



# Evolution of wireless mobile technology and the future 5G technology

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**Abstract:** This paper brings out the evolution of wireless mobile technology starting from 1G to 4G. It mainly explains about the future wireless mobile technology 5G. It is one of the revolutionary concept in the wireless world. It also explains how this 5th generation concept is going to transform the world into smarter one.

**Keywords:** 5G, AMPS, NMT, TACS, QoS, GSM, DMA, CDMA, OTP, TCP

## 1. INTRODUCTION

In this modern world each and every day the technology is developing in a tremendous manner. We started learning things as A for apple B for ball C for cat. But now, in this 21st century things got changed and children started learning things as A for android, B for Bluetooth, F for facebook, W for whatsapp and so on. This shows clearly that how technology has influenced the present generation. So now it becomes our duty to know about the present technologies and it's pros and cons then the future technology which is going to transform this world into the next level of smartness in each and everything.

## 2. GENERATION MOBILE TECHNOLOGY

### 2.1. First Generation

1G stands for 1st generation mobile technology. It was introduced in the year 1980. It uses analog signals for communications. The mobile data speed is about 2.4kbps. 1G uses AMPS, NMT, TACS techniques. AMPS (ADVANCED MOBILE PHONE SYSTEM) was first launched in US and is 1G mobile system

#### Disadvantages

- Allows making calls within one country only.

### 2.2. Second Generation

2G stands for second generation mobile technology. It was introduced in the year 1991 in Finland. It uses digital signals for the communication. 2G was introduced on GSM standard. 2G uses modulation techniques like

- TDMA (Time Division Multiple Access)
- CDMA (Code Division Multiple Access)

The data speed in 2G is up to 64 kbps. 2G provides sufficient security for both sender and receiver. GSM has its origin from Group Special Mobile in Europe. Though GSM originated from Europe it is used in more than 212 countries in the world.

#### Advantages

- 2G technology provides Text messages, MMS, Picture messages.
- Data is encrypted during transmission and reception therefore security is ensured.
- 2G is more efficient than 1G.

#### Disadvantage

- Semi global facility

### 2.3. Third Generation

3G stands for 3rd generation mobile technology. 3G was developed in late 1990's and early 2000. International Mobile Telecommunication-2000 (IMT-2000) is called 3rd generation mobile technology. Packet switching technique is used here. 3G is able to transmit the data efficiently at better and increased bandwidth. The spectral efficiency of 3G is better than 2G technologies. Spectral efficiency is the measurement of rate of information transfer over any communication system. 3G is also called IMT-2000. The transmission speed is from 125 Kbps to 2 Mbps.

#### Advantages

- Superior voice quality.

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- Good clarity in video conference.
- Email, PDA, information surfing, online shopping banking and gaming is possible here.
- Global roaming is possible.

- User can simultaneously be connected with several wireless access technology
- Multiple concurrent data path will be there

#### 2.4. Fourth Generation

4G stands for 4th generation mobile technology. It was introduced in the year 2010. It is faster and reliable than other mobile technologies. The data speed is up to 100 Mbps.

##### Advantages

- High performance.
- Low cost.
- Easy Global roaming

#### 2.5. Fifth Generation

5G stands for 5th generation wireless mobile technology. This is the next major phase of mobile telecommunication and wireless system. Complete wireless communication with almost no limitations. It is going to be introduced in the year 2020 in summer Olympics. 5G is in the developing stage. 5G is still a theory concept. It is expected to have 10 times more of 5G is upto 1Gps. It is expected that 5G will be faster and reliable than 4G. 5G can be called real wireless world. It has incredible transmission speed.

- Worldwide cellular phones
- Extraordinary data capabilities
- High connectivity
- More power and features in hand held devices
- High connectivity
- Large phone memory, more dialing speed and more clarity in audio and video

##### Key Concepts:

- Real wireless world with no more limitations with access and zone issues.
- Wearable devices
- IPV6, where a visiting care of mobile IP address is assigned according to the location and the connected network.
- One unified global standard.
- Smart radio.

### 3. OPEN WIRELESS ARCHITECTURE

#### Network Layer

- All mobile network will use mobile IP
- Each mobile terminal will be FA (Foreign Agent)
- A mobile can be attached to several mobiles or wireless networks at the same time
- A fixed IPv6 will be implemented in mobile phones
- Separation of network layer into two sub layers
- Lower network Layer (for each interface)
- Upper network Layer (for mobile terminal)

#### Open Transport Protocol

- Wireless network differs from wired network regarding transport layer.
- In all TCP versions the assumption is that lost segments are due to network congestion
- In wireless the loss is due to higher bit error ratio in the radio interface.
- 5G mobile terminals have transport that is possible to be downloaded and installed – Open Transport Protocol (OTP)
- Transport Layer + Session Layer = OTP

#### Application Service Layer

- Provides intelligent QoS (Quality of Service)
- Provides possibility for service quality testing and storage of measurement information in information database in mobile terminal
- Selects the best wireless connection for given services
- QoS parameters such as delays, losses, bandwidth reliability will be stored in database for 5G mobile
- Presentation layer + Application layer = Application

#### Hardware of 5G

- Uses UWB (Ultra Wide Band) networks with higher bandwidth with lower energy levels

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- Bandwidth is about 4000 Mbps, which is 400 times faster than today's wireless networks
- Uses smart antenna
- Uses CDMA (Code Division Multiple Access)

#### *Software of 5G*

5G will be single unified standard of different wireless networks, including lan5G will be single unified standard of different wireless networks, including LAN technologies, LAN/WAN, WWW (World Wide Wireless Web), unified IP and seamless combination of broad band.

#### *Features of 5G*

- Software defined radio, flexibility, encryption, antivirus
- High resolution for crazy cell phone users
- Bidirectional large BW
- Less traffic
- 25 Mbps connectivity speed
- Enhanced and Available connectivity just about the world
- Uploading and downloading speed of 5G touching the peak (up to 1Gbps)
- Better and fast resolution
- High quality service based on policy to avoid error
- Support virtual private networks
- More attractive and effective
- Provides subscriber supervision tools for fast action

#### *Advantages of 5G*

- Data Bandwidth of 1Gbps or higher
- Globally accessible
- Dynamic information access
- Available low cost

#### *Application of 5G*

- Wearable devices with AI (Artificial Intelligence)
- Pervasive (global) networks
- Media independent handover
- Radio resource management
- VoIP (Voice Over IP) enabled devices
- With 6th sense technology
- This 5G wireless mobile technology also extends hands for the developing concept IOT (Internet Of Things) where billions of devices can be connected simultaneously.

#### 4. CONCLUSION

This paper has explained the evolution of wireless mobile technology from 1G to 4G and its pros and cons. It effectively explains about the future wireless mobile technology revolutionary concept 5G. The roll of 5G is in enabling the IOT (Internet of Things). There by transforming the world into smarter one. When 5G is fully developed I am sure that India will become a developed nation in the field of IT there by bringing the honourable people president late APJ Abdul Kalam sir's dream a true one by 2020.