

Review on Future Generation Technologies of Wireless Communication

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Abstract: The fourth generation wireless communication systems are already implemented or going to be implemented in many countries, however there are still some challenges that could not solved even in 4G such as spectrum problem, power consumption, poor coverages etc. Still there are many features that some smart mobile do not support yet. This includes mobile television support to receive live programmes, multi user networked three-dimension games, realistic 3D scene rendering and high definition visuals. The lack of these functions are due to computational capabilities and power constraints of the mobile devices, available bandwidth and transmission efficiency of the wireless network, universal access capability of the infrastructure, and the compression and error control efficiency of video and graphics data. Mobile phones are moving faster to provide the user the same or even better experience than the personal computer, but there is long way ahead. From a mobile communication point of view, it is expected to have a higher data transmission rate as comparable to wire line network. Also the expectation is over service and support for seamless connectivity and access, the wireless designers have started research on the fifth generation wireless system that are expected to be deployed after 2020, in this paper we discussed various promising technology for existing wireless communication system and its challenges are also discussed.

INTRODUCTION

5G is the future technology for mobile and wireless communications. 5G successor of 4G and 3G network technology however there are still some challenges that could not solved even in 4G such as spectrum problem, environment associated problem, power consumption, poor coverage's etc. 5G wireless networks will provide many features to handle this [2]. It will provide the end-users more opportunities and flexibilities in accessing video and multimedia contents. Now a day it is quite interesting to note that the new mobile phones, specially the smart phones, are not just the simple phone but much more than that. They are little mobile PC and functions more or less like that. touch screen, provide user friendly graphical user interfaces, provide internet services, web browsing, email connecting, local wireless fidelity connectivity, built in camera, high quality music player capability, and small media management besides phone call functionalities. From the 2G in 1991 to the 3G system first launched in 2001, the wireless mobile

network has transformed from a pure voice call to very rich multimedia systems.

CURRENT STATUS :

What will the 5G network, fifth generation wireless system that are expected to be deployed after 2020, look like? It is now too early to define this with any certainty. The advantage of 5G over 4G is listed in Table 1 below.

Table 1: Comparison of 4G and 5G wireless system

	4G	5G
Deployment	2013	2021
Architecture	W-LAN & WAN	4G+WWW
Information type	Integrated high quality of audio, video and data	Dynamics access information multimedia services
Data rate	1Gbps	10Gbps (Maximum)
Handoff	Horizontal and Vertical	Horizontal and Vertical
Frequency	2 GHz	12 GHz
Class of switching	packet	packet
Multiple access technology	CDMA	CDMA
Quality of service	Less supported	supported

Wireless user specially cell phone and laptop user stay indoor for more than 70% of time so significant amount of penetration loss or signal will be lost because our conventional cellular architecture normally uses an outdoor base station in the middle of the cell communication.

In 4G or 5G can mitigate this losses by using the separate outdoor and indoor base station respectively so penetration loss somewhat avoided. Now a day conventional MIMO system being employed. 2MIMO systems [3,5] consist of multiple antennas at both the transmitter and receiver. By adding multiple antennas, a greater degree of freedom (in addition to time and frequency dimensions) in wireless channels can be offered to accommodate more information data. Hence, a significant performance improvement can be obtained in terms of reliability, spectral efficiency. In massive MIMO systems, the transmitter and/or receiver are equipped with a large number of antenna elements (typically tens or even hundreds). Note that the transmit antennas can be co-located or distributed (i.e., a DAS system) in different applications. Also, the enormous number of receive antennas can be possessed by one

device or distributed to many devices. Besides inheriting the benefits of conventional MIMO systems, a massive MIMO system can also significantly enhance both spectral efficiency and energy efficiency [9]. Furthermore, in massive MIMO systems, the effects of noise and fast fading vanish,

