile Telephony	FDMA	Circuit	PSTN
2G	1990-2004	64Kbps	Digital Cellular Technology	Digital Voice, SMS, Packetized Data	TDMA, CDMA	Circuit, Packet	PSTN
3G	2004-2010	2 Mbps	CDMA2000,UMTS,EDGE	Integrated High Quality Audio Video & Data	CDMA	Packet	Packet N/W
4G	Now	1 Gbps	Wi-Max LTE,Wi-Fi	Dynamic Information Access, Wearable devices	CDMA	All Packet	Internet
5G	Soon 2020	Higher Than 1Gbps	Coming Soon	Dynamic Information Access, Wearable devices with AI capabilities	CDMA	All Packet	Internet

III. 5G REQUIREMENTS AND CAPABILITIES

System Capacity-: System Capacity Should is massive to use 5G because traffic for Mobile Communication increased day by day. So 5G Networks be able to deliver data with lower Cost per bit compared to other Network and same preferably able to operate with lower energy consumption compared with other networks. Another discussion about the capacity. 5G systems have the capacity to connect large number of devices. For example deployment of billion of wirelessly connected devices, sensors and actuators jointly have a very little impact on overall traffic volume.

High Data Rates-: Obviously 5G have higher data rates capabilities compared to previous generations. Higher the data rates capabilities means better the real life condition in different scenario.

1. In different scenario such as indoor and outdoor environment 5G should be able to provide data rate exceeding to 10 Gbps.
2. 100 Mbps should be generally achievable in every condition.
3. 10 Mbps should be essentially achievable everywhere including rural and urban areas of both developing and developed countries.

Availability with High Reliability-: For critical services like driverless cars, remote surgery, traffic safety 5G should enable connectivity with high reliability and availability. It can be achieved bandwidth >1 Gbps.

Low Latency-: Low Latency refers the time tag between request and response it always been key target for every generation. Every New generation have the lower latency than the previous generation. The main purpose of low latency to achieve higher data rates some of 5G applications such as remote surgery, traffic safety, driver less cars and internet of things, may required much more lower latency compared with what is possible today's, mobile network. A true generational shift required latency less than 1MS (End to End latency)

Very Low Energy Consumption and Cost-: Very low energy consumption and cost has always been the key requirement for every generation. However 5G connects billion of devices, sensors, actuators and other devices. So it should be possible for such 5G devices to be available at very low cost and with years of battery life.

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Energy Performance-: Operational cost can be reduced with the help of high every performance there for it is an important factor that will further increase one more step in the 5G Era.

IV. 5G TECHNOLOGY COMPONENTS

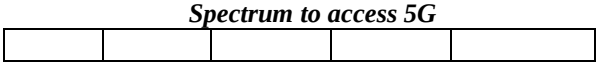
Multi-Antenna Transmission-: Antenna Transmission plays an important role in previous Generation. It will also play even more important role in 5G Era. The use of multiple antennas for beam forming, especially for the operation at higher frequency. This will helpful in extend coverage and to provide higher data rates in sparse deployment.

Ultra-Lean design-: This design is Important for dense deployment where number of network nodes and highly variable traffic conditions. It is also an important component for high network energy performance. Higher data rates are also achievable by ultra lean design by reducing interference from non-user data related transmissions.

User Separation-: User separation is also an important component for future 5G Era The Separation of system control functionality and user data delivery should be possible to extend over multiple frequency band and RAT'S. Such kind of separation and ultra lean design allow a system where everything can be dynamically optimized in a real time.

Flexible Spectrum-: The another important component is flexible spectrum for 5g It is still the topic of discussion what spectrum in higher frequency bands will be made for 5G communication lower frequencies will remain the backbone for communication in the 5G Era but it important to understand the frequency above 10 GHz.

Spectrum to access 5G



Device to device communication-: D2D Communication as an extension to LTE Specification. D2D Communication in the context of 5g should be considered the overall wireless access solution rather than a standalone solution. In order to avoid uncontrolled interference to other links, D2D Communication should be under Network control. In 5G Era support for D2D should be consider as a wireless access solution from the start it's include peer to peer user data communication directly between devices.

Backhaul/Access Integration-: In 5G Era, Wireless Access link and wireless backhaul should not be seen as separate entities. Both of than should be seen as integrated wireless access solution able to use same technology. This will lead more efficiently utilization as will as reduced operation and management effort.

V. ADVANTAGES OF 5G

There are several advantages of 5G. Some of the common advantages have been shown below-:

1. The main advantage of 5G is 'Internet of Things' that means cities will be smart, cars will be driverless, remote surgery will be possible, enhancement in traffic safety etc.

2. Natural disaster like Tsunami and earthquake can be detected faster.

3. Universe, galaxies, planets can be easily visualized.

4. Home appliances like TV's, Pc's, Ac's, and Refrigerator can be easily controlled by mobiles.

VI. DISADVANTAGES OF 5G

Still the development of 5G is under processed so it will be very early to talk about disadvantages. There are some of the problems that can occur:-

1. It will be very difficult to get technical support for faster data speed.

2. The existing devices will not be support 5G technology.

3. Security and privacy is the another issue that has been yet to be solved.

4. It requires high infrastructure cost.

VII. CONCLUSION

5G technology changed the mean to use wireless devices. User will have never experience such a high value technology before. Nowadays, users have much awareness about technology. 5G is the next step in evolution in the wireless technology. The capabilities of 5G access will be extend far beyond than the previous generations. These capabilities include high achievable data rates, very low latency, ultra high reliability. Key components of 5G access include higher frequency bands, multi-antenna transmission, flexible spectrum, D2D communication, backhaul/access integration and use separation. The new coming 5G technology will available

in market in affordable rates, high peak future and much reliability than its preceding technologies.

VIII. REFERENCES

http://www.ericsson.com/res/docs/whitepapers/wp-5g.pdf

https://gsmaintelligence.com/research/?file=141208-5g.pdf&download

https://www.nttdocomo.co.jp/english/info/media_center/pr/2015/1126_00.html

http://www.tutorialspoint.com/5g/5g_advantages_disadvantages.htm

Glossary-:

D2D	Device-to-Device
RAT	Radio access technology
LTE	Long term evolution