



# Gandhinagar Institute of Technology

A Report on

“Workshop on Evolution of Mobile Technology”

(20<sup>th</sup> March 2021, Saturday)

## **Introduction:**

Mobile and Wireless Technology Club (MWTC) of Gandhinagar Institute of Technology (GIT) is established to strengthen the core knowledge about latest trends in field of communication. The aim of MWTC is to make students aware about the trending scenarios of market. To fulfill the requirements from industry, students must possess practical information which tends to lead them Latest developments therefore a Workshop on “Evolution of Mobile Technology” for 8<sup>th</sup> semester Electronics and Communication Engineering & Electrical Engineering students was organized on 21/03/2021 via Online Platform.

## **Objective of Event:**

Under the aegis of MWTC a workshop on “Evolution of Mobile Technology” was conducted by Prof. Chintan Patel and Prof. Ashish Pandya, about Mobile devices and its technological advancement. More than 30 students actively participated and gained the benefits of workshop.

## **About the Event:**

**Introduction:** Mobile wireless communication system has gone through several evolution stages in the past few decades after the introduction of the first-generation mobile network in early 1980s. Due to huge demand for more connections worldwide, mobile communication standards advanced rapidly to support more users. Let us look on the evolution stages of wireless technologies for mobile communication.

**History:** Marconi, an Italian inventor, transmitted Morse code signals using radio waves wirelessly to 3.2 KMs in 1895. It was the first wireless transmission in the history of science. Since then, engineers and scientists were working on an efficient way to communicate using RF waves. Telephone became popular during the mid of 19<sup>th</sup> century. Due to wired connection and restricted mobility, engineers started developing a device which does not requires wired connection and transmit voice using radio waves.

The first generation of mobile network was deployed in Japan by Nippon Telephone and Telegraph company (NTT) in Tokyo during 1979. In the beginning of 1980s, it gained popularity in the US, Finland, UK and Europe. This system used analogue signals and it had many disadvantages due to technology limitations.

Second generation of mobile communication system introduced a new digital technology for wireless transmission also known as Global System for Mobile communication (GSM). GSM technology became the base standard for further development in wireless standards later. This standard could support up to 14.4 to 64kbps (maximum) data rate which is sufficient for SMS and email services. Code Division Multiple Access (CDMA) system developed by Qualcomm also introduced and implemented in the mid-1990s. CDMA has more features than GSM in terms of spectral efficiency, number of users and data rate.

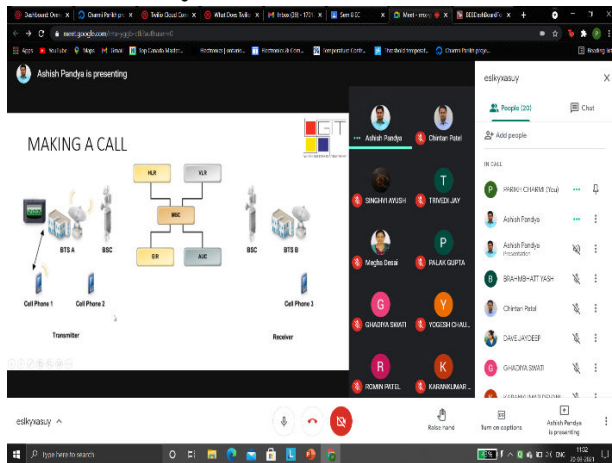
Third generation mobile communication started with the introduction of UMTS – Universal Mobile Terrestrial / Telecommunication Systems. UMTS has the data rate of 384kbps, and it support video calling for the first time on mobile devices. After the introduction of 3G mobile communication system, smart phones became popular across the globe. Specific applications were developed for smartphones which handles multimedia chat, email, video calling, games, social media and healthcare.

4G systems are enhanced version of 3G networks developed by IEEE, offers higher data rate and capable to handle more advanced multimedia services. LTE and LTE advanced wireless technology used in 4th generation systems. Furthermore, it has compatibility with previous version thus easier deployment and upgrade of LTE and LTE advanced networks are possible. Simultaneous transmission of voice and data is possible with LTE system which significantly improve data rate. All services including voice services can be transmitted over IP packets. Complex modulation schemes and carrier aggregation is used to multiply uplink / downlink capacity.

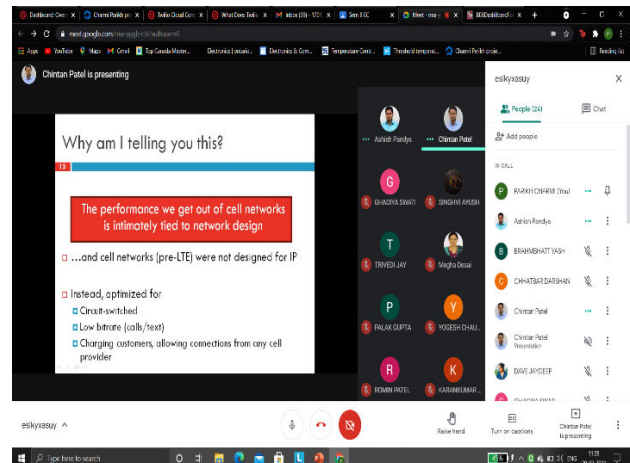
5G will be using advanced technologies to deliver ultra-fast internet and multimedia experience for customers. Current LTE advanced networks will transform into supercharged 5G networks in future. In order to achieve higher data rate, 5G technology will use millimeter waves and unlicensed spectrum for data transmission. Complex modulation technique has been developed to support massive data rate for Internet of Things.

Thus, Comparison between all 5 generations of mobile technology was explained in detail by both the faculties with its advantages, disadvantages and applications.

**Photo Gallery:**



Prof. Ashish Pandya, explaining call process in Mobile technology



Prof. Chintan Patel, explaining about 1G and 2G system of Mobile Evolution

**Time Division Multiple Access**

Guard time – signal transmitted by mobile terminals at different locations to prevent interference at the base station at the same time

- Time is divided into slots and only one mobile terminal transmits during each slot
- In slots during the frame, only one can talk, but others may take the floor in turn
- Each user is given a specific slot; No competition in cellular network
- Unlike Carrier Sense Multiple Access (CSMA) in WiFi

3G, 4G and 5G features explained by Prof. Chintan Patel

**Beyond Voice**

- Store contact information
- Make task-by-do lists
- Send text of appointments
- Calculator
- Send/receive email
- Send/receive pictures
- Send/receive audio clips
- Get information from the internet
- Play games
- Integrate with other devices
- MP3 Players etc.

Explanation of Future technologies