A Seminar Report on

"5G Technology"

Submitted

by

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Mr. Piyush Warke (Roll No: 61)

has completed the necessary Seminar work and prepared the report on

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in satisfactory manner as a fulfillment of the requirement of the award of degree of Bachelor of Computer Engineering in the Academic year 2018-2019

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by

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Abstract

What will 5G be? What it will not be is an incremental advance on 4G. The previous four generations of cellular technology have each been a major paradigm shift that has broken backward compatibility. So we expect that 5G will be a paradigm shift that includes very high carrier frequencies with massive bandwidths, extreme base station and device densities, and unprecedented numbers of antennas. However, unlike the previous four generations, it will also be highly integrative: tying any new 5G air interface and spectrum together with LTE and WiFi to provide universal high-rate coverage and a seamless user experience. To support this, the core network will also have to reach unprecedented levels of flexibility and intelligence, spectrum regulation will need to be rethought and improved, and energy and cost efficiencies will become even more critical considerations. In this seminar we discuss the new thoughts which would improve the efficiency like using mm-waves, small cell, and smart antenna. Then we discuss some of the emerging applications based on 5G. In addition, we mentioned some challenges and open issues related to the previous generations and infrastructure boundaries that we have to considerate during designing 5G networks.

Contents

Chapter 1

Introduction

This chapter includes the introduction to technological advancements of telecommunication network generations from 1G to 5G.

1.1 1G to 5G Technology

The exchange of information or communication with the friends, relatives, and dear ones has become very easy and simple that just with a mobile phone we can be in touch with all of them.5G technology is the abbreviation of the fifth generation mobile technology. Wireless communication has commenced in early 1970s and after four decades of it, the technology has evolved from 1G to 5G.

From 1G to 5G the world of telecommunication is totally changed and now the aim of such industries is to furnish the best of the best services to the customers. The technical people worked very hard to furnish a smooth, undisturbed network and at last they released 5G technology which aims for such wireless telecommunication network. This 5G network offers the data bandwidth of greater than 1Gbps, furnishes CDMA multiplex and has the internet as the core network. Well, the 5G is not completely released but there are few countries which are using the 5G technology.

The fifth generation technology offers high bandwidth, many developed features and due to these parameters, it will have a huge demand in the future. Now-a-days various wireless and mobile technology networks are in use like fourth generation mobile networks, third generation mobile networks (UTMS which stands for Universal Mobile Telecommunication system, CDMA 2000), Long Term Evolution (LTE), Wi-Fi which is an IEEE 802.11 wireless network, WiMAX which is an IEEE 802.16 wireless network and

mobile networks, sensor networks and personal area networks which includes Bluetooth and ZigBee.

To all the wireless and mobile networks, the data and the signaling are transferred through the IP i.e. internet protocol or the network layer. Now, coming to the fifth generation technology it furnishes all the necessary and required facilities like mp3 recording, camera, video and audio player, large phone memory and with many more applications which the user have never imagined before.

This new period of telecommunication is going to begin and surely changes everything related to the cellular industries. In the coming years, the 5G technology will be in use because of its advancement, affordable cost, and possess a bright future that will keep it safe for years. The mobile multimedia internet networks can be totally the wireless without any limitations and make the networks as worldwide wireless web (WWWW).

This fifth generation is based on 4G technology as it is an advanced form of 4G and the internet networks are truly wireless which are supported by LAS-CDMA which stands for Large Area Synchronized-Code- Division Multiple Access, OFDM which stands for Orthogonal Frequency Division Multiplexing, MC-CDMA which stands for Multi-Carrier Code Division Multiple Access, UMB which stands for Ultra-wideband, Network-LMDS which stands for Local Multipoint Distribution Service and Ipv6. At the same time, 5G technology offers very large data capabilities, unlimited data broadcast with the mobile operating system. It makes the vital difference, give more services and advantages to the world when compared to 4G. The people are not availing it as these are just theories but before the innovation of 4G it was also a theory and now it is in existence which proves that theories are the base of every innovation. So, it is an intelligently applied science and connects with the entire world without any limits, the expected release of this technology is around is 2020.

In chapter 3, we study steps of major advancements of 5G technology over preceders. In chapter 4, we define architecture of 5G technology. In chapter 5, we survey challenges for deployment of 5G technology. In chapter 6, we define advantages and disadvantages of deployment of 5G.

