

## 2.2 1G wireless system



FIG. 2.2.1 1G Mobile Phone

First Generation wireless technology (1G) is the original analog (An analog or analogue signal is any continuous signal for which the time varying feature (variable) of the signal is a representation of some other time varying quantity), voice-only cellular telephone standard, developed in the 1980s. The main difference between two succeeding mobile telephone systems, 1G and 2G, is that the radio signals that 1G networks use are analog, while 2G networks are digital. Although both systems use digital signalling to connect the radio towers (which listen to the handsets) to the rest of the telephone system, the voice itself during a call is encoded to digital signals in 2G whereas 1G is only modulated to higher frequency, typically 150 MHz and up. One such standard is NMT (Nordic Mobile Telephone), used in Nordic countries, Eastern Europe and Russia. Others include AMPS (Advanced Mobile Phone System) used in the United States, TACS (Total Access Communications System) in the United Kingdom, JTACS in Japan, C-Netz in West Germany, Radio com 2000 in France, and RTMI in Italy. Analog cellular service is being phased out in most places worldwide.

With EDGE (Enhanced Data Rates for GSM Evolution), you have a theoretical transfer speed of max. 1 Mbit/s (500 kbit/s in practice).

### **Disadvantages**

In less populous areas, the weaker digital signal transmitted by a cellular phone may not be sufficient to reach a cell tower. This tends to be a particular problem on 2G systems deployed on higher frequencies, but is mostly not a problem on 2G systems deployed on lower frequencies. National regulations differ greatly among countries which dictate where 2G can be deployed.

Analog has a smooth decay curve, but digital has a jagged steppey one. This can be both an advantage and a disadvantage. Under good conditions, digital will sound better. Under slightly worse conditions, analog will experience static, while digital has occasional dropouts. As conditions worsen, though, digital will start to completely fail, by dropping calls or being unintelligible, while analog slowly gets worse, generally holding a call longer and allowing at least some of the audio transmitted to be understood.

### **Advantage**

While digital calls tend to be free of static and background noise, the lossy compression they use reduces their quality, meaning that the range of sound that they convey is reduced. Talking on a digital cell phone, a caller hears less of the tonality of someone's voice.

2.5G is a stepping stone between 2G and 3G cellular wireless technologies. The term "second and a half generation" is used to describe 2G-systems that have implemented a packet switched domain in addition to the circuit switched domain. It does not necessarily provide faster services because bundling of timeslots is used for circuit switched data services (HSCSD) as well.

The first major step in the evolution of GSM networks to 3G occurred with the introduction of General Packet Radio Service (GPRS). CDMA2000 networks similarly evolved through the introduction of 1xRTT. So the cellular services combined with enhanced data transmission capabilities became known as '2.5G.'

GPRS could provide data rates from 56 Kbit/s up to 115 Kbit/s. It can be used for services such as Wireless Application Protocol (WAP) access, Multimedia Messaging Service (MMS), and for Internet communication services such as email and World Wide Web access. GPRS

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## CHAPTER 3

### WHAT IS 5G & WHAT IT OFFERS

#### 3.1 What is 5g & what it offers

5G Technology stands for 5th Generation Mobile technology. 5G technology has changed the means to use cell phones within very high bandwidth. User never experienced ever before such a high value technology. The 5G technologies include all type of advanced features which makes 5G technology most powerful and in huge demand in near future. The gigantic array of innovative technology being built into new cell phones is stunning. 5G technologies which are on hand held phone offering more power and features than at least 1000 lunar modules. A user can also hook their 5Gtechnology cell phone with their Laptop to get broadband internet access. 5G technology including camera, MP3 recording, video player, large phone memory, dialling speed, audio player and much more you never imagine. For children rocking fun Bluetooth technology and Pico nets has become in market. As per the present status all over the world WCDMA is commercially launched Some nations has planned to launch LTE within next quarter. Operator is looking ahead for wide scale deployment of LTE in 2012.

Operators will also find that the timing is right to make the switch because much of the first generation of 3G equipment will need to be upgraded soon. LTE networking equipment and handsets, already under development, will become available in 2010, and should be rolled out in large quantities in Europe by 2012. Clearly shows that within 2020 LTE will become the latest trend for wireless communication all over the world. But yet our question remains unanswered. Why there is a need for 5G.

