AIFISPA
ALL INDIA FIXED INTERNET SERVICE PROVIDERS ASSOCIATION

Letter No. AIFISPA/TRAI/041 Dated : 9th December, 2023

To,

Shri Akhilesh Kumar Trivedi,
Advisor (Networks, Spectrum and Licensing),
Telecom Regulatory Authority of India,
New Delhi-110 001
Email id: advmn@trai.gov.in

Subject : Response to TRAI Consultation Paper on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)

Reference : TRAI Consultation Paper No. 22/2023 dt 27.09.2023.

Dear Sir,

Greetings from All India Fixed Internet Service Providers Association (AIFISPA).

At first, we would like to thank the Authority for the subject mentioned consultation paper, and we submit our response as follows:

Executive Summary:

1. ***6 GHz band (i.e., 5925-6425 MHz) may be delicensed for Wi-Fi 6E devices which can deliver high-throughput, real-time immersive experiences to the customers.***
2. ***We would request Authority to recommend for democratization of E band (71-76/81-86 GHz) for the backhaul connectivity of Fixed Line Broadband (FLB) services and to be allotted to all types of TSPs irrespective of the Authorisation they hold. Light licensing regime for the allocation of E Band spectrum on administrative basis with minimum charges as proposed in 2014 TRAI recommendations.***
3. ***The light touch regulation for E Band may be allowed for period of 10 years which we think would be reasonable period, given the rapid changes in technology, and any short period may lead to under-estimation of benefits, as benefits are expected to accrue over a few years.***
4. ***Delicensing of V Bands (57-64GHz) as an enabler for proliferation of FLB services and in line with policy adopted by many countries.***
5. ***Post 2014 TRAI recommendations, various countries have delicensed V Band Spectrum and hence the same global practice can be adopted for India for proliferation of Fixed Line Broadband. We had given those details in the detailed response below.***
6. ***We envision using these spectrum bands as an extension of Fiber where fiber is not viable or feasible for delivering Fixed broadband services.***

In line with above summary, we hereby submit our detailed response as follows:

A. <u>Request to delicense 6 GHZ for Wi-Fi 6E:</u>

1. Wi-Fi technology is based on IEEE 802.11 standards and operates in unlicensed 2.4 GHz and 5 GHz spectrum bands. The Wi-Fi standardization and technology adoption activities are driven by multiple global organizations and these standards keep evolving to achieve better speed and support for multiple use cases. With ratification of latest 802.11ax standards, it also operates in 6 GHz band spectrum — referred to as Wi-Fi 6E — which is considered to be a game changing evolution to bring Wi-Fi at par with 5G cellular technology.
2. Access service providers are also utilizing the Wi-Fi technology to offload their subscriber activity to unlicensed bands so that they can keep the Capex low and maintain the quality of service for more real time applications.
3. In 2021, the global economic value provided by Wi-Fi will reach $3.3 trillion USD and is expected to grow to almost $5 trillion by 2025. This growth represents a 150 percent increase from the 2018 value of $1.96 trillion to the projected value in 2025, underscoring Wi-Fi's critical role in economies across the globe. *(Source : Wi-Fi Alliance report https://www.wi-fi.org/file/economic-value-of-wi-fi-highlights).*
4. The recent report on "The Economic Value of Wi-Fi Spectrum for India" by Broadband India Forum (BIF) estimates Wi-Fi value to be almost Rs. 12.7 lakh crores and data rate per GB over Wi-Fi reducing to less than Rs. 2.
5. Unlike its previous versions, which operated in either the 2.4 GHz or the 5 GHz band, Wi-Fi 6E operates in the 6 GHz band. The 6 GHz band contains radio frequencies between 5.925 and 7.125 GHz and is much wider than the 2.4 GHz and 5 GHz bands. The wide channels, along with other distinct features such as lesser interference, enable Wi-Fi 6E to perform with better speeds, even in multi-user connected, congested, and dense networks.
6. A rapidly growing and diverse ecosystem has gained quick traction in the marketplace, with Wi-Fi 6E devices unlocking high-throughput, real-time immersive experiences enabled by the new spectrum. This momentum is particularly remarkable for high performance devices, such as smartphones and mobile personal computers, where in the next five years itìs forecasted that more than 50% of these Wi-Fi-enabled devices will ship with Wi-Fi 6E.
7. We also believe that some technical co-existence studies were shared by relevant stakeholders to the DoT committee on 6 GHz which clearly showed co-existence of Wi-Fi with incumbent services (Satellite services) in this band with sufficient margins.

