



March 8, 2021

Shri Sukhpal Singh, JWA
Ministry of Communications, India
Sanchar Bhawan, New Delhi-110001

Inputs for WG3 of NFAP-21 Committee

Dear Sir,

ITU-APT Foundation of India (IAFI) is a non-profit, non-political registered society, nonpartisan Industry foundation registered as a society under the Societies Registration Act, 1960. IAFI is working for last 18 years with the prime objective of encouraging involvement of professionals, corporate, public/private sector industries, R&D organizations, academic institutions, and such other agencies engaged in development of Indian Telecom sector in the activities of the International Telecommunication Union (ITU) and the Asia Pacific Telecommunity (APT). The Foundation has been recognized as a international/regional Telecommunications organization by the International Telecommunications Union (ITU). IAFI is also having close working relations with similar organizations in many other countries including, Japan, Indonesia and USA. ITU-APT Foundation of India (ITU-APT) is sector Member of the ITU Radio Bureau (ITU-R), ITU Development Bureau (ITU-D) and ITU Telecommunication Standardization Bureau (ITU-T) which manifests its usefulness of the Indian Telecom industry The Foundation members are entitled to participate and contribute in the activities of ITU-R, ITU-T and ITU-D. Our members include many stalwarts of the telecom sector including many previous secretaries, members, Wireless Advisors and DDGs of the DOT and Telecom Commission. We also have many corporate members from India and other countries including operators, vendors. The foundation has been responding to various government consultations in the past.

Our inputs for WG3 are enclosed herewith as below:

- i) Summary of our proposals in attachment 1**
- ii) Proposals for Changes to IND Remarks in NFAP in attachment 2**

Warm Regards,

A handwritten signature in blue ink, appearing to read 'Bhatia', with a horizontal line underneath it.

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ATTACHMENT 1 TO WG3 INPUT

IAFI is pleased to submit its inputs to WG3 for Review and Revision of NFAP-18.

We see this consultation as critical to the deployment of emerging technologies such as 5G, HITS, NGSO, Wifi-6E, CMRTS, PPDR, etc. which can be transformational for India's economy.

Our proposals for changes to the current India Remarks in NFAP-18 are enclosed. These proposals are categorised in following areas:

1. Spectrum for IMT based on WRC-19 outcome
2. Spectrum for License Exempt Services – E & V Bands
3. Spectrum for Satellite services – Both GSO and NGSO
4. Other miscellaneous changes

1. Spectrum for IMT based on WRC-19 outcome

In Order to provide widespread rural, urban and dense metropolitan (hotspot) coverage and support various use cases of CMTS Including for 4G and 5G, Spectrum is required in three key frequency ranges: Sub-1 GHz, 1-6 GHz and above 6 GHz. Globally many countries have already identified and allocated spectrum for 5G services. The chart below shows the frequency bands that have been allocated for 5G deployments in these countries. Licensed spectrum is essential to guarantee the high quality of service levels and to take care of the vital long-term heavy investments needed for 5G deployments. However the smaller coverage area of these higher frequency bands results in reduced interference levels and enhances the opportunity for sharing. As such, 5G services in an area (e.g. urban) may be able to occupy the same bands as other wireless services (e.g., satellite and fixed radio links) which operate in different geographical areas (e.g. rural) when suitable interference mitigation methods are in place. This could also simplify cross-border coordination with neighbouring countries. The frequency range 24.25-27.50 GHz has been identified for IMT in the ITU Radio regulations. This band is being used by many countries around the world for 5G and India has already prioritized this band for IMT-2020. Within this band, the sub band 24.25-24.5 is also allocated to "Radionavigation" services and there is a view that it may be used for Aeronautical Radionavigation in future. Our view is that this 250 MHz band may be reserved for Industrial 5G (Private LTE) for short area local licensing based on light licensing rules and spectrum above 24.5 and up to 27.5 may be auctioned for CMTS with a zero reserved price.

2. Spectrum for License Exempt Services – E & V Bands

We believe a mix of licensed and unlicensed spectrum can be invaluable to ensure that the massive potential of 5G technologies can reach the largest number of users in the most orderly, efficient and affordable manner. A key factor in expanding high-speed broadband connectivity affordably is ensuring sufficient license-exempt spectrum is available. This is also essential to the growth of 5G, which depends on license-exempt spectrum for offload. To this end, we agree that ensuring internationally harmonised release of spectrum, including license-exempt spectrum, will ensure that India's customers can benefit from global economies of scale.

Broadband penetration in rural India is limited to a mere 29.2 per cent, as on 31 March 2020, as mentioned by Hon'ble Shri Sanjay Dhotre, Minister of State for Communications, Education, and Electronics & Information Technology in a reply to a question in Rajya Sabha. We are fully aware of the challenges faced in the rollout of broadband networks in rural areas due to a comparatively lower level of infrastructure, low population density, and the consequent lack of a viable business case for commercial operators. However, a fully delicensed V band and a hybrid E band (part delicensed and part light licensed) could help create the necessary innovation by our young engineers and scientists in these rural and remote area to overcome these challenges provided DOT helps in delicensing the needed spectrum.

