

# Challenges in wireless networks and role of adhoc network

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## Abstract

*In recent developments in mobile communication has raised the expectation of users to a new height and as demand arises new advancement by mobile companies are also offering newer and faster technologies. In this series the latest development is advancement towards 5 G mobile network with expected data rate over 1 Gbps . This network is expected to roll out around 2020 but a lot of work is pending like infrastructure improvement, architecture development frequency band allotment etc. In this paper, we have reviewed & discussed*

*different challenges which the technocrats will face while implementing 5G in reality. However due to various government and restriction on no of towers in a area will hamper this plan*

## 1. Introduction

Again we are expecting to resolve the issues like access and connectivity across PLMN .Availability of IP address on area or location basis so that availability of IP addresses can be increased along with faster services. One major problem which will arise with the advent of 5G technology is the increased demand for bandwidth.

Generation	1G	2G	3G	4G	5G
Bandwidth	30 KHz	200KHz	20MHz	100MHz	To be finalized
Data speed	2 Kbps	64 Kbps	1Mbps	100 Mbps(min) 1 Gbps(max)	1 Gbps(min) 100Gbps(max)
Technology	Analog	GPRS/EDGE	HPSA	LTE	HPSA and LTE may be developed

The planned services in 5G include everything either it may be personal mobile communication, wireless sensor network, WLAN, or anything which is currently covered under different protocols and in limited area coverage. It will cover all current standards like GPRS/EDGE, 3G, LTE etc.

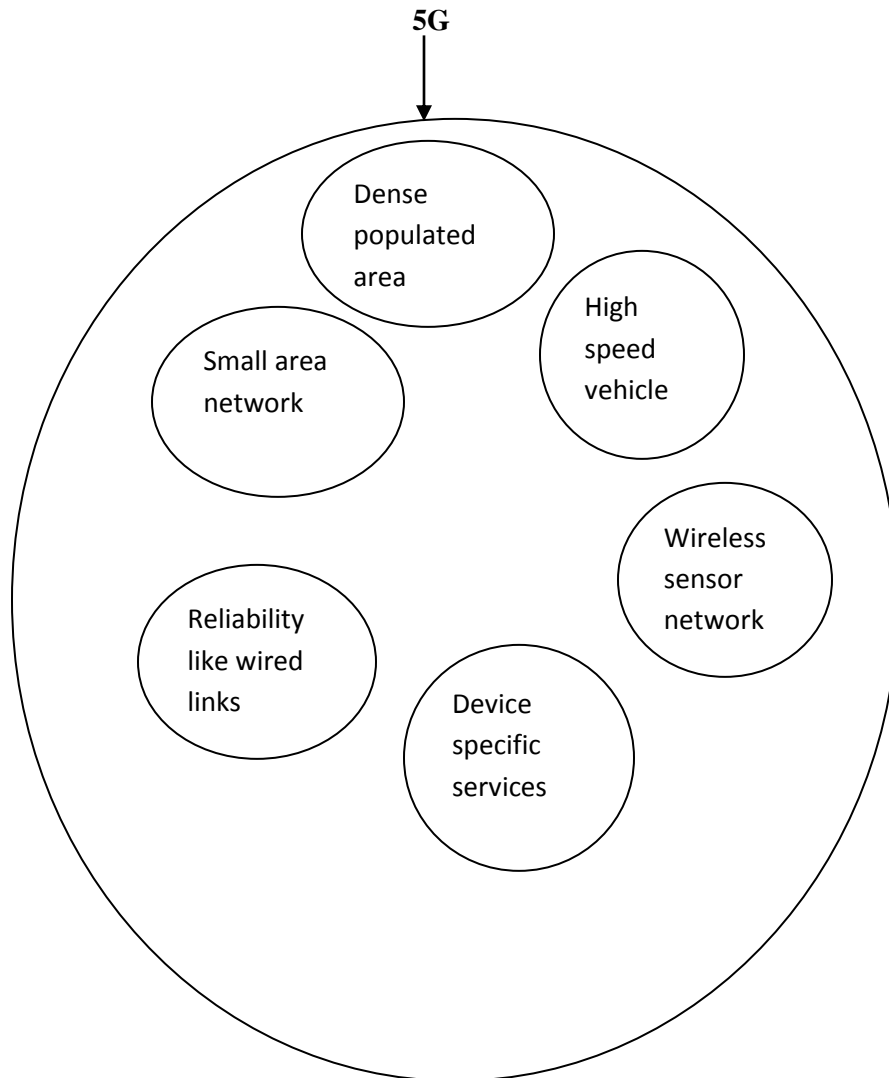
## 2 Challenges in 5G

1. The proposed data speed should be available instantly on demand with no waiting time for any kind of user
2. Should be able to support any type of devices and services

