

Technical Advancement and Social Challenges Associated with Functional Capabilities of 5G Cellular Technologies

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Abstract: Industries started working on the 5G Technology, as 4G is existing one. There are queries that are discussed among Research and Development Institutions, Service Providers, Suppliers, and Governments about the time frame for deployment of 5G, the technologies that can be used for 5G network. This paper analyzes the questions in a sequence, various requirements, cases, spectrum requirements, need, and technical aspects for 5G network. In Chapter II the 5G functions are detailed that includes the capability of Internet of Things (IoT), 4K Video, Safety measure for the Public and Computing Technology. Chapter III discusses the 5G requirements. Chapter IV briefs the key technologies being developed for 5G network and their application in 5G system. The other problems such as computing, information handling and social issues are discussed in Chapter V. In this paper, we conclude with end-to-end 5G echo system, considering all 5G network problems are evaluated.

Keywords — 4G, 5G, M2M, Internet of Things (IoT), EMF, Cyber law.

This document provides the 5G network overview where the phone can define the communication connection for quicker transmission of information [1-6].

Table 1. 5G Parameters of Performance

Performance	5G
Data rate	10 Gbps uplink and 20 Gbps downlink .
Connectivity	1 million devices connected per square kilometer.
Mobility	High Speed Vehicular 500 km/hr.
Energy Efficiency	Used when load is present.
Spectral Efficiency	15 bits/Hz uplink and 30 bits/Hz downlink.

I. INTRODUCTION

Mobile Communication system has existed and how each generation has brought its improvement from 1G, 2G, 3G & 4G. To shape the fifth-generation wireless access to have good connectivity and coverage. The industry is working on the 5G requirements, to provide a system with short timeframe, where the data can be sent in faster manner with high speed. This paper briefs a survey on 5G techniques to address Wireless networks' requirements, technical challenges and challenges. This paper also provides a note on new technical solutions that can be used to better serve the general public for 5G demands. It should be possible to merge the 5G Mobile Communication with multiple fresh methods. The network will be more reliable in handling the system's user mobility and variety of coverage. The 5G network will create the necessary choice for a separate service between distinct wireless access network suppliers.

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II. FUNCTION OF 5G

A. Internet of Things (IoT)

It will be common to have Machine to Machine communication, IoT to be used to connect a greater number of devices simultaneously. Device to Device public safety communication can be carried out without an active cellular coverage. From a Remote location you would be able to access the system for real time operation. Using IoT bulk data are being changed into small data. It's used in Health Care, Automotive Industries, Smart Cities and Telemedicine [7].

B. Computing Methods

The Customer whose device is connected to the Internet face the situation of consistently receiving information which are not required by them. Edge Computing Technology provide the correct information at the exact time by a right way to the users. The Internet sends the customer with the correct information instead the Customer searching for the information [8].

C. Safety Measure for the Public

Korea and China are in development of 5G network at lower cost for the public. Other nation is also working on development of 5G network. Reduction in EMF exposure will help the radiation from the mobile to be less. Using of High-resolution cameras in

public spaces would be helpful in continuously monitoring the Safety of public in various location. Emergency personnel tracking, surveillance and tracking of vehicle can also be made in remote areas using 5G network [9].

III. 5G REQUIREMENTS

By accounting most of the needs of 5G requirements the following are gaining industry ratification

- 25 Gbps connections to endpoints.
- Bandwidth is large and bidirectional.
- Connected devices are 10-100 numbers.
- Availability of the network is 100%.
- Coverage area 100%.
- End to End network data capacity needs to be increased.
- Low power devices - battery life can be increased 10-year.

The main problems with the 5 G requirements are that many different industries want the new 5 G wireless scheme to meet their own needs. All together, no technology will fulfill all their requirements. [10].

IV. VARIOUS 5G TECHNOLOGIES

The various 5G technologies to address the Computation methods are discussed in Chapter II, and the 5G requirements are briefed in Chapter III. [11-14].

The following are identified as technologies:

- New Radio
- Millimeter-Wave communications
- Multiple Access
- Mobility
- Design
- Small Cells
- Device-to-Device Communications
- Data driven Technology
- Cognitive Radio Technology
- Dense Networks
- OFDM

V. 5G CHALLENGES

The 5G has its own set of challenges it must face like designing a new phone which supports the 5G network, how it going to fit the performance, mobility and life of the battery being used. Here, we will discuss other area challenges in 5G network [15-20].

A. Inter Cell Interface

With 5G there would be a large change in cell from traditional macro cells and small cells that leads to interference of the signal in the network.

B. Medium Access control

With 5 G, where entry points and customer terminals are very important, where customer throughput will be very small, latency will be very large, and current hotspots will not be good for wireless computing to deliver elevated

performance. To optimize the software used for access command, it requires to be correctly evaluated.

C. Traffic Management

The person-to-person traffic in 5 G networks has to be addressed with 5 G, as a large number of Machine-to-Machine (M2 M) phones in a cell would trigger system problems, i.e. radio access network (RAN) problems, where the signal overload creates traffic congestion.

D. Cyberlaw

As, 5G networks provide higher speed where there are possibilities for cybercrime and fraud. So, legal and regulation of the Cyberlaw is also an important thing to be addressed by the Government to put some guidelines in information sharing.

E. Security and Privacy

As, 5G networks provide the high data rate , the data sent at higher speed has a security threat and it should be overcome by the Cyber security industry, New software should be used to protect the personal data of users.

VI. CONCLUSION

The wireless technologies used for 5G network should provide a single framework where feasibility studies should be carried out to identify the future technologies that can be used for further development of the network. There are no standards has been defined for 5G, so the companies and government should work on it to develop the 5G network at the earliest. New technologies should be added so that 5G has all the feature advancements and it can be deployed in 2020. It is to make a 5G system which satisfies all the need of the customers and industries, so it helps in faster transmission of data.

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