Prime Minister's Wi-Fi Access Network Interface (PM-WANI) is a critical initiative by the government to elevate wireless internet connectivity in the country which will completely revolutionise the innovation and will also substantially improve the wireless connectivity of the country as well as boost the "ease of doing" business and also "ease of living". "The scheme would enable our small shopkeepers to provide Wi-Fi service. This will boost incomes as well as ensure our youth gets seamless internet connectivity. It will also strengthen our Digital India mission," said the Prime Minister in a tweet recently. Delicensing of E and V bands is a critical input to meet this aspiration of small shopkeepers in rural and suburban areas and a CRITICAL REQUIREMENT OF PM-WANI.

It is important to recall the announcement of Prime Minister that in next 1000 days all villages would be covered. Further, fixed broadband penetration in the households is a big challenge in India. We have a penetration of 1.4% when compared to the developed world figures of 40-50%. We have a policy objective to reach 50% households with fixed broadband by 2022. A freely available V, E bands only would make these visions possible.

The E- and V-bands, offer a wireless solution that can speedily help meet the aspirations of PM-WANI as these bands can be deployed as an alternative solution to backhaul the large traffic in urban, suburban and rural environments while considerably reducing right-of-way hurdles. The V-band (60 GHz) is considered as the ideal solution in providing high-capacity wireless links needed for PM-WANI. This band has short link lengths due to oxygen absorption characteristics of these frequencies that make it almost interference free and ideal for deploying large number of short links. Considering its utility, many countries such as Australia, Brazil, Canada, China, Japan, New Zealand, South Africa, Sweden, the United Kingdom, and the United States have already delicensed the 60 GHz band. TRAI had already recommended that both the V- and E-bands should be opened up for acceleration of broadband penetration.

We strongly recommend that DoT should immediately delicense the V band and implement hybrid regulation of E Band (part delicensed and part light licensed) in line with other developing and developed countries of the world to support innovation by our own engineers in line with the

global ecosystem for low-cost outdoor WI-FI and fixed wireless networks based on global IEEE standards (such as WiGig or “Wireless Fiber” or others) for providing high capacity links to meet the needs of Hon’ble Prime Minister Shri Modi vision of connecting all the villages with high speed broadband. V band delicensing offers such an important opportunity to meet the dream of our beloved Prime minister.

Accordingly, and in line with what is happening in most other countries, we recommend that the lower V band (57-66 GHz) should be immediately delicensed without specifying any channel bandwidth in line with relevant IEEE standards. We further recommend that a part of the E Band to be delicensed without specifying any channel bandwidth and rest of the E Band with a simple on-line registration scheme without any further delay.

ITU-APT respectfully recommends to the WPC that it initiate steps to make the 60 GHz band (57-71 GHz) available for license-exempt use to enable the WiGig technology standard to promote fixed wireless access in homes, business, and public institutions.

License-exempt technologies are transforming society and the economy of every country around the world. Technologies like Wi-Fi dramatically enhance the value of fixed broadband access to consumers, increase the efficiency and productivity of a variety of economic sectors, and address critical societal goals, such as connecting those without home access to the Internet. During the COVID-19 pandemic, the value of Wi-Fi and the advantages it brings have significantly increased. Under the current circumstances, broadband--often accessed through a Wi-Fi connection--is a precondition for a functioning society.

Wi-Fi is also a critical complement to 5G connectivity. It ensures that the mobile operators’ networks function better, by providing a means for consumers to offload data from cellular networks. Wi-Fi plays an integral role in off-loading a large portion of the data traffic from cellular 4G networks and is expected to continue to provide offloading for future 5G networks as well. By 2022, nearly 60 percent of global mobile data traffic is projected to be offloaded onto the fixed network through Wi-Fi . Without the ability to offload traffic to Wi-Fi, 5G networks would be more expensive and less efficient: mobile operators would need to invest more in network densification, deploying many more small cells in dense urban areas to offer gigabit throughput.

The 60 GHz band creates new opportunities for innovative services because of its unique characteristics that combine wide bandwidth channels and small wavelength:

- Wide bandwidth enables communications services with high throughput, high capacity and low latency. It also enables a fine time resolution for radar applications.
- Small wavelength enables implementation on a small footprint of antenna arrays capable of creating narrow beams.

There are two main families of emerging applications that are leveraging the unique characteristics of the 60 GHz band:

- Communication applications with multi-gigabit throughput and low latency. These applications in the 60 GHz band include Radio Local Area Networks and Personal Area Networks which can be a better alternative to provide fiber-like connectivity at a significantly lower cost. It is also quick and relatively easy to rollout, with deployments to market occurring in a matter of weeks.