Public Wi-Fi hotspots

8. One of the ways to connect the unconnected is through public Wi-Fi hotspots. Deployment of Wi-Fi hotspots can also provide an alternate mechanism to access the internet on the move or as and when required. Efforts are being made to create hotspots in the country by Telecom Service Providers and Internet Service Providers.

Wi-Fi speeds from mobile devices will triple by in couple of years. Globally, the average Wi-Fi speeds will grow from 30.3 Mbps in 2018 to 92 Mbps before 2025. Wi-Fi hotspots will grow four-fold from 2018 to 2023. Globally, there will be nearly 628 million public Wi-Fi hotspots by 2023, up from 169 million hotspots in 2018. Wi-Fi 6 hotspots will grow 13-fold from 2020 to 2023 and will be 11 percent of all public Wi-Fi hotspots by 2023. By 2023, APAC will have 49 percent of all networked devices mobile-connected, and 51 percent will be wired or connected over Wi-Fi. By 2023, APAC's average Wi-Fi speeds from mobile devices will reach 116 Mbps, which represents 3.4-fold growth from 2018 (34.5 Mbps). (**Source:** Cisco's annual internet (2018 to 2023) report

1. https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.html).
2. Therefore, it is clear that Wi-Fi hotspots will play a major role in providing broadband services in the country. The National Digital Communications Policy (NDCP 2018) has also highlighted the importance of ubiquitous Wi-Fi hotspots in the country to accomplish the Strategic Objectives of provisioning of broadband for all and deployment of 10 million public Wi-Fi hotspots by 2022. Hence, it is important 6Ghz spectrum needs to be delicensed.

Global Scenario on 6Ghz Spectrum

3. India has around 688 MHz (2.4 GHz & 5 GHz band) of spectrum available for unlicensed use, spread across various spectrum bands compared to around 15000 MHz (2.4 GHz, 5 GHz, 6 GHz & 60 GHz band) in countries like the USA, China, Japan, UK, etc.
4. Many countries have opened up additional spectrum in unlicensed bands to meet increasing demand. While rules vary country-by-country, many leading tech nations have allocated the full 1200MHz of 6GHz spectrum, with others choosing to allocate a smaller swath of 500MHz initially. The ability to leverage the 6 GHz band for unlicensed Wi-Fi operation — referred to as Wi-Fi 6E — will deliver faster connectivity speeds and improved capacity.
5. With IEEE 802.11ax or Wi-Fi 6/6E supporting the 6 GHz spectrum use for Wi-Fi technology, regulators across the regions have taken decisions in this subject matter to open up the 6 GHz band fully or partly depending on the geography, incumbent technology in operation, etc. FCC of the United States of America opened the complete 1200 MHz in 6 GHz band (5.925 to 7.125 MHz) in April 2020. Total 10 countries including South Korea, Saudi Arabia, Brazil, Canada, Chile, Costa Rica, Peru, Honduras and Guatemala have adopted the full 6 GHz band for

unlicensed usage. The UK has opened the band partially. Twenty-four more countries are either considering or have taken decisions to fully or partly open the same so far.

