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6G TECHNOLOGY

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ABSTRACT:

A wireless network allows devices to remain linked to the network yet to roam without any cables unattached. Wi-Fi Signals are amplified by access points, meaning a compute can be far from a router but still be linked to the network.

The aim of wireless technology is to provide high quality, reliable communication and each new generations of services represents a big leap in that direction.

We have seen generations like 1G, 2G, 3G, 4G and now will be using 5G network technology. But few countries are developing the 6G technology.

The 6G technology will be much faster than the previous generations.

What is 6G Technology ?

In telecommunications, 6G technology is the 6th generation standard currently under development for wireless communications technologies supporting cellular network.

It is the next step of 5G. It will be much faster than 5G.

Like it'spredecessors 6G networks will probably be broadband cellular networks, in which the service area is divided into small geographical areas called cells.

Several companies like Nokia, Erickson, Huawei, Samsung , LG, Apple, Xiaomi, as well as countries like India , China , Japan and Singapore .

6G networks are expected to show even more heterogeneity than 5G and are likely to support applications beyond current mobile use scenarios, such as virtual and augmented realty (AR/VR) , ubiquitous instant communications, pervasive intelligence and the Internet of Things (IoT).

6G is developed to drive the adaption of 5G use cases at scale through optimizations and cost reduction, especially at the enterprise level.

It is expected that 6G mobile technology will be support one micro-second or even sub-microsecond latency communications, making communications almost instantaneous.

Development of 6G:

Even as brand new 5G technology has yet to establish their impressionsaround the world, the U.S. and the China already are racing to develop the next step in high-speed communications: [a 6G network](#)

The U.S telecom industry hopes to send a "National 6G roadmap to the bidden administration and Congress in early 2022 to get aearly start.

The 6G blueprint is being developed by a Alliance for Telecommunications Industry Solutions.

One ATIS goal is capturing U.S government funding to explore 6G research and commercial development.

ATIS also aims to put the U.S. government on a fast track to providing technical specifications.

The development and deployment of 6G is viewed as a "Trillion-dollar opportunity" for the mobile industry, while technical leadership is increasingly political priority for many governments around the world.

The 6G technology market is expected to facilitate large improvements in the areas of imaging, presence technology and location awareness.

6G DEVELOPMENT PROJECTS :

There are already 6G technology projects that are under way the moment and organizations are now starting early development.

1. South Korea Electronics and Telecommunications Research Institute: As might be expected, South Korea is well ahead and this institute is conducting research on Terahertz band technology for 6G. They are hoping to make 6G 100 times faster than 4G LTE and 5 times faster than 5G networks.

2. The Ministry of Industry and Information Technology, MIIT, China : With China investing large amounts into technology, they are keen to gain a lead in 6G. Accordingly MIIT is directly investing and monitoring in the research and the development process.
3. The University of Oulu, Finland: This university has started a 6G research initiative known as 6Genesis. The project is expected to run for at least eight years and it will develop ideas that will be suitable for 6G technology almost to 2040.
4. USA initiatives: The USA planning to open up 6G frequency spectrum at frequencies at frequencies between 95GHz and 3 THz for early research and development, although this will require approval from the federal Communications Commission FCC for frequencies over 95 gigahertz to 3 Thz.

TECHNOLOGIES BEING USED FOR DEVELOPMENT OF 6G:

6G Mobile technologies will be build on that already established for 5G. Some of the existing new technologies will be further developed for 6G

1. Millimetre-Wave Technologies: Using frequencies much higher in the frequency spectrum opens up more spectrum and also provides the possibility of having much wide channel bandwidth. With huge data speeds and bandwidths required for 6G, the millimetre wave technologies will be further developed, possibly extending into the Terahertz region of the spectrum.
2. Massive MIMO: Although MIMO is being used in many applications from LTE to Wi-Fi, etc., the numbers of antennas on a single equipment becomes a real possibility because of the antenna sizes and spacing in terms of wavelength.
3. Dense Networks: Reducing the size of cells provides a much more overall effective use of the available spectrum. Techniques to ensure that small cells in the macro-network and deployed as femtocells can operate satisfactorily are required.

