

# 6G is The Future of Connectivity

Khaled Mohammad Al-Zahrani<sup>1</sup>; Abdullah Abdulaziz Al-Ghanim<sup>2</sup>  
Saudi Aramco

**Abstract:-** 6G is the next generation of mobile communication technology, promising advancements in speed, latency, communication, and applications. Promises to be a major leap forward in wireless communication technology compared to 5G. AI will be utilized in 6G networks to manage networks intelligently, predict maintenance needs, and optimize resource allocation.

## I. INTRODUCTION

6G represents the upcoming advancement in mobile communication technology. Advancements in speed, latency, communication, and applications are anticipated to be achieved with the implementation of 6G technology.

Research and development are currently underway for 6G, with plans for an expected launch around the year 2030.

The shift from 5G to 6G marks a major advancement in wireless communication technology.

6G networks will incorporate artificial intelligence for more intelligent network management, predictive maintenance, and efficient resource distribution.

6G network provides smart features, constant connection, and easy integration in the physical digital environment. This indicates strong support for smart devices, the Internet, and a sustainable world connected to technology.

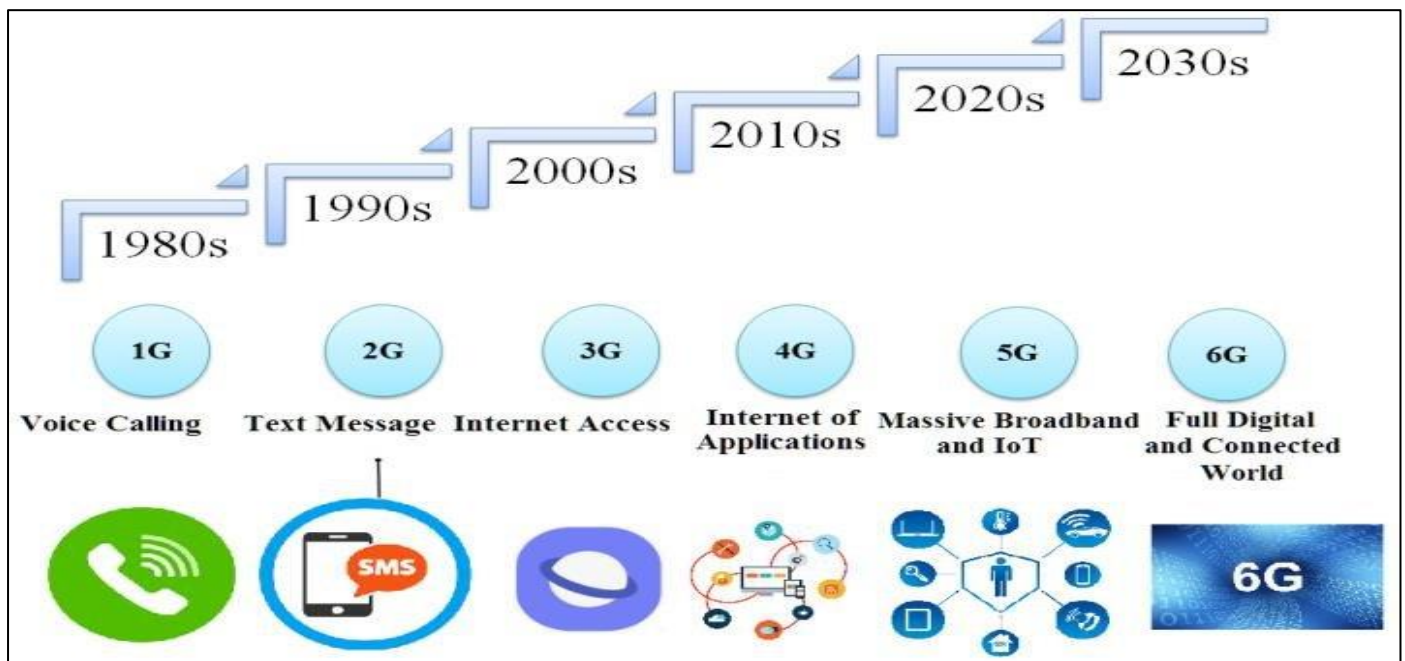


Fig 1 An Overview of 1G-6G Devices and the Corresponding Technology Breakdown

## II. 6G FACTS

The next generation of wireless technology (6G) will work within the terahertz frequency (THz) range of 300 gigahertz to 3 terahertz, offering a wide bandwidth and very high data speeds. The frequencies used in this technology are significantly higher than those in 5G, which utilizes frequencies in the sub-6 GHz and millimeter-wave bands (24 GHz to 100 GHz).

## III. 6G CHALLENGES

It is expected that 6G rates of up to 100 GB/s with latency in the Microsecond range, allowing to provide contacts close to the eight compared to 5G, which provide peak data rates of up to 10GP/s with latency about 1 millisecond.

6G will focus on ubiquitous connectivity, integrating satellite networks for global coverage and ultra-reliable connectivity and low latency.