Country	Status	Spectrum
Andorra	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Argentina	Adopted	5925-7125 MHz
Australia	Adopted	5925-6425 MHz
	Considering	6425-7125 MHz
Austria	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Bahrain	Adopted	5925-6425 MHz
Belgium	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Brazil	Adopted	5925-7125 MHz
CEPT	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Canada	Adopted	5925-7125 MHz
Chile	Adopted	5925-6425 MHz
Colombia	Adopted	5925-7125 MHz
Costa Rica	Adopted	5925-7125 MHz
Dominican Republic	Adopted	5925-7125 MHz
Egypt	Considering	5925-6425 MHz
El Salvador	Adopted	5925-7125 MHz
European Union	Adopted	5925-6425 MHz
		(*only adopting 5945-6425)
Faroe Islands	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
France	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Germany	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Gibraltar	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Guatemala	Adopted	5925-7125 MHz
Honduras	Adopted	5925-7125 MHz
Hong Kong	Adopted	5925-6425 MHz
	Considering	6425-7125 MHz

Iceland	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Ireland	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Isle of Man	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Japan	Adopted	5925-6425 MHz
	Considering	6425-7125 MHz
Jordan	Adopted	5925-6425 MHz
Kenya	Adopted	5925-6425 MHz
Liechtenstein	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Luxembourg	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Malaysia	Adopted	5925-6425 MHz
Mauritius	Adopted	5925-6425 MHz
Mexico	Adopted	5925-6425 MHz
Monaco	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Morocco	Adopted	5925-6425 MHz
Netherlands	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
New Zealand	Adopted	5925-6425 MHz
Norway	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Oman	Considering	5925-6425 MHz
Peru	Adopted	5925-7125 MHz
Portugal	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Qatar	Adopted	5925-6425 MHz
	Considering	6425-7125 MHz
Russian Federation	Adopted	5925-6425 MHz
Saudi Arabia	Adopted	5925-7125 MHz
Singapore	Adopted	5925-6425 MHz
South Africa	Adopted	5925-6425 MHz
South Korea	Adopted	5925-7125 MHz
Spain	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz

Switzerland	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
Thailand	Adopted	5925-6425 MHz
Togo	Adopted	5925-6425 MHz
Tunisia	Considering	5925-6425 MHz
Turkey	Adopted	5925-6425 MHz
United Arab Emirates	Adopted	5925-6425 MHz
United Kingdom	Adopted	5945-6425 MHz
	Considering	6425-7125 MHz
United States	Adopted	5925-7125 MHz

(Source: https://www.wi-fi.org/countries-enabling-wi-fi-in-6-ghz-wi-fi-6e)

IEEE 802.11 is a standards working group (WG) which specifies the Wi-Fi standards that define a set of media access control (MAC) and physical layer (PHY) protocols for implementing wireless local area network (WLAN) computer communication. Over the last two decades, WiFi standards

1. have evolved to achieve speeds from 2 Mbps to multi gigabit, a 1000x increase in throughput. Starting from 802.11b, new protocols such as 802.11g, 802.11n, 802.11ac and 802.11ax (Wi-Fi 6/6E) have been introduced to achieve higher speed and improvement in other parameters. In addition to increasing peak data rates, evolving standards also improve spectral efficiency which characterizes how well the system uses the available spectrum. The new standards have evolved to support new multiplexing schemes such as OFDM and OFDMA and of higher order of modulation such as 64 QAM, 256 QAM and 1024 QAM to achieve higher data rates. Multi-user techniques such as multi-user MIMO (MU-MIMO) and orthogonal frequency division multiple access (OFDMA) have been introduced to improve network efficiency and network capacity. These new standards also support transmission of multiple streams to a single client or multiple clients simultaneously. The standard and amendments as shown in image below provide the basis for wireless network products using the Wi-Fi brand:

Background on Wi-Fi Standards

Rel. Year	1999	2007	2009	2013	2020	2023(?)
Freq. Band	2.4 GHz	2.4 GHz	2.4 + 5 GHz	5 GHz	2.4 + 5 + 6 GHz (6E)	2.4 + 5 + 6 GHz
Bandwidth	20 MHz	20 MHz	40 MHz	80 MHz, 160 MHz	80 MHz, 160 MHz	240 MHz, 320 MHz

2. IEEE 802.11 WG has already started the standardization work to define the next generation of Wi-Fi standards i.e., Wi-Fi 7 in IEEE 802.11 by Extremely High Throughput Task group. These

enhancements will define the next generation of Wi-Fi. The standard is estimated to be completed by 2024. One of the main goals of Wi-Fi 7 is to increase the capacity and data rate beyond 9.6 Gbps of Wi-Fi 6. In Wi-Fi 7, the maximum data rate is 46 Gbps in 320 MHz channel and one 160 MHz channel in 5 GHz band with 4096 QAM and 16 spatial streams.