Chapter 2

Literature Survey

During last two decades world has witnessed rapid evolution of cellular communication technologies from 2G GSM system to 4G Long Term Evolution Advanced (LTE-A). The main motivation has been the requirements of more bandwidth and low latency. Alongside throughput related performance enhancements, some allied parameters like jitter, inter channel interference and connectivity, scalability and compatibility with legacy networks are also taken under consideration. Bandwidth is the measurement of channel capacity or the maximum rate of information transfer possible over a noisy channel. It is generally not possible to send more data over a noisy channel above the Shannon limit and this is the maximum throughput of the channel. As throughput is the actual data transfer rate, it may be smaller than the available bandwidth. The other important parameter latency is the time delay between the sender sending the message and the receiver decoding the same after receiving. Latency largely depends on the processing speed of each of the node through which the data stream traverses. When we stepped from 2G GSM system into 3G UMTS system, we experienced higher network speed and faster download speed making real-time video call. LTE and subsequent LTE-A offered us with enhanced network capacity, reduced delay in app-server access making triple -play traffic (Data, Voice and Video) access possible wirelessly, anytime anywhere. So 4G is truly mobile broadband. Although 3G was first mobile broadband standard, it was originally designed for voice with some multimedia and data consideration. Whereas 2G was designed as 1st digital mobile voice communication standard for improved coverage than 1G analog basic voice services. So in digital mobile telephony, we have seen data rate improvements from 64 kbps in 2G to 2 Mbps in 3G and 50 to 100 Mbps in 4G. 5G is expected not only to enhance the data transfer speed of mobile network but also

to enhance scalability, connectivity and energy efficiency of the network. It is assumed that by 2020, 50 billion devices will be connected to the global IP network which seems to be a challenge [5]. Remote controlled operation over a reliable network will be possible with 5G network with zero-delay. A true Networked Society is emerging through internet of things (IoT) demanding real-time control of the machines by our mobile devices. Last but not the least is the requirement of low energy hungry network nodes towards a greener world. So the bottom line to describe 5G as a high throughput, low-latency, highly reliable, more scalable, energy efficient mobile communication technology.

In the recent years remarkable developments have been made in mobile and wireless networks. We may expect mobile phones may have Wax adapter also in spite of Bluetooth, WLAN etc. The ultimate aim is the need of larger bandwidth and lesser latency. Improvement in technologies goes far ahead from 2G GSM to 3G Universal Mobile Telecommunication System(UMTS) where networking and download speed increases allowing real time video calls. As far as 4G is concerned its main motivation was towards flawless incorporation of networks such as 3G and GSM. The improvement results as 2G which was for mobile voice communication while 3G for broadband standard designed for voice and some data consideration. As far as 4G is concerned it is for multimode consumer terminals and offers enhanced network capacity including all the three network traffics (data, voice and video) to access anytime, anywhere. The data speed varies from 64kbps in 2G to 2Mbps in 3G and 50-100 Mbps in 4G showing improvement of data speed in wide range. Now it is eagerly been expecting that 5G not only enhances the data transfer speed but also energy efficiency, flexibility, finest connectivity and also managing user mobility. It is been expected that 5G provides larger broadcasting of data in Gigabit and about 50 Billion devices would be connected to global IP network which is being the current challenge[1].

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.

Chapter 3

Advancement to 5G

3.1 Introduction to 5G

The 5G technology is expected to provide a new (much wider than the previous one) frequency bands along with the wider spectral bandwidth per frequency channel. As of now, the predecessors (generations) mobile technologies have evidenced substantial increase in peak bitrate. Then how is 5G different from the previous one (especially 4G)? The answer is it is not only the increase in bitrate made 5G distinct from the 4G, but rather 5G is also advanced in terms of -

- High increased peak bit rate
- Larger data volume per unit area (i.e. high system spectral efficiency)
- High capacity to allow more devices connectivity concurrently and instantaneously
- Lower battery consumption
- Better connectivity irrespective of the geographic region, in which you are
- Larger number of supporting devices
- Lower cost of infrastructural development
- Higher reliability of the communications