3. Should be able to support any no. of users with same efficiency
4. Should Bandwidth efficient as this may be a major threat for further expansion
5. Since most of the devices are mobile so it should be less power consuming.
6. Latency rate should be as low as possible or it may be made uses dependent like life threatening services it may be reduced to few micro seconds and for normal course work it may be relaxed.

7. In several application very high levels of network reliability is needed

8. Affordability is always a factor so when the 5G network rollout its cost of establishment operation and maintenance should be low.



**Figure 1: Coverage of 5G System**

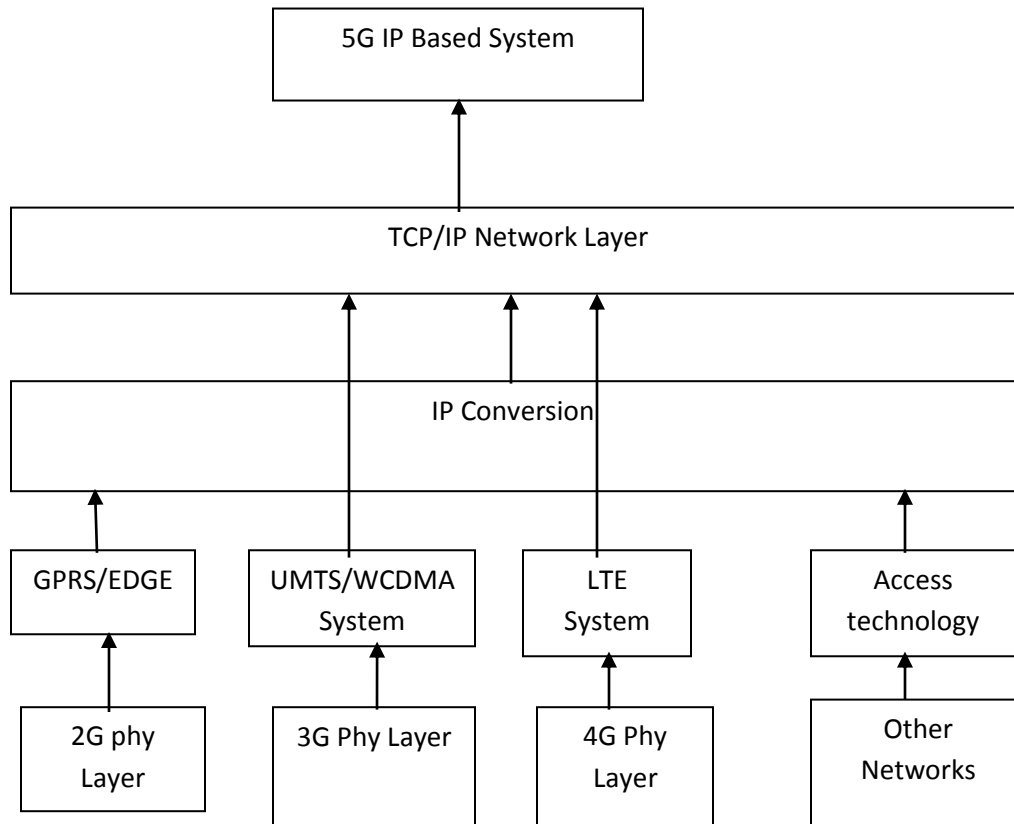
For 5G it is necessary to use a new waveform because OFDM wave form may not be able to support such high speed as it has amplitudes which is similar to noise and to reduce this noise we have to use power amplifiers in RF spectrum again any change in carrier

frequency will affect it very much in comparison of a single carrier system

One more reason for not using OFDM is split spectrum of rarely used frequency till now as it is under consideration to use 6GHz to 60 GHz spectrum for 5G. Science these

changes are proposed to make at physical layer of architecture so new system which is the extension of LTE and HSPA, has to be redesign using non orthogonal wave forms

Incorporation of various system in 5G network



**Figure 2: Block diagram for proposed integration of various systems in 5G**

In this architectural block diagram we are proposing a system to integrate various systems which are currently in use. The main concept of our system is to convert every system in IP based system so that we can incorporate these systems with 5G system. Since we cannot change already established systems so we are proposing a layer in TCP/IP module before network layer and named it as IP conversion

layer. This layer will act as interface between these system and network layer.