Many new technologies will also be introduced. Some credentials that are being talked about could include the following:

1. Future PHY / MAC: The new physical layer and MAC presents many new interesting possibilities in a number of areas :
 - a. Waveforms: One key area of interest is that of the new waveforms that could be used for wireless communications. OFDM has been used very successfully in 4G and 5G mobile communications as well as a circumstances.
 - b. Multiple access schemas: Again a variety of new access schemas are being investigated for 6G technology
 - c. Modulation: Whilst PSK and QAM have provided excellent performance in terms of spectral efficiency, resilience and capacity, the major drawback is that of a high peak of average power ratio. Modulation schemas like APSK could provide advantages in certain circumstances.
2. Duplex Methods: There are several candidate forms of duplex that could be considered for the new 6G wireless communications system. Currently systems use either frequency division duplex, FDD or time division duplex, TDD. New possibilities are opening up for 6G including flexible duplex, where the time or frequencies allocated are variable according to the load in either direction or a new scheme called division free duplex or single channel full duplex. This scheme for 6G would enable simultaneous transmission and reception on the same channel.

WHAT ARE THE ADVANTAGES OF 6G Vs 5G:

- The 6G network will be 100 times much faster than 5G.
- It can achieve more reliability and better network coverage.
- 6G networks may one day allow you to reach maximum speeds of 1 terabit per second (Tbps) using an internet device which is much faster than 5G as peak speed of 5G is 10GBPS.
- We are already using AR and VR systems with 5G plus interconnected cities and various technology used in farms , intelligent robots works in the factories, also there is vehicle- to-vehicle communication and many more. But 6G will continue to support all these areas with greater strength and will also provide more bandwidth that will expand innovation.
- The 6G technology may discover such things which we have not considered and thought.

- If 5G supports 1 million devices for every 1-square-kilometer, 6G to support 10 million devices.

DO WE NEED REALLY 6G TECHNOLOGY:

- 5G intends to make the internet more accessible for lots of people and improve everything from entertainment to healthcare. Whether those areas will look for improvement beyond 5G—and thus require the use of something better, like 6G—is a resounding yes.
- As fun as it might be to imagine a time when 5G is considered slow and 6G powers the world, if 5G pans out correctly or slowly evolves under that same term, we might never need to come up with a new next-gen network.
- The 6G concept could be avoided as long as manufacturers, regulators, and telecom companies keep improving 5G. If all of 5G's pitfalls could be addressed on a frequent basis, new products could continuously flow into the market to take advantage of the ever-changing and constantly evolving new technology.

DISADVANTAGES OF 6G TECHNOLOGY :

To state the disadvantages of 6G technology might be difficult today, as it has not yet completely developed, it's under development. But definitely as everything has some advantages and disadvantages, the 6G technology will also have few disadvantages.

1. **Difficult to Use:** One of the main advantage of 6G technology is difficult to use. Technology can be confusing for many people. Moreover, it is not easy to learn the new technology quickly. It can take a lot of time and patience to learn this new technology for common people.
2. **Expensive:** The 2nd disadvantage of 6G technology is that it has a high price. Definitely providing the 100 times faster network and great coverage will require lot of money. Consumers are expected to willing to pay the price for this type of technology, which may seem expensive compared to the one they are previously using.
3. **Privacy:** There are privacy concerns related to this type of technology. There have been questions for the security of 6G technology. And it is easily accessible by government or anyone else who can access to monitor networks.
4. **Compatibility issues :** The 6G technology will have compatibility issues with older devices. It may happen that the 6G technology will not be available for older devices. This can causes a problem for many customers who want to use this technology but are unable to use due to their older version of devices.
5. **Negative impact on health:** Due to it's high-frequency radiations it can affect health of people leading to headache, dizziness, nausea and blurred vision.
6. **Impact on children and people:** Due to this technology's high speed and coverage definitely there will be much usage of mobile phones which can include playing games, watching some contents on mobile phones so it may lead to thinking ability, laziness and bad or dangerous habits, which can impact overall growth of children or people.

CONCLUSION:

6G network technology is new and exciting that will be very useful in the future for businesses, studies and government institutions. Lightning the fast speed also ensures that there will be fewer communications issue in the remotest areas. As for pros and cons more scientific evidence and deployment of technology would clear the picture.