KEY HIGHLIGHTS OF

Wi-Fi

&

Delicensing of 6 GHz:

The Driving Force of Broadband for All

Tuesday, 11th April,2023

KEY HIGHLIGHTS

"Wi-Fi and Delicensing of 6 GHz: The Driving Force of Broadband for All", jointly organised by Broadband India Forum (BIF) and Wireless Broadband Alliance (WBA) on **11th April, 2023,** Le Meridian Hotel, Delhi**,** witnessed 5 knowledge intensive technical sessions. The technical sessions covered a number of important facets of the Wi-Fi & Delicensing of 6 GHz viz.

1. **Enabling Broadband through NextGen Wi-Fi technologies**
2. **Convergence of 5G & Wi-Fi**
3. **Delicensing of 6 GHz Spectrum**
4. **Public Wi-Fi Roaming - OpenRoaming/ OpenWi-Fi & PM-WANI- The Indian perspective**
5. **Global Perspectives Towards Wi-Fi 7**

The event jointly focused on the importance of the globally harmonised unlicensed 6 GHz spectrum band and the benefits it brings by helping address the Digital Divide, by making license exempt spectrum available for the next generation Wi-Fi products based on standardised IEEE 802.11 technologies viz, Wi-Fi 6E and Wi-Fi 7, accelerate technology innovations including new applications like AR/VR, Holographic & Haptic systems, besides providing much needed Wi-Fi capacity to supplement the high capacity download requirements through mobile data offloads and thereby help improve the QoS for the 5G Mobile Networks.

The event brought together policymakers, industry leaders, subject matter experts, and other stakeholders to discuss and deliberate on aspects around how the latest Wi-Fi technologies 802.11ax and 802.11.ay (Wi-Fi 6E and upcoming Wi-Fi 7) which work exclusively in the delicensed 6 GHz spectrum band, can help complement 5G and thereby help bridge the connectivity gap besides spurring new innovations and catalyse research & development.

The key takeaways from each of the distinguished and eminent speakers at the Conference is presented in this document.

Inaugural Session:

Enabling Broadband through NextGen Wi-Fi technologies

Mr. TV Ramachandran, President, BIF, emphasised the importance of Wi-Fi and the 6 GHz spectrum in enabling India to achieve its digital ambitions and aspirations. He emphasised the role and importance of the 6 GHz delicensed spectrum and said that it is a prime driver for this growth. He also stated that **Wi-Fi complements 5G and is not in competition with it. Wi-Fi shall be required even more by 5G than previous generations of cellular technologies as very high data downloads and uploads are required at ultra-low latencies in the 5G era. These can be easily facilitated through the help of next-generation Wi-Fi Technologies which work exclusively in the 6 GHz bands.**

A robust and reliable Wi-Fi network along with a 5G network could enable network efficiencies, optimal spectrum utilization, and better quality of Service (QoS) of the Mobile networks besides improving the overall customer experience and customer satisfaction. Further, the mobile data offload would enable the release of the crucial licensed spectrum for other applications. This would be a win-win situation for the operator as well as the consumer.

To solve the problem of the co-existence of new Wi-Fi services in the 6 GHz spectrum band with that of the incumbent services, Broadband India Forum (BIF), along with other partners, conducted a detailed technical study with local parameters. The technical study report has been submitted to the Department of Telecommunications (DoT) on the co-existence of Wi-Fi, Fixed Satellite Services (FSS) and Fixed Services (FS) in the 6 GHz band. The study carried out conclusively proved that Wi-Fi can easily co-exist with all the incumbent services in this band without any harmful interference.

Mr. Ramachandran added that **it is necessary to delicense the entire 1200 MHz spectrum in the 6 GHz band, as the next generation applications viz. AR/VR/MR and other innovative applications can only be utilised if the entire 6 GHz band is made available in a delicensed manner as this would enable availability and utilisation of at least 3 channels of a channel bandwidth of 320 MHz, which is essential to be able to make optimal use of these next-generation applications. This**

would provide numerous advantages to consumers which would otherwise not be possible in other frequency bands.