- Sensing and radar applications with fine time and spatial resolution.

60 GHz technologies are also critical to Augmented Reality (AR) and Virtual Reality (VR) applications. The best wireless, immersive user experience requires low latency and multi-gigabit speed to support massive data exchange and high-resolution content, and 60 GHz band technologies are well-suited to this purpose. VR has enormous potential to transform positively impacting the way companies do business and changing the face of education and professional training in healthcare and beyond. While modern-day VR headsets fully immerse people in 3D virtual environments, augmented reality takes computer-generated images and overlays them on your view of the world.

The license-exempt status of the 60 GHz band in many countries has attracted considerable investment leading to innovation, development, and deployment of advanced services and applications ranging from outdoor wireless links that extend the reach of fiber networks to personal networking technologies based on the WiGig standards IEEE 802.11ad and 802.11ay that deliver multi-gigabit speeds between devices. The 60 GHz band is already widely available globally. In Asia, administrations in Australia, Japan, Malaysia, and New Zealand have adopted license exempt 60 GHz band frameworks allowing outdoor license-exempt use of the band for multi gigabit wireless systems. IEEE 802.11ad enables data rates up to 8 Gbps on 2.16 GHz channels. IEEE 802.11ay extends the 11ad capabilities to 200 Gbps on channels up to 8.64 GHz. The Wi-Fi Alliance has an ongoing WiGig certification program and is working on the certification of 60 GHz Fixed Wireless products. 3GPP with broad industry participation are also moving forward with development for 5G NR for 60 GHz unlicensed.

The mobile backhaul use case of 60 GHz solutions is also of great interest to mobile network operators who are keen to leverage these solutions for capacity augmentation and cell densification. Although at WRC-19, the upper part of the 60 GHz band (66-71 GHz) was designated for IMT-2020, Footnote 5.559AA makes clear that the IMT designation does not preclude making the band license-exempt for WiGig use cases. It states, "This identification does not preclude the use of this frequency band by any application of the services to which this frequency band is allocated and does not establish priority in the Radio Regulations. Resolution 241 (WRC-19) applies. Therefore, the WPC may pursue opening the band for license-exempt use. ITU-APT suggests that the WPC align its technical parameters for the extended band with the parameters of the United States Federal Communications Commission Part 15 rules.¹²[1] Under the U.S. framework, there are general power level limits, as well as higher power level limits for fixed point-to-point outdoor use. The U.S. rules do not mandate a specific coexistence mechanism.

3. Spectrum for Satellite services – Both GSO and NGSO

The satellite industry is going through many changes with ISRO opening up the skies for the private sector. GSO and NGSO satellites are key to:

- i) key mobile backhauling provision to the mobile industry
- ii) broadband connectivity to homes and businesses, as well as ubiquitous high-throughput connectivity to mobile platforms, such as airplanes, vessels, etc

- iii) critical/governmental services, including the types of societal broadband services to remote areas that the current pandemic has shown to be not simply desirable, but indispensable

The Fixed Satellite Service allocations in the Ku (11/14 GHz) and Ka-bands (18/28 GHz), which are widely used for satellite communications for provision of broadband services to homes, airplanes and ships are critical.

In addition, Advancements in satellite technologies, includes the more recent Non-Geostationary Satellite (NGSO) systems which allow for very low-latency applications and can deliver quality and affordable broadband to everyone and everywhere. These satellite technologies will complement GSO and current ground-based services to fully support the Government's forward-looking vision of Digital India, removing the digital divide and providing broadband to all. In fact, despite the telecom revolution in India over the last decade, there is still a very significant portion of the Indian population that lacks consistent and high-quality connectivity, which can be effectively addressed with the new satellite communication technologies.

To allow for a timely introduction of these innovative services, development of a suitable regulatory framework for GSO and NGSO systems in Ku and Ka-band is required . Necessary changes needed in the NFAP for this purpose are in the attachment 2.

ATTACHMENT 2 TO WG3 INPUT

India Footnotes to the column named “India” in the Table of Frequency Allocations relating to Bands above 6GHz

IND 16 The following frequency bands, or parts thereof, have been identified for implementation of International Mobile Telecommunications (IMT):