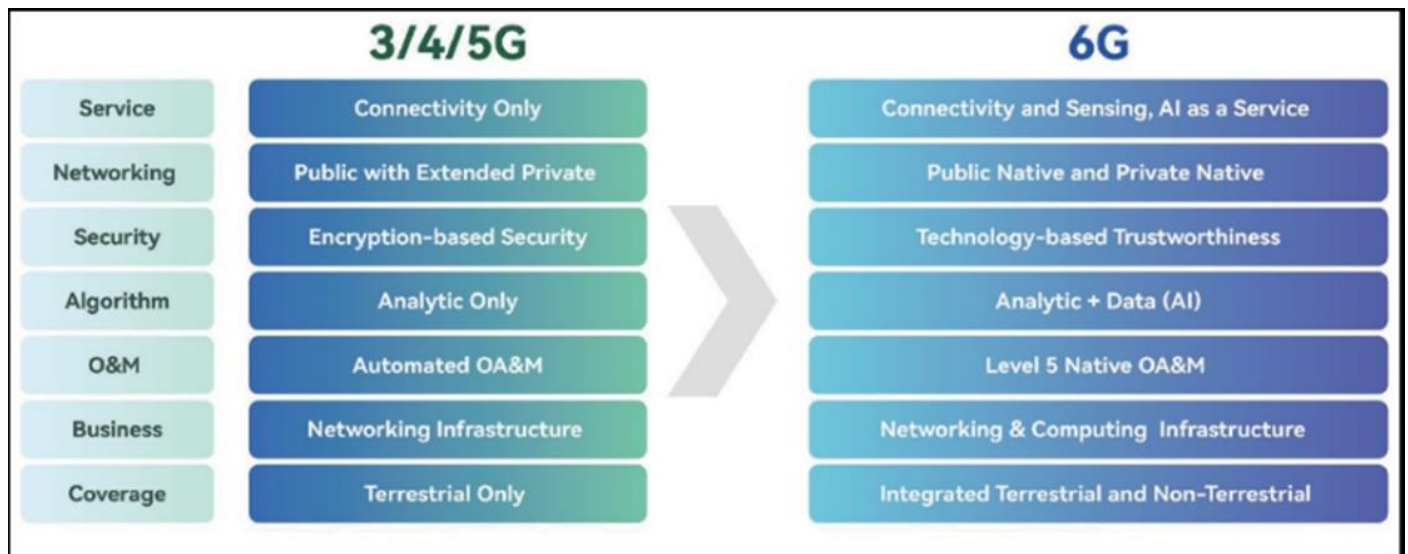


Fig 2 The Comparison between 6G and 3G, 4G, and 5G

#### IV. HEALTH EFFECTS AND RESEARCHES

The health impacts of prolonged exposure to 6G technology remain uncertain since it is still in the developmental stages and has not been implemented.

Research is currently being conducted on the health impacts of radiofrequency radiation, which is the energy produced by cell phones, including those utilizing 6G technology. Although some research has hinted at a potential connection between radiofrequency radiation and illnesses such as cancer, further studies are necessary to validate these results.

International safety organizations have established rules to reduce people's exposure to radiofrequency radiation. Cell phone networks, including those anticipated to utilize 6G technology, must adhere to these safety regulations.

#### V. CONCLUSION

As we approach the horizon of 6G technology, the potential for transformative advancements in mobile communication becomes increasingly apparent. With promises of unprecedented speeds, reduced latency, and intelligent network management through AI, 6G is poised to revolutionize how we interact with technology. The move to terahertz frequencies will enable data transmission at rates and efficiencies far beyond the capabilities of current 5G networks, enhancing global connectivity and supporting the proliferation of smart devices and the Internet of Things.

However, the path to this new era is not without challenges. The technical hurdles associated with integrating 6G's high-frequency bands and ensuring seamless global connectivity require substantial innovation and investment. Moreover, while the benefits of 6G are promising, the potential health effects of prolonged exposure to higher-frequency radiation necessitate ongoing research and adherence to stringent safety regulations.

In conclusion, while the advent of 6G holds great promise for the future of wireless communication, it is crucial to navigate its development with careful consideration of both technological and health implications. As we move toward the 2030 launch and beyond, balancing innovation with safety will be key to realizing the full potential of 6G technology and ensuring it contributes positively to our connected world.

#### REFERENCES

- [1]. Bell Labs, "What is 6G?" Bell Labs, 2024. Available: Link
- [2]. **Matthaiou, M., Yurduseven, O., Ngo, H. Q., Morales-Jimenez, D., Cotton, S. L., and Fusco, V. F.**, "The Road to 6G: Ten Physical Layer Challenges for Communications Engineers," *IEEE Access*, vol. 9, pp. 103445-103463, 2021. Available: IEEE Access Article
- [3]. **Latva-aho, M., and Leppänen, K.**, 6G: The Next Generation of Wireless Networks, VTT Technical Research Centre of Finland, 2020. Link
- [4]. **Agha, S., and Mazinani, A.**, "6G: Envisioning the Key Technologies, Applications and Challenges," *Future Wireless*, vol. 15, no. 2, pp. 75-90, 2024. Available: Future Wireless Article. Reference for Figure 1.
- [5]. Huawei, "Unlocking the Potential of 5G Transport Networks: Requirements, Structure, and Key Technologies," Huawei Enterprise Forum, 2024. Available: Huawei Enterprise Forum. Reference for Figure 2.