Smt. Aruna Sundarajan, Chairperson of BIF, emphasized that the country is at a critical juncture in shaping not just the broadband landscape, but also the overall digital ecosystem through the adoption of Wi-Fi technology and the delicensing of the 6 GHz spectrum band.

India's digital transformation is progressing at a rapid pace, and the country is in the next phase of its growth, which is being enabled by simultaneous impetus on several fronts. These include (1) Manufacturing India, (2) Building a robust digital public infrastructure, (3) Implementing digital regulations such as the Digital India Act, which will set a benchmark for many countries, and (4) Rolling out 5G and Web 3.0 at an unprecedented pace. The recent boom in startups also highlights the need for quality broadband to be made available without any delay to ensure an excellent service experience for entrepreneurs and customers alike.

According to Smt. Sundararajan, **India has a unique opportunity to become a global leader in Wi-Fi technology, given the high level of readiness to adopt Wi-Fi in the ecosystem. The estimated value of unlocking this potential is about 250 billion, which makes the delicensing of the 6 GHz spectrum a crucial step towards achieving this goal.** However, it's important to strike a balance in spectrum allocation to different players such as TSPs, or satellite broadcasters to ensure the holistic growth of the sector, rather than focusing on the growth of a single technology. **The world has shown how the delicensing of the 6 GHz spectrum can act as a catalyst for exponential and transformational inclusive growth of the sector.**

Mr. Tiago Rodrigues, CEO of WBA, said that **delicensing of the 6 GHz spectrum band could lead to a great opportunity for Wi-Fi to evolve, as Wi-Fi 6E is becoming the dominant Wi-Fi standard around the world.** Currently, 50 percent of the players are already using it and 44 percent are looking to implement it this year. Several countries have already opened up the entire 6 GHz spectrum band, and the WBA,

along with its members, is creating Automated Frequency Coordination (AFC) platforms to ensure dynamic and optimal use of the spectrum on hand and achieve higher and more efficient performance through Wi-Fi.

Additionally, with the exponential data needs of citizens and the need for roaming amongst PM-WANI Public Wi-Fi users, all wireless technologies should work together and complement each other to meet the demands of the citizens**. Delicensing the 6 GHz spectrum band for Wi-Fi is a fundamental step to boost capacities, enable new use cases, and foster new innovations based on XR technologies, Metaverse, and other emerging technologies. It shall be the underlying technology to help connect to all these new technologies in a seamless manner.**

Shri V.J. Christopher, Wireless Advisor, WPC, DoT, emphasized that Wi-Fi and public hotspots can play a significant role in enhancing broadband penetration and promoting social and economic progress in the country. With an increase in data usage from 0.3 GB/user/month in 2016 to 17 GB/user/month in 2022, along with mobile spectrum availability and network infrastructure constraints, it is important to have a complementary framework of Wi-Fi, including public Wi-Fi hotspots. A committee within DoT is working on the mode of allocation of the 6 GHz band and is trying hard to ensure a balanced recommendation for the optimal utilisation of this band.

Around the world, public Wi-Fi is evolving as a means of enhancing broadband connectivity and proliferation among the masses. **Wi-Fi can complement 5G technology and improve the overall quality of service, bridging the digital divide and providing people in remote and under-served areas with access to critical services such as education and job opportunities. Furthermore, it is undeniable that adopting globally harmonized bands including Wi-Fi, will have a multiplier effect on the country's GDP growth.**

Regarding efficient utilization of spectrum resources, Mr. Christopher emphasized that the 605 megahertz in the 5 GHz band and the 80 megahertz in the 2.4 GHz which has been already delicensed. He emphasised the need for these frequency bands to be optimally utilized.