3.2 Difference between 5G and the previous mobile generations

- 5G networks expand broadband wireless services beyond mobile internet to IoT and critical communications segments.
- 4.5G (LTE advanced) networks doubled data speeds from 4G.
- 4G networks brought all-IP services (Voice and Data), a fast broadband internet experience, with unified networks architectures and protocols.
- 3.5G networks brought a true ubiquitous mobile internet experience, unleashing the success of mobile apps eco-systems.
- 3G networks brought a better mobile internet experience but with limited success to unleash massive data services adoption.
- 2.5G and 2.75G networks brought a slight improvement to data services, respectively with GPRS and EDGE.
- 2G networks brought digital cellular voice services and basic data services (SMS, Internet WAP browsing) as well as roaming services across networks.
- 1G networks brought mobility to analog voice services.

3.3 Specification Requirements

- Up to 10Gbps data rate i.e 10 to 100x improvement over 4G and 4.5G networks
- 1-millisecond latency
- 1000x bandwidth per unit area
- Up to 100x number of connected devices per unit area (compared with 4G LTE)
- 99.999% availability
- 100% coverage

- 90% reduction in network energy usage
- Up to 10-year battery life for low power IoT devices

Chapter 4

Architecture/Model

4.1 Design of 5G

The 5G mobile will have well connected core network and RAN. The ultimate focus of 5G is to provide adequate RF coverage with interconnection of many wireless networks. The architecture may be less complex and evolved to accommodate an increased amount of signaling and pay load overhead. The such less complex architecture of futuristic 5G , using mm-wave has been reported in Giga Korea. [2]Three Dimensional beam formation is achieved by using 2D array of patch antenna. Highly directive beams of radio transmission signals formed in 3D spaces emanating from patch antenna help to achieve Space Division Multiple Access (SDMA). Moreover to overcome the limited coverage of millimeter wave RAN , relay transmission is used and the handoff process may no longer be controlled by the core node but by rather by the base station. In 4G LTE, the base station or eNB performs this resource allocation task. For achieving better QoS, many algorithms were scheduled. 5G should make use of cognitive radio links based on game theoretic computation algorithms in case of macro cell-based operations, where beam-forming is not possible. Moreover, recent development in cloud based networking has triggered possibilities of virtualized core networks. A quick handoff capability between different beams makes the radio access technique robust, secure, and highly reliable.

4.2 5G Technologies

Architecture of 5G is highly advanced, its network elements and various terminals are characteristically upgraded to afford a new situation. Likewise, service providers can implement the advance technology to adopt the value-added services easily.

However, upgradeability is based upon cognitive radio technology that includes various significant features such as ability of devices to identify their geographical location as well as weather, temperature, etc. Cognitive radio technology acts as a transceiver (beam) that perceptively can catch and respond radio signals in its operating environment. Further, it promptly distinguishes the changes in its environment and hence respond accordingly to provide uninterrupted quality service.

5G is entirely IP based model designed for the wireless and mobile networks.The system comprising of a main user terminal and then a number of independent and autonomous radio access technologies. Each of the radio technologies is considered as the IP link for the outside internet world. The IP technology is designed exclusively to ensure sufficient control data for appropriate routing of IP packets related to a certain application connections i.e. sessions between client applications and servers somewhere on the Internet. Moreover, to make accessible routing of packets should be fixed in accordance with the given policies of the user.

Architecture of 5G is based on 5 brand new technologies emerging as a foundation of latest generation of communication network.

- mm Waves (Millimeter Waves)
- Small Cell Technology
- Massive MIMO (Multiple Input Multiple Output)
- Beam Forming
- Full Duplex (Point to Point Transmission)

4.3 mm Waves

The term mmWave refers to a specific part of the radio frequency spectrum between 24GHz and 100GHz, which have a very short wavelength. This section of the spectrum is pretty much unused, so mmWave technology aims to greatly increase the amount of bandwidth available. Lower frequencies are more heavily congested with TV and radio signals, as well as current 4G LTE networks, which typically sit between 800 and 3,000MHz. Another upside of this short wavelength is that it can transfer data even faster, though its transfer distance is shorter.

In a nutshell, lower frequency bands cover much greater distances but offer slower data speeds, while high-frequency bands cover much smaller areas but can carry much more data. MmWave is just part of the 5G picture, but carriers are particularly fond of talking about it because it allows for extremely high bandwidth and shows off the most impressive data speed figures.

