# Unveiling the Power of Wi-Fi in the 6-GHz Band: A Quantum Leap in Wireless Connectivity

**Bharat Bhatia,** FIETE

ITU-APT Foundation of India, G 104, World Trade Centre, Barakhamba Road, New Delhi 110001 India

bharat.bhatia@itu-apt.org

*Abstract* -- **In an era defined by connectivity, the evolution of wireless technology continues to shape how we interact with the digital world. Among the latest innovations is Wi-Fi operating in the 6-GHz frequency band, commonly referred to as Wi-Fi 6E. This new frontier in wireless communication promises to revolutionize our internet experience, offering unparalleled speed, reliability and capacity. Wi-Fi 6E is a game-changer that will redefine how we experience connectivity. Wi-Fi 6E offers unparalleled speed, capacity, and reliability compared to its predecessors. In India, unlocking the potential of Wi-Fi 6E by delicensing the 6-GHz band is not just a luxury but a necessity to drive innovation, economic growth, and digital inclusion, enabling Indian telecom hardware and software companies to corner a large part of this futuristic global market.**

**Considering the importance of the Wi-Fi in 6-GHz band, major economies of the developed world including USA, Canada, France, Germany, UK, Singapore, UAE have delicensed Wi-Fi in 5925-6425 MHz band.**

*Keywords: 6GHz band, Bandwidth-intensive applications, 4K streaming, Online gaming, Virtual reality*

## I. INTRODUCTION

THE 6 GHz band represents a significant expansion of available spectrum for Wi-Fi networks. Traditionally, Wi-Fi operated in the 2.4GHz and 5GHz bands, which have become increasingly congested with the proliferation of devices competing for bandwidth. With the addition of the 6GHz band, Wi-Fi 6E provides a vast swath of untapped spectrum, free from the interference and congestion that plague its predecessors. Considering the importance of the Wi-Fi in 6 GHz band, the entire developed world including major economies USA, Canada, France, Germany, UK, Singapore, UAE etc, have already delicensed Wi-Fi in 5925-6425 MHz band.

One of the most compelling features of Wi-Fi 6E is its ability to deliver blazing-fast speeds. By leveraging wider channels and higher frequencies, Wi-Fi 6E can achieve speeds of up to 9.6 gigabits per second (Gbps), making it ideal for bandwidth-intensive applications such as 4K streaming, online gaming, and virtual reality. Moreover, Wi-Fi 6E offers significant improvements in latency, ensuring a more responsive and seamless user experience. Whether it's lag-free gaming,

crystal-clear video calls, or real-time IoT applications, the reduced latency of Wi-Fi 6E opens up a world of possibilities for innovation and productivity. Wi-Fi in the 6-GHz band represents a quantum leap forward in wireless technology. With its blazing-fast speeds, low latency, and improved capacity, Wi-Fi 6E is poised to redefine how we experience connectivity in the digital age. As more devices and applications demand higher bandwidth and reliability, the 6-GHz band offers a solution that is not only future-proof but also essential for unlocking the full potential of the internet of things, augmented reality, and other emerging technologies.

Additionally, Wi-Fi in the 6-GHz band allows for more efficient use of spectrum, enabling higher device densities and better network performance in crowded environments. This means fewer dropped connections, faster data transfers, and smoother overall connectivity for users.

## II. WORLD RADIOCOMMUNICATION CONFERENCE

World Radiocommunication Conference (WRC-23), a pivotal global conference held in Dubai from November-December 2023 brought together over 4000 spectrum and industry experts from 172 countries. Among many key issues addressed during the conference, the 6-GHz band had drawn maximum attention of the participants from across the world. WRC-23 had decided to identify the band 6425-7025 MHz for 5G in Europe, Middle East and Africa (ITU Region 1) with strict conditions to protect satellites, while keeping that band available for Wi-Fi for administrations wanting to delicense the same. However, the frequency band 5925-6425 continues to be open for Wi-Fi and other non-4G/5G services on shared basis.

It may be recalled that the COVID-19 pandemic fundamentally shifted work patterns, leading to a widespread adoption of the "work from home" model. This surge in remote work drove an unprecedented demand for Wi-Fi connectivity. Currently, the Department of Telecommunications (DoT) permits Wi-Fi use only in the 2.4 GHz and 5 GHz frequency bands. Unfortunately, these bands offer a combined spectrum of approximately 600 MHz, falling significantly short of the over 2 GHz needed to meet current demand. It is estimated that present use of Wi-Fi

in India creates an economic value of about Rs. 1.6 Lakh crores every year, includes contributions from the use of Wi-Fi by consumers, businesses, service providers, and more.

The delicensing of lower 6-GHz band in India will further boost India's local manufacturing, innovation and exports, not just for telecom but in many other Industrial sectors as a whole as most products in future will have inbuilt Wi-Fi modules and India's export of industrial products may be compromised without access to the necessary Wi-Fi modules. As Wi-Fi-6E is still a niche technology, it is easier for the Indian telecom hardware and software companies to corner a large part of this futuristic global market, which we could not do in case of 5 GHz Wi-Fi, as it was delicensed in India after more than 20 years from rest of the world.

It is pertinent to mention here that the Government of India's initiatives to expand broadband access are further enhanced by the PM Public Wi-Fi Program (PM-WANI), which aims to proliferate public Wi-Fi for the masses. Complementing these efforts, the BharatNet Project has significantly advanced rural connectivity, establishing over 104,675 Wi-Fi hotspots to bridge the last mile of internet access. Therefore delicensing of the lower 6-GHz band will support domestic innovation and align with global trends, aligning with similar actions taken by numerous developed and developing countries and is crucial for empowering our engineers and promoting the "Atmanirbhar Bharat" initiative.

