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5G Bringing Revolution in Communication

The new generation wireless network means more facilities and higher speed internet. With the help of 1G technology, we got the opportunity to talk on mobile. 2G gave us the facilities to send messages from mobile. With 3G, we were able to run the internet spontaneously for the first time with mobile. And with the advent of 4G,talking on video calls or playing games on the internet has become easy to easier. However, people in remote areas of the village are still not able to fully enjoy the benefits of 4G. Although 4G is new in our country, the developed world is now enjoying 5G facility, whose data transfer speed is 20 to 100 times higher than that of 4G.

Reason for advent of 5G

The number of smartphone users in the world is increasing day by day, so that the demand for internet uses is also increasing. With the advent of the Internet of things in addition to smartphones, products such as TVs, refrigerators, watches, bulbs, home assistants, etc. are now being connected to the Internet. To meet this growing demand for Internet use, researchers have long sought to innovate new technologies for exchanging data. As a result of long term research, many researchers around the world have developed the fifth generation telecommunication technology known as 5G . The Five G is still in the experimental phase. The Five G service has been piloted in China, Korea, the US, Canada, Finland and Germany.

The Structure of 5G

5G is a groundbreaking technology that will revolutionize our lifestyle. It will be able to transfer data a 1000 times more than 4G. And its data transfer speed will be 20 to 100 times higher than 4G. For an example, a person can download an HD movie in just one second.Now we will talk about the structure of 5G.

Five G is the latest technology for wireless data transfer via short wavelengths consisting of five completely new technologies.

1. Millimeter wave

2.SmallCell Network

3.Massive MIMO

4. Beam Forming

5. Full Duplex or Balanced Singnaling System

Millimeter wave(MM wave)

A medium is needed to move something from one place to another place. When we want to call someone with mobile or use internet on mobile, our mobile also uses a medium.The medium is called Millimeter wave.With the help of waves, we can make mobile calls or use the Internet. Our mobile usually uses waves of a certain frequency, usually at frequencies below six GHz. Generally its frequency remains under the 6GHz and the wavelength of this wave is much larger in size. Due to the limitations of wavelengths, mobile operator companies can only transfer a certain amount of data with the help of waves of this frequency. So when there are more smartphone users in a certain place, the network signal often drops or gets disconnected and the speed also decreases. To solve this problem, researchers thought of increasing the wavelength limit. So they started working experimentally with wavelengths of millimeter waves or wavelengths of 30-300 GHz frequency. Wavelengths of this frequency have never been used before for mobile phones. So turning it on means ensuring a lot more bandwidth for everyone. But there is a problem with the wavelength of this frequency. Millimeter waves cannot pass through buildings, trees, people or any heavy object. Even in rain or thick fog, its movement is disrupted. To solve this problem, researchers invented a second technology, the small cell network.

SmallCell Network

he most widely used wireless network technology today is the use of large, powerful towers at a distance**.** But since small millimeter waves of high frequency could not cross any barrier. So, thousands of smaller towers were erected. These towers will be very small in size and energy efficient and will be placed very close. This means that these small, energy-efficient towers will be side by side, meaning that the distance between them will be very short. And these will be stuck with lampposts and electric poles. Due to the short distance between each tower, if it is difficult to get the signal from one tower, the signal will come from another nearby tower. So the user will always get uninterrupted connection. As a result of this technology, urban dwellers will benefit the most. Because there are more buildings in the city and more people live in less space. As a result of having more and more towers, when an urban person is moving from one place to another, or while moving, another tower will start sending signals as soon as he crosses one tower, so that city dwellers will get uninterrupted speed connection all the time.

Massive MIMO

The full form of Mimo is Multiple Input, Multiple Output. The 4G base stations currently in use have dozens of ports for antennas to handle all types of traffic. But the massive Maimo base stations will support about a dozen ports. This will increase the capacity of the new network by 22 times or more than the existing network. Massive Mimo also has limitations. Currently used antennas transmit signals evenly at all times at the same time, causing multiple signals to cross each other, causing disruption in the connection. To solve this problem, another technology is used which is beam farming.