Dr. R.K. Upadhyay, CEO and Chairman Project Board, C-DOT

India has made significant progress in the digital landscape, with 800 million broadband customers using 17 GB per month at rates drastically reduced to less than 10 rupees per GB compared to 500 rupees per 250 MB a few years ago. However, more than 500 million people still remain unconnected, which is crucial to realize the Hon'ble Prime Minister's vision of becoming a USD 5 trillion economy by 2025.

Despite the technological advancements, 63% of the rural population in India is still unconnected in terms of Broadband, which needs to be addressed. **While 4G/5G and fixed access are major candidates for providing broadband, Wi-Fi is a complementary technology that can connect the unconnected and the under-connected.** Public Wi-Fi services, such as PM-WANI, have seen a speed increase from 33 Mbps in 2018 to 92 Mbps in 2022. **Wi-Fi contributes significantly to the global economy, with more than 60 countries having opened up the entire 6 GHz spectrum for unlicensed use to provide Wi-Fi 6E services.**

TSPs are utilizing Wi-Fi for offloading data traffic for cost savings and extending better service to customers with explosive data needs. Hence, Wi-Fi is not a competitor to 5G/6G, but rather complements it.

In summary, the esteemed speakers in the Inaugural session unanimously agreed that delicensing 6 GHz spectrum band for Wi-Fi is a fundamental step to enable new use cases, and foster new innovations based on emerging technologies such as AR/VR/XR technologies and Metaverse. The delicensing of the 6 GHz spectrum which provides High Reliability, High Speeds, Enhanced Quality of Service(QoS), and Extremely low latency, can act as a catalyst for exponential and transformational inclusive growth of the sector, which is crucial to realize the Hon'ble Prime Minister's vision of becoming a USD 5 trillion economy by 2025.

Session 2 – Convergence of 5G & Wi-Fi

Shri A K Tiwari, Honourable Principal Advisor of BIF highlighted the potential of Wi-Fi to bridge the urban–rural connectivity gap. The delicensed 6 GHz band of Wi-Fi can suitably complement the 5G infrastructure in India and **suggested allocating a significant portion of the 1200Mhz spectrum available in the 6 GHz band to Wi-Fi to ensure that Indian citizens can benefit from the economic and social advantages offered by the new advanced Wi-Fi technologies viz. Wi-Fi 6E & Wi-Fi 7**.

Mr. Tiwari emphatically mentioned that it is irrelevant whether the other unlicensed spectrum bands viz. 2.4 & 5 GHz were being optimally utilised or not as the innovative applications which are proposed to be deployed viz. AR/VR , etc can only work with Wi-Fi products and technologies in this 6 GHz band and not in any other band. Hence the 6 GHz band must be opened up for delicensing, notwithstanding the utilisation factor of other spectrum bands, as the applications & use cases in this band were entirely different and cannot work in any other band.

Mr. Vivek Dua, GM (FWA), BSNL, highlighted **that improving service delivery rather than advancing technology is the current challenge in bridging the digital divide in rural India**. Deploying both Wi-Fi 6 and 5G would play a crucial role in enabling digital transformation in remote regions and rural areas. He suggested a blended deployment of both to address the digital divide and empower rural communities with access to cutting-edge technology.

Mr. Jayant Mandal, Group Leader, C-DOT, spoke about the highly efficient network required for various communication modes such as machine-to-machine(M2M) and device-to-device(D2D) communication. **Combining the capabilities of 5G and Wi-Fi would deliver the high-efficiency network needed to ensure quality services for customers. He also highlighted the deep architectural convergence and cooperation from both industries required to achieve the full potential of 5G and Wi-Fi.**

Mr. Steve Namaseeveyum, Vice President, Industry Engagement, WBA, spoke about the Wireless Broadband Alliance's role in driving the **convergence of Wi-Fi and 5G to enhance capabilities and interoperability worldwide.** Citing AT&T's successful data offloading and roaming as a motivating case study, with Wi-Fi connectivity in all US airports and sports stadiums. Train Wi-Fi and in-flight Wi-Fi connectivity are other promising use cases, and the **WBA's OpenRoaming initiative is poised to make a significant difference in Wi-Fi deployments by promoting the convergence of Wi-Fi and 5G.**

