

## **BIF RESPONSE TO TRAI CP on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)**

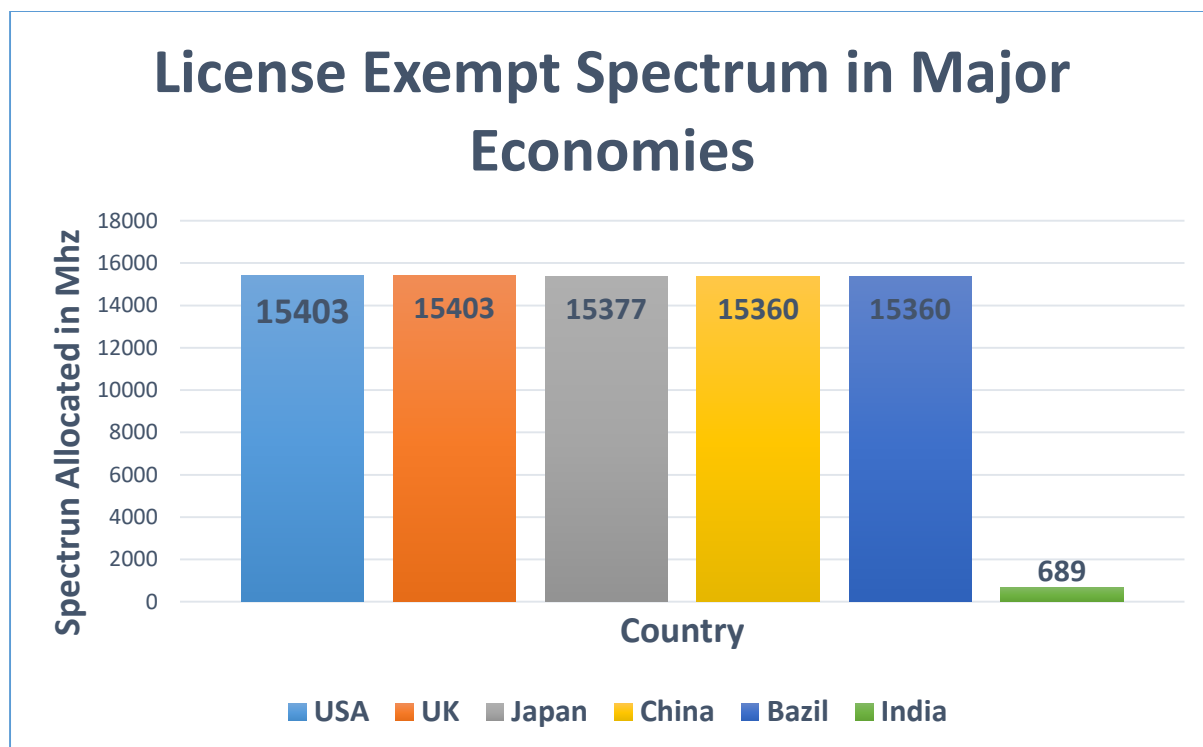
At the outset, Broadband India Forum wishes to laud TRAI for coming out with an important Consultation Paper on the method of assignment of Spectrum for MWA & MWB carriers and for assignment of spectrum in E & V bands.

As a part of the Preamble, BIF wishes to submit a Background Note highlighting how India compares with leading and developed economies, when it comes to availability of quantum of delicensed spectrum. One of the major components of the huge quantum of delicensed spectrum in advanced and developed economies comes from the V band (14GHz or 14000 MHz).

### **Background Note:**

Graph below compares the International Position on delicensing of spectrum

### **Comparative Position of India vs other Countries as regards quantum of Unlicensed Spectrum**



From the above it is evident that India is lagging behind other developed economies in terms of quantum of delicensed spectrum. India has one twentieth of the unlicensed spectrum that leading economies have. The two primary bands that India is yet to delicense are

- a) The entire 1200 MHz in the 6GHz band (5925-7125MHz)
- b) The entire 14000 Mhz (or 14GHz) in the V band (57-71GHz)**