IND Remark Number	Proposal	Existing/New/Revised Text			Reasons for the Proposal
16	Add 4 new Rows in the Table	Sl.	Band as mentioned in RR	Relevant RR Footnotes	New WRC-19 Allocation
		34	24.25-27.5 GHz	5.338A 5.532AB	
		35	37-43.5 GHz	5.550B	
		36	47.2-48.2 GHz	5.553B	
		37	66-71 GHz	5.559AA	
IND 17	No Change (NOC)	The <i>bands</i> 14-14.5 GHz (Earth to space), 29.5-30 GHz (Earth to space), 10.7-11.7 GHz (space-to-Earth), 12.5-12.75 GHz (space-to-Earth) and 19.7-20.2 GHz (space-to-Earth) may be used for earth-stations on land transportations, ships and aircrafts as per the applicable provisions of the Radio Regulations and or its Resolutions. The use these bands or part thereof and the associated <i>satellite-orbit</i> shall be taken together as a <i>resource</i> and the number of such resources shall be limited to the minimum essential to satisfy the needs of earth-stations on land transportations, ships and aircrafts. The use of these bands shall be limited to satellites coordinated with India.			New footnotes are proposed to Cover FSS and ESIM requirements
IND 17 A	New IND Remark	IND 17A (new) In the bands 10.7-11.7 GHz (space-to-Earth), 12.2-12.75 GHz(space-to-Earth), 14.0-14.5GHz (Earth-to-space), 17.7-18.6GHz (space-to-Earth), 18.8-19.7GHz (space-to-Earth) 19.7-20.2GHz (space-to-Earth) 28.5-29.1GHz (Earth-to-space), 29.5-30.0GHz (Earth-to-space) Earth Stations In Motion (ESIMs) may be authorized for operation with FSS non-geostationary satellites. This is subject to the conditions that these earth stations may not			To allow deployment of earth stations in motion operating with NGSO satellite systems, in the space-to-Earth direction on a non-protection, non-interference

		claim protection from or cause interference to stations in the terrestrial service in shared bands and that non-geostationary-satellite systems not cause unacceptable interference to, or claim protection from, geostationary-satellite networks.	basis in relation to terrestrial systems, while guaranteeing protection of GSO systems
IND 17 B	New IND Remark	IND-17 B (New) The frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are used by Earth Stations In Motion (ESIMs) to communicate with geostationary satellite systems, subject to the application of 5.517A (WRC-19). Operations in the 27.5-29.5 GHz band may <i>only</i> be constrained when within line of sight of co-frequency terrestrial operations in neighbouring countries that occur on a co-primary basis, absent an agreement to operate at higher levels than otherwise specified in Resolution 169.	AS above for GSO ESIMS
IND 28 A	New IND Remark	IND 28 A <i>The Frequency band 24.25-24.5 GHz may also be considered for use by Industries, enterprises and other captive users for localized area licensing on a case-by-case coordination basis for broadband Wireless communications using IMT technologies while fully protecting the incumbent users</i>	To provide 5G spectrum in mm Wave band for Industry 4.0
IND 31	NOC	IND 31 Frequency bands 10.95-11.2 GHz, 11.45-11.7 GHz and 12.2-12.75 GHz may predominantly be used for fixed satellite service (down links).	
IND 32	NOC	IND 32 It may be borne in mind that the frequency band 18.6-18.8 GHz is exclusively earmarked for Earth Exploration Satellite Service (EESS-passive) in IRS Satellite system.	
IND 33	NOC	IND 33 The frequency bands 19.7-21.2 GHz (Space-to-earth), 29.5-31.0 GHz (Earth-to- space) may be considered predominantly for the use of FSS.	
IND 33A	ADD	IND 33A (NEW) The frequency bands 17.7-18.6 GHz, 18.8 –19.7 GHz (Space-to-earth), 28-5-29.5 GHz (Earth-to- space) may be considered predominantly for FSS.	To extend predominant FSS use to the 28GHz band
IND 33B	ADD	IND 33B (NEW) The frequency bands 27-5-28.5 GHz (Earth-to- space) may also be	Create enabling provision for Mobile services

		considered for sharing between FSS and Broadband Wireless Access.	in 27.5-28.5 GHz
IND34	NOC	IND 34 Subject to not constraining the deployment of the services to which the band 24.0 –24.25 GHz has been allocated, the low power telecom systems and devices including Radio Local Area Networks (RLAN) and traffic safety applications in the frequency band 24.0 –24.25 GHz using a maximum Effective Isotropic Radiated Power of 2Watts with spectrum spread of 50 MHz or higher may also be permitted on non-interference, non-protection and non-exclusive basis.	
IND 35	NOC	IND 35 While considering assignments in the frequency band 25.5.-27.0 GHz, the protection to facilities in EESS (Earth Exploration Satellite Service) at a few locations shall be taken into account.	
IND 36	NOC	IND 36 The band 71-76 GHz and 81-86 GHz may be used for high-density point to point / multipoint links in Fixed Service (FS) also taking care of FSS service.	
IND 37	NOC	IND 37 The band 57-71 GHz may be used for high-density point to point / multipoint links and other access applications also taking care of other services identified as Primary in band.	To extend V band fixed links up to 71 GHz

Annex 1

Wireless equipment exempted from licensing

Proposal: Add V Band delicensing and E band easy licensing here