With access to wider channels in the 6-GHz band, Wi-Fi 6E can deliver blazing-fast speeds of up to 9.6 Gbps, enabling seamless streaming, gaming, and large file transfers. The additional spectrum offered by the 6-GHz band alleviates network congestion, especially in densely populated areas, ensuring consistent performance even in high-traffic environments.Wi-Fi 6E's improved latency enables real-time responsiveness, critical for applications such as online gaming, video conferencing, and IoT devices, enhancing user experiences and productivity. By leveraging higher frequencies with less interference, Wi-Fi 6E extends the reach of wireless networks, providing better coverage and connectivity across homes, offices, and public spaces.The proliferation of Internet of Things (IoT) devices and emerging technologies like augmented reality (AR) and virtual reality (VR) necessitates a robust wireless infrastructure, which Wi-Fi 6E can deliver efficiently.

In summary, the deployment of Wi-Fi 6E holds immense promise for India's economy and society by facilitating faster internet speeds and reliable connectivity, empowering businesses to innovate, enhance productivity, and compete on a global scale. Industries such as e-commerce, telemedicine, education, and manufacturing stand to benefit significantly from the adoption of this technology, driving economic growth and job creation. Access to affordable, high-speed internet is a prerequisite for digital inclusion.

Delicensing the 6-GHz band for Wi-Fi 6E enables more Indians, especially those in underserved rural and remote areas, to bridge the digital divide, access online education, healthcare services, government initiatives, and participate in the digital economy.Wi-Fi 6E provides a fertile ground for innovation and entrepreneurship, enabling start-ups and tech enthusiasts to develop groundbreaking applications and services that leverage its high-speed, low-latency capabilities. This fosters a thriving ecosystem of technology-driven innovation, attracting investment and fostering a culture of entrepreneurship in India.

Wi-Fi 6E holds the promise of transforming India's digital landscape, driving economic prosperity, fostering innovation, and promoting digital inclusion. To unlock its full potential, policymakers must prioritize the delicensing of the 6-GHz band, ensuring that this valuable spectrum resource is accessible to all stakeholders. By embracing Wi-Fi 6E, India can build a resilient and inclusive digital infrastructure that empowers individuals, businesses, and communities to thrive in the digital age. Despite the numerous benefits of Wi-Fi 6E, its widespread adoption in India faces regulatory hurdles from the existing mobile operators.

## III. CONCLUSION

With the increasing demand for wireless connectivity, spectrum scarcity poses a significant challenge. Delicensing the 6-GHz band unlocks a valuable spectrum resource, providing much-needed capacity to meet the growing demands of consumers and businesses. Many countries worldwide have already recognized the importance of the 6GHz band for Wi-Fi 6E and have moved to delicense it. India must align its spectrum policy with international standards to ensure interoperability, foster innovation, and enable seamless connectivity for global travellers and businesses.The urgency of delicensing the 6GHz band cannot be overstated.

Delaying action risks impeding India's technological advancement, hindering economic growth, and widening the digital divide. By acting swiftly to delicense the 6-GHz band, India can position itself as a leader in wireless innovation and secure its digital future.

## FOR FURTHER READING

[1]. Vidushi Sinha and Aman Mishra, "Examining Wi-Fi 6E for India", Research Report, CUTS International.

[2]. Universal and meaningful connectivity: The new imperative. https://www.itu.int/itud/reports/statistics/2022/05/29/gcr-chapter-1/

[3] Policy and regulatory strategies that drive digital transformation. https://www.itu.int/itud/reports/statistics/2022/05/30/gcr-chapter-7/

[4]. Artificial Intelligence (AI), Internet of Things (IoT), Augmented

Reality, Virtual Reality, cloud computing, among others and also include technological fusions like AI and IoT, which are increasingly becoming mainstream. https://www.weforum.org/agenda/2021/03/ai-is-fusing-with-the-internet-ofthings-to-create-new-technology-innovations/

[5].   Meaningful Connectivity: A New Standard for Internet Access. https://www.ictworks Meaningful Connectivity.org/ meaningful-connectivity-a-new-standard-for-internet-access/#. Y3vfPnZBzIU

[6].   COVID-19: A wake-up call for Indian Internet Service Providers. https://www.igauge.in/admin/uploaded/report/files/ QSIGAUGECOVIDISPReportApril2020_1606732097. pdf

[7].   High-speed internet offers key connection to health, but millions lack it. https://www.heart.org/en/news/2020/08/05/high-speed-internet-offers-key-con

**Bharat Bhatia,** FIETE is President, ITU-APT Foundation of India and Vice Chairman, World Wireless Research Forum (WWRF). He possesses over 45 years of experience in Public Protection and Disaster Relief (PPDR), Spectrum management and ICT policies and regulations. Earlier, he served as President of Telecom Equipment Manufacturers Association of India (TEMA) and Vice President of Association of Telecom Industries of Singapore (ATIS). He was a senior regulator with government of India for 22 years as a spectrum regulator and Telecom policyspecialist and was actively involved in opening of the Indian telecom to the private sector, including the first ever GSM metro licensing in India. He was also a key architect of India's first ever National Frequency Allocation Plan (NFAP) in 1981 and the first ever published NFAP in 2000.

Mr Bhatia holds a BE degree from University of Delhi in Electronics and Telecommunications and completed a number of management courses from various institutes and universities including National University of Singapore and George Washington University, USA.