Beam Forming

Beamforming is much like a cellular signal traffic signaling system. Instead of sending signals everywhere with the help of beamforming, the antennas will only send signals where the user is, not anywhere else. Beamforming is the most efficient way to send data to the user at maximum speed. With the help of beamforming, a specific antenna will only send signals to users within that antenna coverage. If a particular user is in motion, the antenna will follow that user and change the position of the signal. As a result of sending the signal in a certain direction, there is no possibility of interruption or disconnection. As a result, an antenna can handle many input and output signals at the same time. Suppose someone is standing in the middle of a building and want to make a phone call using a conventional network, the antenna inside your coverage will continue to send signals everywhere. So, the signals will cross each other, the connection will be interrupted, only a few signals will reach your mobile. As a result, data transfer will be slower.

But if massive maimo technology is used, the antennas inside coverage, it will determine users location and send signals only to users mobile. As a result, users will get uninterrupted fast connection. When the antennas of the massive maimo base station receive an input signal, it remembers the direction and time of sending the signal. It then uses signal processing algorithms to identify exactly where the signal came from, and how to send the output signal to the user's mobile in the fastest time.

Many times it uses artificial intelligence to change the direction of some data packets, so that the data packets pass by buildings, trees and obstructing objects or one signal does not cross another signal. As a result we get realtime data streaming of rocket speed, without any latency or delay. There is actually latency, but the amount is so low that it is almost 1 millisecond or less.

Full Duplex or Balanced Singnaling System

A simple antenna can only do one thing at a time, either receive a signal or send a signal. But cannot receive or send signals at the same time. Such a time is the result of a policy of exclusion or reaction. Which is actually a tendency for radio waves to move back and forth at the same frequency. The silicon transistor is a high-speed switch that will release this outdated system of wave crossing. It's a lot like a signal system that for a moment the train will change the direction or frequency of the waves so that multiple waves can travel together without any collisions.

Revloution Of 5G

Now whatever we do with our smartphones, the 5G can do it faster and better. Augmented Reality, Mobile Virtual Reality, High Quality Video etc. the Internet is making today's urban life smarter. But there will be many new services that we can't even imagine. Research and rescue activities will be conducted through drones, will help in fire fighting. And for that, 5G technology will be helpful.Many researcher think that the G will also become important for driverless cars, live maps and reading traffic information.Mobile gamers will get more benefits. Video calls will be clearer. Videos can be viewed on mobile easily and without any interruption. Fitness devices fitted to the body and will be able to give signals at the right time, send emergency medical messages. But 5G not means more than high speed internet connection. Using 5G will revolutionize the world's communications and industrial systems. It's not just for watching movies, but the world of 5G is much bigger.Those are:

High Speed Download

This is the most talked about aspect of 5G. The data transfer rate is expected to be 20-100 times higher than 4G. As a result, we can download a full HD movie from the Internet with a few seconds, which is unthinkable in the case of 4G. Also, to update a large size of software, weu don't have to sit for hours like the previous times.

Bufferless streaming

The current era is the era of streaming. At one time people only thought of video streaming, but platforms like Google's Stadia are also arranging video games for streaming. In the case of 5G, new horizons of video game will be opened for low latency. Then we can play all high-profile games without downloading on mobile or PC. Games can be played on any PC without a high-powered gaming PC. With the help of cloud computing we can stream games.

Virtual Reailty

Virtual reality is the future of modern science. Experience virtual reality or augmented reality will be easier for 5G. At the same time, operations like robotic surgery will gradually become more common using virtual reality. Then a doctor can operate on a patient in a remote operating theater using a robotic arm while sitting in his chamber. 5G's high speed and ultra-low latency will make this advantage.

Power efficient

5G network modem chips are much more power efficient than before. As a result, using the net in 5G technology on mobile devices will cost much less. This will greatly reduce our worries about mobile charging. Experts believe that the battery charge of 5G phones will be more long lasting. However, Nokia has already stated that the 5G network will be up to 90 percent energy efficient.

Automatic Car

Driverless cars are already running on the road. However, with the advent of 5G, their spread will increase. Due to the fast speed and ultra-low latency of the 5G network, the vehicles will be able to operate more accurately with instant communication with their own / local network and server.

5G networks and services will be deployed in stages over the next few years to provide a platform on which new digital services and business models can arrive. 5G will mark a turning point in the future of communications bringing high powered connectivity to billions of devices. As more devices become connected, and the Iot of use cases grow exponentially, 5G networks facilitate the rapid increase and will bring significant benefits to corporations and consumers.