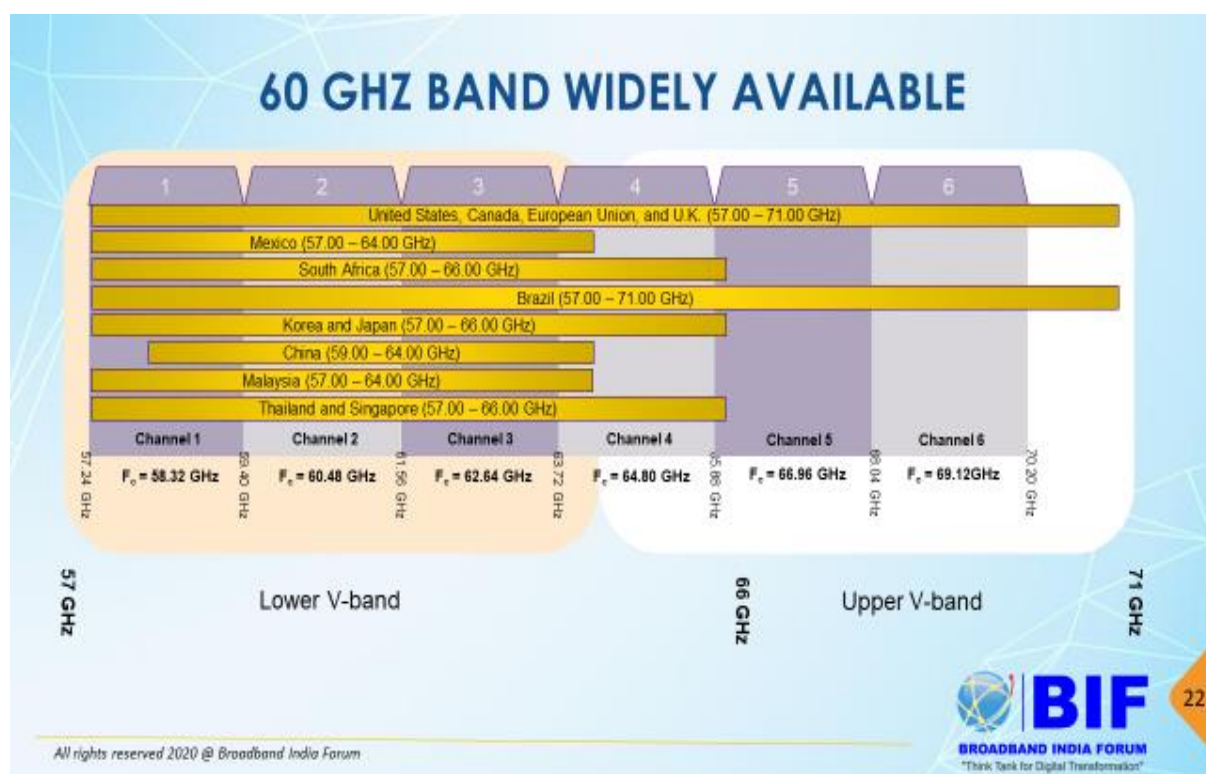
## Global Regulatory Position for Countries around the World as regards Regulatory Approach for MWA/MWB Carriers

1. Regulators typically allocate spectrum on a link-by-link basis based on administrative methodology
2. Conventional link-by-link coordination is currently the most popular method for PTP networks, accounting for about 45% of the countries surveyed.

The link to the Report is available here

: <https://www.gsma.com/spectrum/wp-content/uploads/2022/04/wireless-backhaul-spectrum.pdf>

## Global Regulatory Status - Countries around the World Are Adopting a License-Exempt Approach in the V-Band



## EU MANDATE (27 MEMBER STATES)

Band no	Frequency band	Category of short-range devices	Transmit power limit/field strength limit/power density limit	Additional parameters (channeling and/or channel access and occupation rules)	Other usage restrictions	Implementation deadline
75	57-71 GHz	Wideband data transmission devices	40 dBm e.i.r.p. and 23 dBm/MHz e.i.r.p. density	Requirements on techniques to access spectrum and mitigate interference apply [7].	Fixed outdoor installations are excluded.	1 January 2020
75a	57-71 GHz	Wideband data transmission devices	40 dBm e.i.r.p., 23 dBm/MHz e.i.r.p. density and maximum transmit power of 27 dBm at the antenna port or ports	Requirements on techniques to access spectrum and mitigate interference apply [7].		1 January 2020
75b	57-71 GHz	Wideband data transmission devices	55 dBm e.i.r.p., 38 dBm/MHz e.i.r.p. density and a transmit antenna gain ≤ 30 dBi	Requirements on techniques to access spectrum and mitigate interference apply [7].	This set of usage conditions is only available to fixed outdoor installations.	1 January 2020