Mr. Paramjit Singh Puri, Global Director- Membership, Wi-Fi Alliance, talked about how Wi-Fi has emerged as the centre stage of the digital economy and is one of the most innovative technologies developed over the past 25 years. Wi-Fi and 5G must complement each other to cater to the growing demand for wireless connectivity. In India, we are currently using Wi-Fi 5, and **the full potential of Wi-Fi 6E and Wi-Fi 7 (expected next year) and Wi-Fi 8 (expected in 3-4 years) can only be realized if the 6 GHz spectrum is delicensed**. Worldwide shipments of Wi-Fi 6E has already crossed 350 M units.

Indoor data growth accounts for 80-95% of overall IP traffic, and the demand for wireless connectivity is only going to increase in the future. The 6 GHz frequency band is uniquely suited to meet this growing demand for Wi-Fi, as it can offer significantly higher bandwidth and lower latency compared to the existing spectrum bands with less interference to existing technologies like Satellite etc. Industry reports suggest that Wi-Fi traffic increases with each cellular generation.

Mr. Puri mentioned that world over, there are no 5G networks or devices in the 6 GHz band anywhere. In fact, there is no development work for 5G going on in this band. Even if this band is allocated for licensed 5G use cases, this band would lay fallow for 3-4 years till products evolve in this band. Hence it does not make economic sense to deprive advanced Wi-Fi technologies viz. Wi-Fi 6E & Wi-Fi 7 which have already been developed and are being deployed in a number of countries the world over, the right to be utilised in the 6 GHz band in a delicensed manner.

Next-generation use cases such as AR/VR, XR, telehealth, industrial IoT/ automation, and 3D video require significant computational resources and high-speed connectivity, which can only be delivered by NextGen Wi-Fi technologies like Wi-Fi 6E and Wi-Fi 7 because of high speeds, very low latency and spectral re-use. The transformation of Wi-Fi technology is already underway with the introduction of Wi-Fi 6E, and Wi-Fi 7 in the near future will provide the capabilities required for various applications.

Ms. Sindhu Verma, Broadcom, highlighted that the aim of Wi-Fi 6E technology was not only to improve peak data rates but also the performance and battery life in densely populated indoor and low-mobility outdoor environments. The delicensing of the 6 GHz band would significantly increase its flexibility and enable the deployment of the latest technologies, such as AR/VR, which require high bandwidths to deliver optimal user experiences.

In conclusion, the experts at the conference stressed the need for a blended deployment of 5G and Wi-Fi in the 6 GHz band to address the digital divide and empower rural communities with access to cutting-edge technology. The complementary relation between Wi-Fi and 5G is necessary to cater to the growing demand for wireless connectivity.

Session 3 – Delicensing of 6 GHz Spectrum

Mr. Parag Kar, Vice President of BIF, spoke about the need for delicensing of the 6 GHz band, to enable the deployment of the latest technologies and high bandwidth-hungry applications like AR/VR. The focus of the discussion was on efficient spectrum utilization and ensuring that technology deployment does not interfere with existing satellite services (FSS) and FS links that occupy the same frequency band. The need for a full 1200 MHz spectrum to be opened up in an unlicensed manner in the 6 GHz band was emphasized. The question of whether the other unlicensed spectrum bands viz. 2.4 & 5 GHz were being optimally utilised was deemed irrelevant, as the technologies,

products and applications which are proposed to be deployed in this band cannot simply work in any other band.

Mr. Amol Kulkarni, Director of CUTS International, an organisation that upholds consumer rights, spoke about the consumer benefits from delicensing of 6 GHz.