3. While the Global scenario is moving towards Wi-Fi 7, it is important that the Authority positively consider opening up of 6GHz for effective proliferation of Wi-Fi 6E.

6GHz will increase customer experience:

4. Customer experiences are increasingly defined by a rise in bandwidth-intensive and latency-sensitive applications such as video conferencing, cloud gaming or high-resolution 4K or 8K streaming — plus the ever-growing density and variety of devices in the home. 6GHz Wi-Fi plays a critical role in delivering these new use cases to consumers. 6 GHz band helps minimize the risk of interference and congestion, while supporting gigabit+ speeds in the home. 6GHz quadruples the total space available to traditional Wi-Fi.
9. The target in all major countries is now to have a one-gigabit broadband connection in every household which can be used for access to immersive cloud-based services including HD video, gaming and augmented/ virtual reality.
10. The existing 2.4 GHz band was already crowded due to legacy devices and crowded deployments. The 5 GHz band, with around 605 MHz bandwidth, so far supported increasing data demand. However, going forward, with the need for newer applications, the 5 GHz will be crowded soon and won't be able to support increasing data demand**. Therefore, it's important that we further strengthen the ecosystem in the country for its fast proliferation and realizing economic benefits. To support evolving use cases and data demand, it became important to open the 6 GHz band for unlicensed usage.**

B. E & V Bands can contribute to the penetration of FLBs:

1. In India the reliance on the mobile broadband is much higher than high speed fixed broadband connections and this context of broadband Internet in India determine the kinds of benefits that India can get from V-band and E-band. There is need in the Country for expanding access to fixed broadband and decongesting mobile broadband in dense urban environments and also to utilise the new spectrum-based technologies and business models being developed, those that will rely on E & V spectrum bands.
2. Proliferation of fixed broadband and use of V-band and E-band will lead to higher average speed of Internet usage and would contribute to GDP increase. The World Bank estimates a 1.38 percentage point increase in Gross Domestic Product for every 10 percentage point

increase of broadband penetration. The most recent study, published in 2017, found that 10 percent increase in India's total Internet traffic delivers on average a 3.3 percent increase in India's GDP. (*Source: Kathuria et al. Estimating the Value of New Generation Internet Based Applications in India. 2017*.)

3. The V-band and E-band spectrum can be used for 1. support expansion of fixed broadband Internet in urban areas: these bands can help solve the last mile problems of getting high speed wired broadband Internet into dense urban locations; 2. Backhaul for mobile broadband: these bands can provide higher capacity backhaul for mobile broadband, thereby easing congestion; 3. Support proliferation of commercial Wi-Fi and Wi-Gig hotspots: these bands can help backhaul the commercial Wi-Fi infrastructure in a cheaper and quicker manner, especially in dense urban locations; and 4. these bands can be put to a variety of other uses. These, inter alia, include: extension of local area networks between buildings within a building complex; Internet of Things; Vehicle to vehicle communication; Augmented Reality (AR)/Virtual Reality (VR) Systems; and so on.

Use of E & V Bands in Fixed Line Broadband services:

4. In densely populated urban areas, because of the existing built-up area, it is expensive and often very difficult to take wired Internet to homes and offices. Even if wired network can be taken into certain locations, extending it to adjacent areas can be challenging because of difficulties of obtaining right of way permissions, or the physical obstructions on the way. V-band and E-band can be used along with fibre optic cables to create a high speed wired Internet network, which can help improve consistency of Internet connectivity in India, and get FTTH and FTTC networks in locations where they are not present currently. V-band and E-band can help in the expansion of the fixed broadband subscriber base in urban areas by making it easier and cheaper to backhaul these connections.
5. In urban cities, the number of office, college, university, hospital and other complexes wherein multiple buildings are located in a contiguous area, with a local area network spanning the complex. V-band and E-band can help connect different buildings within such complexes using point-to-point cells, so that such connections do not require fibre optics or other cable-based solutions. This can help reduce the cost of networking without significant compromise in the quality of the network.
6. The usage of these band for last-mile connectivity. The fiber connectivity is available upto aggregate sites, beyond which fiber becomes impractical to use due to a number of reasons. In that scenario backhaul from this base site is extended using these bands, which will cater to a market area, high rise residential area, slum area and office complex, etc. As the aggregation

sites are connected using fiber, the bandwidth they can carry is assumed to be very high. These base units would then connect to other cells (within line of sight) to ensure adequate coverage of each area.

7. Use of V-band and E-band spectrum can, by enabling changes in the infrastructure for Internet, help improve the quality of Internet access in India. By helping expand the access to fixed broadband, these spectrum bands can help change the way users in India access the Internet.
8. If the V-band and E-band spectrum is delicensed or lightly licensed, the pass-through cost of this spectrum will be zero or very small, and only the installation costs incurred will be substantial. In a competitive market, reduction in costs will lead to lower prices for consumers. Given the price elasticity of demand for internet, and the rapid evolution of technology, this availability will lead to higher usage of broadband internet by consumers, allow new consumers to use broadband internet, and enable innovative business models and technologies.
9. Most of the benefits discussed in this section depend not just on release of the spectrum, but also on other enabling conditions. Hence, we sought for the following policy environment:
    a. Light licensing regime for the allocation of E Band spectrum on administrative basis with minimum charges as proposed in 2014 TRAI recommendations.
    b. The light touch regulation for E Band may be allowed for period of 10 years which we think would be reasonable period, given the rapid changes in technology, and any short period may lead to under-estimation of benefits, as benefits are expected to accrue over a few years.
    c. As the benefits of these bands in India are still not being evaluated in practical terms and not known to ISPs the above 10 years period may be allowed for use the scenario by ISPs who provide Fixed line Broadband services.
    d. Delicensing of V band spectrum in line with policy adopted by the many countries.

C. *Light licensing regime for the allocation of* E Band (71-76/81-86 GHz):

1. E & V Spectrum band uses envisaged by 3GPP as well as other competing uses through IEEE 802.11ad and 802.11ay enabling backhaul connectivity for Fixed Wireline services.
2. This technology can provide a high bandwidth (10Gbps +), low latency and jitter performance to most current and future applications.
3. This may be used for FWA, Wifi Backhaul, Small Cell Backhaul, Enterprise and Smart City Solutions.
4. **Both E&V bands are being treated similarly despite significant differences in their use cases and technical characteristics.**

5. E-band has large bandwidth (10 GHz) capabilities allowing transmission of high-speed data over short distances (2 to 3 kms). E-band's frequencies enable point-to-point and line of sight radio communication. These unique transmission properties of very high frequency millimeter waves enable simpler frequency coordination, interference mitigation and path planning compared to lower frequency bands.
6. E-band uses antennas which are highly directional, and this coupled with the propagation limitations allows for highly focussed point to point "pencil-beam" links allowing for much higher frequency reuse in a given area. There are some licensing exceptions, but most of the world follows a lightly licensed regime for E-band.
7. Light touch or "lightly licensed" or even "unlicensed" regulation is appropriate for these bands. The high propagation loss in these bands and the associated necessity for highly directional antennas to overcome these losses mean that links at these frequencies can be densely deployed with minimal concern about interference between links. This furthermore allows many different users to deploy and use wireless links in the same area with little or no collaboration required.
8. However, E bands is useful for many such applications but its unique properties make it useful for distance over 1 KM and not attenuated by oxygen. Hence it can maintain signal quality for over longer distances that makes it useful for backhaul applications for TSPs and ISPs to use in their network.
9. As captured in the present consultation paper and as per the report published by the European Telecommunications Standards Institute (ETSI)ìs îE-Band and V-Band - Survey on status of worldwide regulation, 2020ï database spanning a total of 109 countries, the E- Band in open for fixed services in 86 countries. As per TRAIìs 2014 recommendations only 40 countries has released E Band spectrum and as per the above report it is 89 countries who have released the E Band spectrum. ***It is evident that post 2014 TRAI recommendations that about 46 countries has released / adopted light touch regulation for E bands to facilitate Fixed line broadband services.*** All developed countries except China had opened E bands for Fixed line broadband services and it is imperative for India to adopt the same for proliferation of Fixed line Broadband.
10. Hence, we request the Authority to recommend for ***"Light licensing regime for the allocation of E Band spectrum on administrative basis with minimum charges as proposed in 2014 TRAI recommendations allowing all types of TSPs to use the same. The same may be allowed for period of 10 years which we think would be reasonable period, given the rapid changes in technology, and any short period may lead to under-estimation of benefits, as benefits are expected to accrue over a few years"***. Post analysing the usage of E Band by FLB service