The objective with mmWave is to increase the data bandwidth available over smaller, densely populated areas. It will be a key part of 5G in many cities, powering data in sports stadiums, malls, and convention centers, as well as basically anywhere data congestion might be a problem. Out in rural towns and villages, sub-6GHz and low bands below 2GHz will probably play a more crucial role in ensuring consistent coverage.

4.4 Small Cell Technology

As we are approaching 5G standard for wireless communication, the traditional network infrastructure has lot of limitation. 5G technology has to address many challenges in terms of data speed, reliability and latency specifications. In order to provide higher bandwidth signal and extend coverage for more users, 5G technology will have to use small cell concept.

Small cells are low power, short range wireless transmission systems (base stations) to cover a small geographical area or indoor / outdoor applications. However, small cells have all the basic characteristics of a conventional base stations and it is capable of handling high data rate for individual users. In LTE advanced and 5G deployments, small cells will play a significant role to efficiently deliver high speed mobile broadband and other low latency applications.

Small cells are further divided into three major categories based the coverage area and number of users it can support.

4.4.1 Femtocells

Femtocells are basically small mobile base stations designed to provide extended coverage for residential and enterprise applications. Poor signal strength from mobile operators base stations can be solved using Femtocell implementation. Femtocells are primarily introduced to offload network congestion, extend coverage and increase data capacity to indoor users.

Coverage area	10 meters to 50 meters (indoors)
Power	Typically 100 milliwatts
Number of users	8 to 16 users
Backhaul	Wired, fiber connection
Application	Indoor (primarily for indoor application, can be used for outdoor applications)
Cost	Low cost

4.4.2 Picocells

Pico cells are another category of small cells suitable for small enterprises applications for extended network coverage and data throughput.

Coverage area	100 meters to 250 meters (indoors)
Power	Typically 250 milliwatts
Number of users	32 to 64 users
Backhaul	Wired, fiber connection
Application	Indoor applications (offices, hospitals, shopping centre and schools)
Cost	Low cost

4.4.3 Microcells

Micro cells are designed to support slightly large number of users compared to femtocells and pico cells. Due to high transmission power, it is capable to cover larger cells size and suitable for application like smart cities, smart metro etc

Coverage area	500 meters to 2.5 kilometers
Power	2 to 5 watts
Number of users	up to 200 simultaneous users
Backhaul	Wired, fiber connection and microwave links
Application	Outdoor Applications
Cost	Medium cost

4.5 Massive MIMO

Massive MIMO is the currently most compelling sub-6 GHz physical-layer technology for future wireless access. The main concept is to use large antenna arrays at base stations to simultaneously serve many autonomous terminals. The rich and unique propagation signatures of the terminals are exploited with smart processing at the array to achieve superior capacity. In MU-MIMO/mMIMO, the base station applies distinct precoding for the data stream of each UE where the location of the UE, as well as the location of all the other UEs, are taken into account to optimize the signal for target UE and at the same time minimize interference to the other UEs. To do this, the base station needs to know how the downlink radio channel looks like for each of the UEs. Massive MIMO splendidly offers two most desirable benefits:

1. Excellent spectral efficiency

Achieved by spatial multiplexing of many terminals in the same time-frequency resource. Efficient multiplexing requires channels to different terminals to be sufficiently different, which has been shown to hold, theoretically and experimentally, in diverse propagation environments. Specifically, it is known that Massive MIMO works as well in line-of-sight as in rich scattering [3].

2. Superior energy efficiency

By virtue of the array gain, that permits a reduction of radiated power. Moreover, the ability to achieve excellent performance while operating with low-accuracy signals and linear processing further enables considerable savings.

4.6 Beam Forming

Beamforming is a traffic-signaling system for cellular base stations that identifies the most efficient data-delivery route to a particular user, and it reduces interference for nearby users in the process. Depending on the situation and the technology, there are several ways to implement it in 5G networks.

Beamforming can help massive MIMO arrays, which are base stations arrayed with dozens or hundreds of individual antennas, to make more efficient use of the spectrum around them. The primary challenge for massive MIMO is to reduce interference while transmitting more information from many more antennas at once. At massive MIMO base stations, signal-processing algorithms plot the best transmission route through the air to each user. Then they can send individual data packets in many different directions, bouncing them off buildings and other objects in a precisely coordinated pattern. By choreographing the packets movements and arrival time, beamforming allows many users and antennas on a massive MIMO array to exchange much more information at once.