He mentioned Wi-Fi is rapidly becoming the preferred mode of internet connectivity in various locations, particularly in Tier 1 cities. As more devices emerge that are powered by Wi-Fi 6 or 6E, people are upgrading to new bands of Wi-Fi or installing Wi-Fi not just for a better quality of experience or increased usage, but because an increasing number of people want to connect high-end devices to Wi-Fi. **This trend is indicative of the growing demand for high-speed, reliable, and ubiquitous Wi-Fi connectivity, which is set to continue as the adoption of Wi-Fi 6 and 6E continues to gain momentum.**

Mr. Tiago Rodrigues, CEO of Wireless Broadband Alliance, highlighted the fact that the United States had opened up the entire 6 GHz band for unlicensed use and the regulator's dynamic Spectrum management system, including the AFC system to minimize the risk of harmful interference.

Mr. Shubhodeep Adhikari of Broadcom focused on the deployment of the 6 GHz band and its coexistence with fixed satellite service (FSS) and fixed service (FS).

Several countries such as the **USA, Canada, Brazil, Saudi Arabia, and South Korea have delicensed the entire 6 GHz band for unlicensed use. Others like Japan, the UK, Australia, Hong Kong, and Qatar have delicensed the lower 6 GHz band and are considering delicensing the upper 6 GHz band in future. The EU, Russian Federation, South Africa, UAE, New Zealand, and others have currently delicensed the lower half of the 6 GHz band**.

Regardless of industry positions, it's clear that the most feasible long-term path for the use of the 6 GHz band is unlicensed use for primarily indoor or outdoor-

indoor Wi-Fi + FS + FSS. As the 6GHz band is the prime spectrum, regulators/governments should use it in a way that best serves national interests.

Mr. Sandeep Agrawal, Team Leader of C-DOT, explained that the **6 GHz band offers a range of use cases, including high throughput with 160/320 MHz channel sizes, MIMO, QAM, and video applications such as AR/VR and Metaverse. The deterministic Wi-Fi feature with a "Green Channel" and no legacy operation makes it perfect for industrial IoT use cases.**

Ms. Martha Suarez, President of DSA, emphasized that the existing 5 GHz band is insufficient for new use cases and innovative applications that require larger channel bandwidths, low latency, and high throughput. **Wi-Fi is no longer limited to household use but has become critical for healthcare, education, transportation, smart warehouses, smart cities, industry applications, IoT, and public hotspots.**

Session 4: Public Wi-Fi Roaming - OpenRoaming/ OpenWi-Fi & PM-WANI- The Indian perspective.

The session brought together experts from various fields to discuss the challenges and opportunities presented by PM-WANI, the Indian government's public Wi-Fi network initiative. **Shri. Vivek Narayan, DDG (DS), DoT**, highlighted the gradual growth of PM-WANI hotspots across India but also acknowledged challenges such as low network density and lack of awareness among users. **He emphasised the importance of PM-WANI Roaming which the DoT plans to introduce shortly, will help increase mass awareness, help users seamlessly connect with different PDOAs, improve the overall user experience and drive the adoption of the service**.

Mr. Sai Manapragada, Chairman & CEO, Xi-Fi Networks, stressed the potential of PM-WANI to create a circular economy in India. However, the adoption of PM-WANI is still relatively low due to a lack of awareness among potential users. To bridge the digital divide, OpenRoaming technology can be leveraged to enable seamless connectivity and enhance the overall user experience.

Mr. Srinivas Gudipudi, Founder & CEO, MatreComm Technologies, echoed the potential of PM-WANI to drive a circular economy in India but noted that limited income opportunities for PDOs, technical and compliance issues with hotspots, and a lack of awareness leading to low usage are hindering its adoption. Suggested leveraging the synergies between PM-WANI, FTTX, and roaming to create a powerful ecosystem that delivers ubiquitous connectivity and empowers individuals and businesses to thrive.