### 3 Roaming Management

In countries like INDIA there are two types of standard that are being used till date one is named as GSM and another is CDMA and none of them supports each other. Roaming is used to

provide better coverage or to increase coverage. Roaming can be of four types

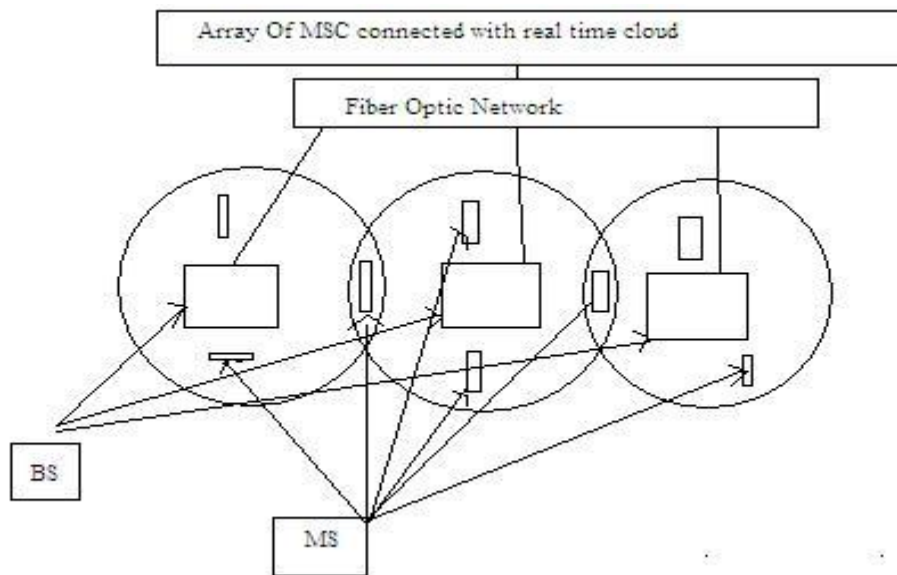
1. In Cell Roaming (also known as handoff in a single cell in the areas where cell splitting is used)
2. Out of cell (also known as handoff from one cell to other cell when subscriber moves to a new cell)
3. Out of MSC (when subscribers moves out of current service provider's zone to a new zone)
4. Out of country (when subscriber moves outside of the country)

In these roaming one common thing is that the standard should be same otherwise roaming service cannot be provided. However in some countries this problem has been resolved by making network compatible for both. A normal technology which is being adopted is to passing

signal from block after receiving s which converts CDMA signal in to GSM and vice versa. In this technique the SIM should have two layers one for GSM identity and another for CDMA. For complete coverage we have to adopt these type technology so that the system can support inter standard roaming.

#### 4 Other Required Changes

We have to improve spectral efficiency for more than 10 times. As we have already discussed we cannot rely on current OFDM technology similarly we have to use different modulation methods like of use of trellis encoding or at least 256 QAM modulation. We have to use array of antenna in cells to improve coverage at boundaries of cells and better coverage inside the cell. For using antenna array we have to use cell structure which at some places may be smaller than femto configuration. We can use following architecture of cells



**Figure 3: Femto Architecture**

In this system we can see that a mobile may be covered by a no of base station at a time this will

reduce load on a single base station so it can perform better again all the base stations are

connected to a optic fiber cable network with nano switches and these cables are connected to a MSC which is connected with other MSC in a cloud architecture. By using this structure we can reduce load on a single MSC as well as make connection faster for the mobile in other zone.

## 5. Conclusion

In this paper we have gone through the requirements of a 5G network. It shows that we need to make a lot of changes at every layer of network. Either it may be a physical layer or network or transport definitely we have avoided application layer because for change in application layer we have to make changes at user end and it will increase our investment to a very large extent. Again we have suggested some changes roaming system that may need government approval. After evolution of 5G network we are expecting a new era in digital infotainment with live performances in real time on internet and global coverage. Keeping in mind the above facts use of cooperative communication is highly recommended

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