See SRD 7<sup>th</sup> update Decision (EU) 2019/1345 adopted on 2 August 2019 and published at <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1567676305871&uri=CELEX:32019D1345>

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## CEPT (48 MEMBER STATES) ERC RECOMMENDATION 70-03

ERC RECOMMENDATION (70-03) Page 13

### ANNEX 3. WIDEBAND DATA TRANSMISSION SYSTEMS

#### Scope of Annex

This annex covers frequency bands and regulatory as well as informative parameters recommended for Wideband Data Transmission Systems.

Table 3: Regulatory parameters

Frequency Band	Power / Magnetic Field	Spectrum access and mitigation requirements	Modulation / maximum occupied bandwidth	ECC/ERC Deliverable	Notes
a1	863-868 MHz	25 mW e.i.r.p.	≤ 10% duty cycle for network access points and mobile spectrum access; ≤ 2.0% duty cycle otherwise and peak spectrum access	≤ 600 kHz ≤ 1 MHz	Wideband data transmission in data networks (note 1). The frequency band is also identified in Annexes 1, 2, 10 and 11
a2	915.5-919.4 MHz	25 mW e.i.r.p.	≤ 10% duty cycle for network access points and mobile spectrum access; ≤ 2.0% duty cycle otherwise and peak spectrum access	≤ 600 kHz ≤ 1 MHz	Wideband data transmission in data networks (note 1) and 2). All mobile and mobile devices within the data network shall be controlled by a master network access point (NAP). The frequency band is also identified in Annexes 1, 2 and 11
b	2400-2483.5 MHz	100 mW e.i.r.p.	Adequate spectrum sharing mechanism (e.g. LBT and TMAA) shall be implemented	Not specified	For wideband modulations other than FSSB, the maximum e.i.r.p. density is limited to 10 mW/MHz
c1	67-71 GHz	40 dBm e.i.r.p., 26 dBm/MHz e.i.r.p. density	Adequate spectrum sharing mechanism shall be implemented	Not specified	Fixed outdoor installations are not allowed
c2	67-71 GHz	40 dBm e.i.r.p., 26 dBm/MHz e.i.r.p. density and maximum transmit power of 27 dBm at the antenna port or ports	Adequate spectrum sharing mechanism shall be implemented	ECC Report 205	
c3	67-71 GHz	55 dBm e.i.r.p., 38 dBm/MHz e.i.r.p. density and transmit antenna gain ≤ 30 dBi	Adequate spectrum sharing mechanism shall be implemented	ECC Report 205	Applies only to fixed outdoor installations

Note 1: A network access point in a data network is a fixed terrestrial short range device that acts as a connection point for the other short range devices in the data network to service platforms located outside of that data network. The term data network refers to several short range devices, including the network access point, as network components and to the wireless connections between them.

Version of June 2019

See ERC Recommendation 70-03, Annex 3 <https://www.ecodocdb.dk/download/25c41779-cd6e/Rec7003e.pdf>

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### Allocation Methodology for E-Band

- Spectrum in the E-band should be allocated using administrative method of allocation.
- Page 87 of the TRAI CP itself indicates that a large number of developed economies have opted for administrative method of allocation for E-band.

**Q1. What quantum of spectrum in different MWA and MWB frequency bands is required to meet the demand of TSPs with Access Service License/ Authorization? Whether MWA/ MWB spectrum is also required by TSPs having authorizations other than Access Service License/ authorization, and other entities (non-TSP, for non-commercial/ captive/ isolated use)? Information on present demand and likely demand after five years may kindly be provided as per the proforma given below with detailed justification:**