Even though LTE provides wide range of growth for present wireless telecommunication. People are not in a circumstance to make use of those benefits in an effective manner LTE might be rigorously used in Commercial/Industrial areas. But think of a common man who utmost utilize LTE for downloading a movie or make a video call. Fact is that there is no such ground-breaking application exists in real world to be utilized by a common man.

You might doubt how this verdict is applicable for current innovative world, where have enormous splendid real time applications. Concern is that our present wireless telecommunications is bottlenecked to use those applications in an effective manner. This paper

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## 4.1. Physical layer

Physical and Medium Access Control layers i.e. OSI layer 1 and OSI layer 2, define the wireless technology. For these two layers the 5G mobile networks is likely to be based on Open Wireless Architecture.

## 4.2. Network layer

The network layer will be IP (Internet Protocol), because there is no competition today on this level. The IPv4 (version 4) is worldwide spread and it has several problems such as limited address space and has no real possibility for QoS support per flow. These issues are solved in IPv6, but traded with significantly bigger packet header. Then, mobility still remains a problem. There is Mobile IP standard on one side as well as many micro-mobility solutions (e.g., Cellular IP, HAWAII etc.). All mobile networks will use Mobile IP in 5G, and each mobile terminal will be FA (Foreign Agent), keeping the CoA (Care of Address) mapping between its fixed IPv6 address and CoA address for the current wireless network. However, a mobile can be attached to several mobile or wireless networks at the same time. In such case, it will maintain different IP addresses for each of the radio interfaces, while each of these IP addresses will be CoA address for the FA placed in the mobile Phone. The fixed IPv6 will be implemented in the mobile phone by 5G phone manufacturers.

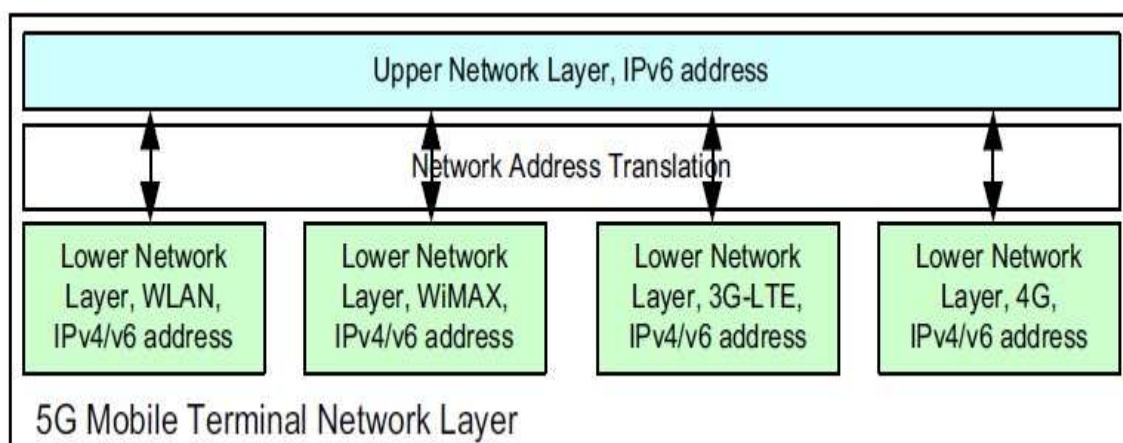


FIG.4.2.1. 5G Mobile Terminal Network Layer

The 5G mobile phone shall maintain virtual multi-wireless network environment. For this purpose there should be separation of network layer into two sub-layers in 5G mobiles (Fig. )

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allow users to access applications from centralized servers. Google, Net Suite, Rack space cloud, amazon.com and sales force are some of the active.

3. Infrastructure – The third segment in cloud computing, known as the infrastructure, is the backbone of the entire concept. Infrastructure vendorsG environments such as Google gears allow users to build applications. Cloud storage, such as Amazon's S3, is also considered to be part of the infrastructure segment. 5G Nanocore will efficiently utilizes all the above 3 segments to satisfy his customer demands.

The concept of cloud computing will reduce the CAPEX of 5G network deployment. In turn this will create a less billing to the end user for all kinds of services that he utilizes through Nanocore.