providers and growth/penetration of FLB services the Authority can recommend review for charging the said E Band Spectrum.

D. <u>Delicensing of V Band (57-64GHz):</u>

<u>V band needs to be delicensed and opened up for all types of TSPs.</u>

1. Spectrum in the V-band (57 GHz - 64 GHz) can be used for high-capacity transmissions over short distances. Using point-to-point or mesh topologies, the spectrum can be put to a variety of backhaul and access uses. Further, since its propagation characteristics, especially high oxygen absorption, mitigate the level of interference, there is lesser need for active interference management. As the typical antenna beamwidths in this spectrum are less than five degrees, many links can be put in the same area just by having them point in slightly different directions. These features of the band were highlighted by TRAI in their recommendations on the allocation of these bands. Auctioning of V band would mean that India would not only be going against all well-established international best practices followed over a decade, but also against the recommendations of TRAI.
2. Well-established international best practices followed in over 80 countries, as well as several TRAI recommendations have suggested that the V band be delicensed in India. The lower portion of the V Band (57-66 GHz) is simply not suitable for backhaul as the oxygen attenuation is 100 times more than the adjacent frequencies and the signals die out much faster (100 times faster) - making the band unusable for access and backhaul. Nonetheless, this feature makes this lower V band extremely useful for technologies like Wi-Fi, Short Range Devices (SRDs) and other innovative applications.
3. At the same time, the extended V band (66-71 GHz) that lies on the higher end of the spectrum and is not attenuated by oxygen absorption, can optimally enable medium and long backhaul capabilities. This would ensure a fair and rational distribution of the V band amongst all stakeholders.
4. If V band is assigned through auctions for exclusive use, it will force most of the spectrum to remain unused because the higher attenuation of radio waves will make the band operationally unviable. They would need at least 100 times more towers to ensure comparable coverage for other assigned spectrum bands. Moreover, the regulatory and administrative cost of maintaining and monitoring the huge number of point-to-point links of much shorter length (few meters), would be prohibitive. Auctioning of the lower V band (57 - 66 GHz – which is prone to oxygen attenuation) would also deprive India of making significant progress in the various efficient use cases and applications of this band, such as
    - In-building and in-campus Wi-Fi solutions

- SRDs (Short Range Devices) used in medical diagnostics, RFID, telemetry, radar, etc.
- Short-range wireless technologies including Wi-Fi, Bluetooth, Near-Field
- Communication (NFC), Ultra-wideband (UWB); and IEEE 802.15.4.