For millimeter waves, which are high-frequency waves expected to play a key role in 5G networks, beamforming is primarily used to address a different set of problems: Cellular signals are easily blocked by objects and tend to weaken over long distances. In this case, beamforming can help by focusing a signal in a concentrated beam that points only in the direction of a user, rather than broadcasting in many directions at once. This approach can strengthen the signals chances of arriving intact and reduce interference for everyone else.

4.6.1 Digital beamforming

The signal is pre-coded (amplitude and phase modifications) in baseband processing before RF transmission. Multiple beams (one per each user) can be formed

simultaneously from the same set of antenna elements. In the context of LTE/5G, MU-MIMO equals to digital beamforming. Multiple TRX chains, one per each simultaneous MU-MIMO user, are needed in the base station. Digital beamforming (MU-MIMO) is used in LTE Advanced Pro (transmission modes 7,8, and 9) and in 5G NR. Digital beamforming improves the cell capacity as the same PRBs (frequency/time resources) can be used to transmit data simultaneously for multiple users.

4.6.2 Analog beamforming

The signal phases of individual antenna signals are adjusted in RF domain. Analog beamforming impacts the radiation pattern and gain of the antenna array, thus improves coverage. Unlike in digital beamforming, only one beam per set of antenna elements can be formed. The antenna gain boost provided by the analog beamforming overcomes partly the impact of high pathloss in mmWave. Therefore analog beamforming is considered mandatory for the mmWave frequency range 5G NR.

4.6.3 Hybrid beamforming

Hybrid beamforming combines the analog beamforming and digital beamforming. It is expected that mm-wave gNB (5G base station) implementations will use some form of hybrid beamforming. One approach is to use analog beamforming for coarse beamforming, and inside the analog beam use a digital beamforming scheme as appropriate, either MU-MIMO or SU-MIMO.

4.7 Full Duplex

Today's base stations and cellphones rely on transceivers that must take turns if transmitting and receiving information over the same frequency, or operate on different frequencies if a user wishes to transmit and receive information at the same time. With 5G, a transceiver will be able to transmit and receive data at the same time, on the same frequency.

5G technology is known as full duplex, and it could double the capacity of wireless networks at their most fundamental physical layer: Picture two people talking at the same time but still able to understand one anotherwhich means their conversation could take half as long and their next discussion could start sooner.[4]

With full duplex and other 5G technologies, engineers hope to build the wireless network that future smartphone users, VR gamers, and autonomous cars will rely on every day. Already, researchers and companies have set high expectations for 5G by promising ultralow latency and record-breaking data speeds for consumers. If they can solve the remaining challenges, and figure out how to make all these systems work together, ultrafast 5G service could reach consumers in the next five years.

Chapter 5

Challenges

5.1 Technological Challenges

5.1.1 Inter-cell Interference

This is one of the major technological issues that need to be solved. There is variations in size of traditional macro cells and concurrent small cells that will lead to interference.

5.1.2 Efficient Medium Access Control

In a situation, where dense deployment of access points and user terminals are required, the user throughput will be low, latency will be high, and hotspots will not be competent to cellular technology to provide high throughput. It needs to be researched properly to optimize the technology.

5.1.3 Traffic Management

In comparison to the traditional human to human traffic in cellular networks, a great number of Machine to Machine (M2M) devices in a cell may cause serious system challenges i.e. radio access network (RAN) challenges, which will cause overload and congestion.

5.2 Common Challenges

5.2.1 Multiple Services

Unlike other radio signal services, 5G would have a huge task to offer services to heterogeneous networks, technologies, and devices operating in different geographic regions. So, the challenge is of standardization to provide dynamic, universal, user-centric, and data-rich wireless services to fulfil the high expectation of people.

5.2.2 Infrastructure

Researchers are facing technological challenges of standardization and application of 5G services.

5.2.3 Communication, Navigation, Sensing

These services largely depend upon the availability of radio spectrum, through which signals are transmitted. Though 5G technology has strong computational power to process the huge volume of data coming from different and distinct sources, but it needs larger infrastructure support.