#### ➤ **All IP Network:**

As already discussed for converging different technologies to form a single 5G Nanocore, we require a common platform to interact, Flat IP architecture act as an essential part of 5G network. The All-IP Network (AIPN) is an evolution of the 5GFP system to meet the increasing demands of the mobile telecommunications market. To meets customer demand for real-time data applications delivered over mobile broadband networks, wireless operators are turning to flat IP network architectures. Primarily focused upon enhancements of packet switched technology, AIPN provides a continued evolution and optimization of the system concept in order to provide a competitive edge in terms of both performance and cost.

The key benefits of flat IP architectures are:

- Lower costs
- Universal seamless access
- Improved user experience
- Reduced system latency
- Decoupled radio access and core network evolution

The drive to all IP-based services is placing stringent performance demands on IP based equipment and devices, which in turn is growing demand for multicore technology.

There is strong growing demand for advanced telecommunications services on wired and wireless Next Generation Network (NGN) infrastructures, and fast growing demand for the

network on October 1, 2001, using the WCDMA technology. In 2002 the first 3G networks on the rival CDMA2000 1xEV-DO technology were launched by SK Telecom and KTF in South Korea, and Monet in the USA. Monet has since gone bankrupt. By the end of 2002, the second WCDMA network was launched in Japan by Vodafone KK (now Softbank). European launches of 3G were in Italy and the UK by the Three/Hutchison group, on WCDMA. 2003 saw a further 8 commercial launches of 3G, six more on WCDMA and two more on the EV-DO standard.

During the development of 3G systems, 2.5G systems such as CDMA2000 1x and GPRS were developed as extensions to existing 2G networks. These provide some of the features of 3G without fulfilling the promised high data rates or full range of multimedia services. CDMA2000-1X delivers theoretical maximum data speeds of up to 307 kbit/s. Just beyond these is the EDGE system which in theory covers the requirements for 3G system, but is so narrowly above these that any practical system would be sure to fall short.

The high connection speeds of 3G technology enabled a transformation in the industry: for the first time, media streaming of radio (and even television) content to 3G handsets became possible, with companies such as Real Networks and Disney among the early pioneers in this type of offering.

In the mid 2000s an evolution of 3G technology began to be implemented, namely High-Speed Downlink Packet Access (HSDPA). It is an enhanced 3G (third generation) mobile telephony communications protocol in the High-Speed Packet Access (HSPA) family, also coined 3.5G, 3G+ or turbo 3G, which allows networks based on Universal Mobile Telecommunications System (UMTS) to have higher data transfer speeds and capacity. Current HSDPA deployments support down-link speeds of 1.8, 3.6, 7.2 and 14.0 Mbit/s. Further speed increases are available with HSPA+, which provides speeds of up to 42 Mbit/s downlink and 84 Mbit/s with Release 9 of the 3GPP standards.

By the end of 2007 there were 295 million subscribers on 3G networks worldwide, which reflected 9% of the total worldwide subscriber base. About two thirds of these were on the WCDMA standard and one third on the EV-DO standard. The 3G telecoms services generated over 120 Billion dollars of revenues during 2007 and at many markets the majority of new phones activated were 3G phones. In Japan and South Korea the market no longer supplies phones of the second generation.

physical layer up to the application. Currently, the ongoing work is on the modules that shall provide the best QoS and lowest cost for a given service using one or more than one wireless technology at the same time from the 5G mobile phone.

A new revolution of 5G technology is about to begin because 5G technology going to give tough completion to normal computer and laptops whose marketplace value will be effected. There are lots of improvements from 1G, 2G, 3G, and 4G to 5G in the world of telecommunications. The new coming 5G technology is available in the market in affordable rates, high peak future and much reliability than its preceding technologies

## 10.2 Future enhancement

5G network technology will open a new era in mobile communication technology. The 5G mobile phones will have access to different wireless technologies at the same time and the terminal should be able to combine different flows from different technologies. 5G technology offer high resolution for crazy cell phone user. We can watch TV channels at HD clarity in our mobile phones without any interruption. The 5G mobile phones will be a tablet PC. Many mobile embedded technologies will evolve.

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