Mr. Steve Namaseeveyum, Vice President, Industry Engagement, WBA, spoke passionately about the PM-WANI initiative and its potential to revolutionize connectivity in India. He emphasized the importance of the framework's ability to seamlessly connect users and devices to Wi-Fi. He highlighted the potential & business benefits of WBA OpenRoaming platform, which could play a key role in the PM-WANI in bringing together billions of people and things, enabling a truly global and interoperable network and thus drive growth and development in the technology sector.

Prof Himanshu Tyagi, Associate Professor, IISc, discussed the slow adoption of PM-WANI, which he attributed to business-related issues, technical challenges, and a lack of awareness about the service. He emphasized that **to address these challenges, there is a need for a more supportive environment for business innovation, such as enabling roaming in PM-WANI. By allowing users to associate their existing subscription plans with different user apps, they can seamlessly connect with different PDOAs, improving the overall user experience and driving the adoption of the service**.

Mr. Pramod Gummaraj, Founder & CEO, Aprecomm Private Limited, discussed the increasing demand for high-performance computing and network services as the number of connected devices grows. He highlighted the importance of Network-as-a-Service (NaaS) and experience measurement in delivering the best possible customer experience and suggested that businesses that can successfully harness the power of NaaS and experience measurement will be well-positioned to deliver high-performance, reliable networks that meet the evolving needs of their customers.

Mr. Khetan Gajjar, Telecom Infra Project, emphasized the importance of better quality and more ubiquitous connectivity in India to address key policy objectives and promote economic growth and innovation. He highlighted the Telecom Infra Project's (TIP) OpenWi-Fi initiative, which can help achieve these objectives by **promoting open standards and collaboration between technology providers to accelerate the development of new and innovative Wi-Fi solutions & suggested that with the support of TIP OpenWi-Fi, India can leverage the power of wireless connectivity to transform the country's digital landscape and empower communities.**

Session 5 – Global Perspectives Towards Wi-Fi 7

Leading experts in the field of wireless communications discussed the potential benefits of Wi-Fi 7 technology and the resultant need for 6 GHz spectrum

Dr. S N Gupta, Chairman of the Board at Blue Town India and BIMSTEC, South Asia, emphasized the potential for Wi-Fi 7 to offer significant improvements in speed, reliability, and latency compared to previous generations of Wi-Fi, making it an ideal complement to 5G technology in areas where setting up dense infrastructure may not be economically feasible.

Mr. Tiago Rodriques, CEO of WBA, highlighted the growing recognition of Wi-Fi's importance and the potential for the 6 GHz spectrum to deliver better broadband connectivity. He also discussed the opportunities provided by the OpenRoaming

Standard for connecting billions of users and devices seamlessly to millions of Wi-Fi networks globally.

Mr. Bhuvnesh Sachdeva, Senior Vice President at HFCL, spoke about Wi-Fi 7's potential to offer reliable and low-latency wireless connectivity, making it a viable alternative to traditional cellular technologies for mission-critical enterprise applications.

Mr. Mark Grayson, Cisco Fellow at Cisco Networks highlighted that the 6 GHz spectrum offers several opportunities, such as the ability to avoid legacy stations and interference. Additionally, self-interference can be managed more effectively, resulting in more deterministic performance, particularly in open environments. This makes the 6 GHz band an ideal choice for Wi-Fi 6E, allowing for the use of wider channels that provide faster data rates, lower latency, and more reliable connectivity. The use of the 6 GHz spectrum can also address the growing demand for more bandwidth-intensive applications and services, such as video conferencing, cloud-based applications, and online gaming. Overall, the 6 GHz spectrum provides a significant opportunity to improve the quality and reliability of Wi-Fi networks, especially in environments with high levels of interference.

Mr. Kevin Robinson, CEO of Wi-Fi Alliance, emphasized the value of Wi-Fi and the potential for Wi-Fi 6E and 7 to deliver significant advancements in faster speeds, lower latencies, and better converged connectivity experiences. He also highlighted the importance of the availability of the full 1200 MHz spectrum in the 6 GHz band to be able to optimally leverage the benefits of the latest Wi-Fi technologies.