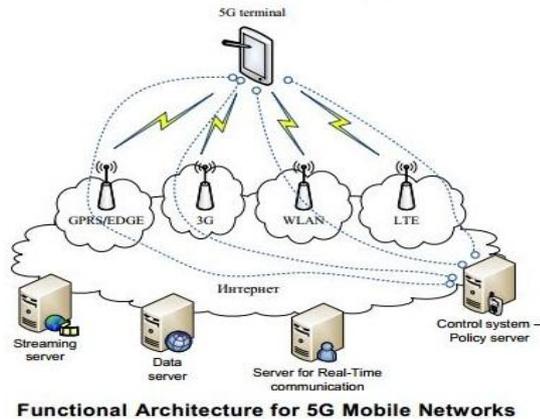


Fig-1

The functional architecture of the 5G[3] networks is shown in figure-1, its integrate all types of network like general packet radio service(GPRS), extended data rate for GSM evolutions. Its provide data rate is higher than GPRS . Long term evolution (LTE) is a standard used for 4G networks, for Wi-Fi, Wireless lan is there, so 5G architecture looks like cloud computing networks

Another technique has been proposed at present in 4G and 5G is a Femtocell. Femtocell is a new concept that is being used. It combines the mobile relay concept (moving network) with femtocell technology. An Femtocell is a small cell that can move around and dynamically change its connection to an operator's core network. It can be implemented on public transport buses, trains, and even private cars to enhance service quality to users within vehicles. Deployment of Femtocells can potentially benefit cellular networks. First, Femtocells can improve the spectral efficiency of the entire network Second it can improved signal quality.

femtocells can also used for small office and underground buildings , where signal gets attenuate, A cell is divided in to smaller cell and femtocell is a subset of small cells. Each class of device connects to a service provider's network through typical broadband, such as DSL or fibre optics cable. They use this connection to them broadcast cellular service over a relatively small area, compared with the range of a conventional base station.

4G and 5G generation wireless communication systems reframing the old system. It required Higher Bandwidth in the ranges of GHz and THz could be deployed by utilizing techniques in cognitive radio. This is a highly potential field is exploited by wavelength in millimeter

range and hence the term millimeter wave is in practice. Around 2020, the cellular networks would face a very high data traffic and thereby higher capacity demands for data rate and spectrum. For wireless future wireless generation of 5G mobile data rates must increase up to several gigabit per second (Gbps).

Challenges in future wireless systems: in future generation wireless there are still many challenges ahead like how to achieved higher Capacity , high data rate, managing massive number of connection, cost and quality of services etc. in technical point of view, this will required a complexes signal processing tool for massive MIMO systems. Multiple-input multiple-output (MIMO)[6] is an advanced technology that can effectively exploit the spatial domain of mobile fading channels to bring significant performance improvements to wireless communication systems. Past generations wireless systems used a MIMO systems, known as point-to-point MIMO or collocated MIMO, require both the transmitter and receiver of a communication link to be equipped with multiple antennas., it may possible now a present scenario(tens of antenna) many wireless devices may not be able to support multiple antennas due to size and hardware limitations.

Cross-layer design mechanism plays a[8] critical role in order to supply so many applications and services with quality of service in 5G networks. In the cross layer design the interactions between the different network protocol layers can be optimized jointly in end-to-end system. This is done in order to achieve better performance. The content delivery with satisfactory quality of user experience becomes an important issue. For environment ,the emission CO_2 would be issue, The most important to reduce the infrastructure cost as well as the costs related with their operation ,maintenance and management, to make connectivity a universally available at lower cost, The challenge for the design of 5G is that huge improvements are needed, therefore customers are willing to pay proportionally[11].

CONCLUSIONS

The fourth generation wireless communication systems are already implemented or going to be implemented in many countries, however 5G wireless communication systems are expected to Provide much higher data rates, lower cost per transmitted bit, more flexible mobile terminals, and seamless connections to different networks. In this paper, we introduced the features of 5G. We also point out the short coming of the existing technology. These shortcomings will be solving by 5G. But technology always comes at some cost.

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