5. It must be understood that delicensing the V band (57 – 66 GHz) in no way means that the TSPs are excluded from its usage. Every aspirant (including the TSPs) can use the entire delicensed portion of the band in a non-interference and non-protection manner. Further signal loss in V band is faster than other neighbouring spectrum bands due to oxygen absorption and hence not much useful for mobile access that need to propagate over a few kilometres. But at the same time, it is suitable for high capacity, low and short coverage applications and also significantly mitigates interference, while allowing wide channel bandwidths and enabling high throughputs, making it ideal for delivering high gigabit capacity Wi-Fi. Besides the fact that V band (57-64 GHz) can provide fiber like capacities at a fraction of the cost of fiber and with much faster implementation speeds, V band can also be used to deliver high quality broadband.
6. The National Institute of Public Finance and Policy (NIPFP) in its report titled 'The Economics of Releasing the V-band and E-band Spectrum in India' has also recommended delicensing of the V band, and quotes studies from the USA that have shown the Economic Value of delicensed spectrum bands to be to the tune of USD 240 Bn. With a population of almost 4 times that of the USA, India could derive far higher economic benefits from these bands.
7. In India, Wi-Fi spectrum in 2.4 GHz and 5 GHz is delicensed, and hence, the throughput of the Wi-Fi band is limited by the carrier size of 20/40 MHz available on the 2.4/5 GHz bands. Delicensed V band will expand this carrier bandwidth to 2.16 GHz (50 to 100 times) - making sure that Wi-Fi link does not become a bottleneck for us to leverage the full carrying capacity of the optical fiber cable at the fiber nodes from where end user connectivity will be through Wi-Fi to connect to the last mile (for applications such as the Government's own flagship project - Bharat Net and many others). This would enable full flexibility of usage by all stakeholders for a number of consumer centric applications, thereby maximizing consumer benefit.
8. DOT has recognised about the value of Short Range devices and V Band delicensing can be best leveraged for the benefit and use of SRD that works best over 57 – 64GHz bands as many countries are doing.
9. Since we are of the opinion that this V Band spectrum would be useful for Fixed Line Broadband services and would pave long way for proliferation of FLB services.

Global Scenario on V Band Spectrum:

10. It is noteworthy that many national administrations have delicensed the lower 60 GHz band (57-64 GHz) and also have not imposed specific channelization plans. Additionally, the US has opened the upper V-band (64 – 71GHz) ***(Source: See Use of Spectrum Bands Above 24 GHz for Mobile Radio Services, et. al, Report and Order and Further Notice of Proposed Rulemaking, FCC 16- 89, 31 FCC Rcd. 8014 (2016) at https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-89A1.)*** and Countries around the world are considering doing the same. This has begun to trigger technology innovation and eco-system growth. This process repeats the Wi-Fi story where the use of unlicensed 2.4 and 5 GHz bands enabled a massive eco-system around Wi-Fi and drove down broadband equipment and operation costs dramatically and facilitated affordable broadband access for the public. There would have been no Wi-Fi revolution if the 2.4 and 5 GHz bands had been licensed.

11. **Countries that have delicensed V Band along with Timeline in the table below:**

Around the world, countries across regions have adopted a licensed-exempt framework, including Germany, the United Kingdom, China, Japan, South Korea, Singapore, the United States, Canada, Brazil, Mexico, and South Africa. Table 1 below provides a timeline of the countries that have adopted license-exempt 60 GHz band regulations.

Table 1: (Source: https://broadbandindiaforum.in/wp-content/uploads/2020/12/WHITE-PAPER-ON-V-BAND-FINAL.pdf)