5.2.4 Security and Privacy

This is one of the most important challenges that 5G needs to ensure the protection of personal data. 5G will have to define the uncertainties related to security threats including trust, privacy, cybersecurity, which are growing across the globe.

5.2.5 Legislation of Cyberlaw

Cybercrime and other fraud may also increase with the high speed and ubiquitous 5G technology. Therefore, legislation of the Cyberlaw is also an imperative issue, which largely is governmental and political (national as well as international issue) in nature.

5.3 Challenges from 4G

5.3.1 Many user terminals

Using 4G there is a single user terminal which will operate in different wireless network that has many design restrictions like size, cost and power consumption. By using software radio approach, this trouble can be eliminated.

5.3.2 Wireless systems-different choices

All wireless systems have distinctive roles and specific service at a particular place and time. The choice will be made fit according to the requirements of consumers.

5.3.3 Network infrastructure and QoS support

Integrating the current non-IP and IP-based systems and providing QoS assurance for end-to-end services that engage different systems is a challenge.

5.3.4 Protection

A design of adaptive and light weight mechanism should be made

5.3.5 Difficulties in charging and billing

It is a very hectic task for maintaining and handling the datas of service and the relative billings of different costumers.

5.3.6 Attacks on Application Level

Software applications which will offer an new feature to the consumer but will commence new bugs.

5.3.7 Jamming and spoofing

Spoofing is fake GPS signals being sent out, in which case the GPS receiver considers that the signals arrives from a satellite and computes the wrong coordinates. Criminals can make use of such techniques. Jamming occurs when a transmitter sending out signals at the same frequency shifts a GPS signal.

5.3.8 Charging and Billing

It is hard to accumulate, handle and accumulate the Consumers account information from many service providers. In the same way Consumers billing is also a difficult task.

5.3.9 Encryption of data

GPS receiver on communicating with main transmitter, The link formed between these two are easy to break and thus we can make use of the lost data.

Chapter 6

Advantages and Disadvantages

5th generation technology offers a wide range of features, which are beneficial for all group of people including, students, professionals (doctors, engineers, teachers, governing bodies, administrative bodies, etc.) and even for a common man.

6.1 Advantages

There are several advantages of 5G technology, some of them are described below -

6.1.1 Technical Advantages

- High resolution and bi-directional large bandwidth shaping.
- Technology to gather all networks on one platform.
- More effective and efficient.
- Technology to facilitate subscriber supervision tools for the quick action.
- Most likely, will provide a huge broadcasting data (in Gigabit), which will support more than 60,000 connections.
- Easily manageable with the previous generations.
- Technological sound to support heterogeneous services (including private network).

- Possible to provide uniform, uninterrupted, and consistent connectivity across the world.

6.1.2 Advantages for common people

- Parallel multiple services, such as you can know weather and location while talking with other person.
- You can control your PCs by handsets.
- Education will become easier - A student sitting in any part of world can attend the class.
- Medical Treatment will become easier frugal A doctor can treat the patient located in remote part of the world.
- Monitoring will be easier - A governmental organization and investigating offers can monitor any part of the world. Possible to reduce the crime rate.
- Visualizing universe, galaxies, and planets will be possible.
- Possible to locate and search the missing person.
- Possible, natural disaster including tsunami, earthquake etc. can be detected faster.

6.2 Disadvantages

Though, 5G technology is researched and conceptualized to solve all radio signal problems and hardship of mobile world, but because of some security reason and lack of technological advancement in most of the geographic regions, it has following shortcomings -

- Technology is still under process and research on its viability is going on.
- The speed, this technology is claiming seems difficult to achieve (in future, it might be) because of the incompetent technological support in most parts of the world.

- Many of the old devices would not be competent to 5G, hence, all of them need to be replaced with new one - expensive deal.
- Developing infrastructure needs high cost.
- Security and privacy issue yet to be solved.

Chapter 7

Conclusion

5G technology is the upcoming technology and the bandwidth for this is very high and was having higher data transfer rate. However, now we are using the 3G technology efficiently and in some countries the people are using the 4G but in future we can use the 5G technology. Many big countries are investing huge amount of money on this project as it was having high demand in the future. It will altogether manufacture flexibility, limit, degree, comparability and meeting. Thus, it will satisfy the growing solicitations of rising bigdata, cloud, machine-to-machine, and diverse applications.

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