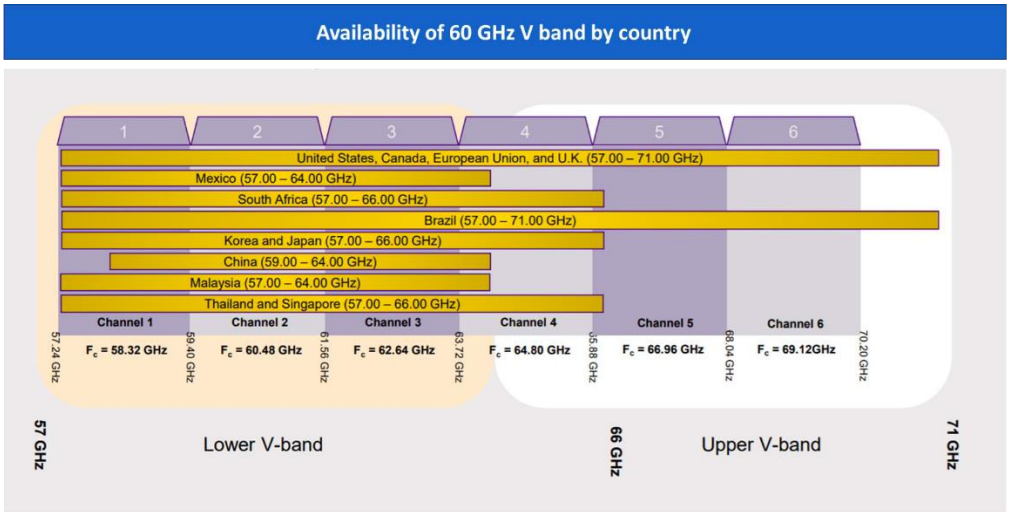
Country	Date of Adoption of Exemption of License – 60 GHZ band
Austria	Feb 2009
Australia	**July 2014**
Belgium	May 2014
Brazil	**July 2008**
Canada	Dec 2010
China	June 2015
Japan	**May 2014**
Korea	April 2013
Malaysia	**Feb 2015**
Mexico	**Nov 2017**
New Zealand	**Oct 2014**
Philippines	Jan 2016
Poland	Dec 2014

Singapore	April 2013
Slovakia	Feb 2015
Spain	Dec 2011
South Africa	Mar 2015
Switzerland	Jan 2011
UK	Oct 2010
US	**Dec 2010**

(Countries that allow outdoor operation for multigigabit wireless systems are in **bold** in table above)

It is evident from the above table that post 2014 TRAI Recommendations, many countries have delicensed V Band and hence the same case study can be adopted for India facilitating technology convergence, advancement and for proliferation of fixed broadband services. Auctioning of V band would mean that India would be going against all well-established international best practices followed over a decade.

12. The availability of 60GHz V band by various countries are depicted in the picture below. By looking at the picture many countries have made lower band of V Band spectrum for telecom service providers. Accordingly the Authority can recommend for delicensing the lower band of V – Band (57 – 66 GHZ) while making the higher band of V Band (66 – 71 GHz) be on licensed basis.



Source: Facebook

13. **India's policy for 60 GHz band spectrum should be flexible and should not establish coordination or channelization requirements.**

The availability of a delicensed 60 GHz band in major markets already, in addition to broad adoption of the WiGig standard, will ultimately result in the emergence of new applications.

Furthermore, it is the large production base of WiGig chipsets that could be leveraged to facilitate low cost 60 GHz infrastructure. However, to utilize WiGig chipsets, equipment in a point-to-point or point-to-multi-point configuration would have to operate with the same frequency channelization. This means that in order for India to reap the benefits of low cost backbone infrastructure and avoid the costs of nonstandard equipment, it would be in its interest to delicense the 60 GHz band without specifying any pre-fixed channelisation plan (similar to delicensing for 2.4 GHz & 5 GHz bands in India). Misalignment with international standards may hinder development of a vendor ecosystem, increase equipment costs for India and result in underutilization of the band.

14. Hence, we request the Authority to recommend for "**delicensing the V Band spectrum 57 – 66 GHZ**".

Response to Queries:

As on date, Fixed Line Service Providers (ISPs) do not use any spectrum other than the delicensed WiFi bands for providing our services. Our response to the queries is covered in the write up submitted above and the same may kindly be treated as our response to the questions as well.

About AIFISPA

All India Fixed Internet Service Providers Association (AIFISPA) is an Industry body of the fixed line Internet Service Providers of India to represent, nurture and foster the interests of the fixed line internet service providers industry effectively. The association is aimed to deploy measures to increase and achieve the fixed broadband internet connections pan India by solving industry challenges; to provide reliable and affordable broadband access to all through use of latest technologies; to foster healthy competition and innovation in the sector and to be an important force to drive this industry towards growth trajectory.

Yours truly,

for **All India Fixed Internet Service Providers Association (AIFISPA)**

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