- (i) Present demand Band Quantum of spectrum required (per entity per LSA) TSPs with Access Service License/ Authorization TSPs with other than Access Service License/ Authorization Other entities (non-TSP, for non-commercial/ captive/ isolated use) 6 GHz (5.925-6.425 GHz) 7 GHz (7.125-7.425 GHz) 7 GHz (7.425-7.725 GHz) 13 GHz (12.750-13.250 GHz) 15 GHz (14.5-15.5 GHz) 18 GHz (17.7-19.7 GHz) 21 GHz (21.2-23.6 GHz)**
- (ii) (ii) Likely demand after five years Band Quantum of spectrum required (per entity per LSA) TSPs with Access Service License/ Authorization TSPs with other than Access Service License/ Authorization Other entities (non-TSP, for non-commercial/ captive/ isolated use) 6 GHz (5.925-6.425 GHz) 7 GHz (7.125-7.425 GHz) 7 GHz (7.425-7.725 GHz) 13 GHz (12.750-13.250 GHz) 15 GHz (14.5-15.5 GHz) 18 GHz (17.7-19.7 GHz) 21 GHz (21.2-23.6 GHz)**

## **RESPONSE**

The digital ecosystem is rapidly evolving with the rapid deployment of new age technologies like IoT, AR, VR, etc., and transforming all the sectors – from education to banking to health services to entertainment by enabling them to move online. This can only be achieved with the availability of high-quality, high-speed mobile broadband services.

Enhancing access networks to maximise throughput is vital to keep up with the rapid technological evolution. It is also crucial to support these advancements for robust and capable backhaul networks. Only when access and backhaul networks work in harmony with each other that mobile broadband services will be able to effectively meet the demands of customers in this fast-paced digital age.

For perspective, the volume of total wireless data usage in India increased from ~8.1 EB during QE Mar 18 to ~42 EB during QE Mar 23. It is estimated to grow to 58 EB per month by 2028. In order to facilitate this, the requirement of backhaul capacity per site has also grown in the same pace from 4 Mbps to 300 Mbps and will need to continue being increased as data traffic continues to explode.

### **Microwave backhaul is indispensable:**

TSPs have two options – increasing fiberisation and using microwave spectrum for backhaul, to deliver such massive capacity. Although fiber offers better data

carrying capacity, India has only reached a suboptimal ~36% fiberisation at sites, owing to the various geographical, technical as well as financial challenges involved in the laying of fiber.

The Right of Way (RoW) policy has been substantially simplified and streamlined by the Government and TSPs are also making every effort to fiberise their networks. The growth in fiberisation will continue at its own pace. Therefore, the backhaul spectrum is essential if they are to overcome the challenge of rapidly growing network rollouts and traffic generation.

#### **Present demand for MWA/MWB carriers:**

Demand for MWA carriers: The current guidelines allow a TSP with Access Service Authorisation to hold a maximum of 8 MWA carriers in each of the metros and Category A LSAs, and 6 carriers in each of the Category B and C LSAs. This is sufficient to meet the industry demand at present and in the near future.

Demand for MWB carriers: MWB carriers are currently assigned on a P2P link basis to all user categories. However, we submit that MWB carriers should also be assigned for the entire LSA on an exclusive basis to TSPs with Access Service Authorisation, similar to MWA carriers (please refer to our detailed response to Q2 in this regard).

Further, as per industry estimates, the operators with limited fiber infrastructure would need to acquire 2 MWB carriers initially. Thus, a ceiling of 2 MWB carriers per LSA, in all categories of LSAs, should be sufficient.

#### **Future demand for MWA/MWB carriers:**

The assessment of future demand for MWA/MWB carriers is difficult since it depends upon subscriber base, the access technology, and the amount of radio access spectrum holding of the TSP. The backhaul requirement per site has increased in the recent years due to explosion in the volume of traffic and will continue to rise significantly.

In addition, factors such as backhaul capacity required per site, microwave link capacity, mobile network density, hub density, existing fiber penetration and planned fiber deployment, evolution of existing network, suboptimal angular separations, line of sight availability and infrastructure limitations also influence the backhaul requirement.

Thus, instead of static values, future demand should be dynamically evaluated and reviewed in 2-3 years.

Requirements of TSPs with authorization other than Access Service and non-TSPs:

They may require the carriers only on a point-to-point ("P2P") link basis, as these entities do not have wide densified networks. Thus, the existing P2P assignment policy should continue in case of TSPs with other than Access Service Authorisation and non-TSPs.

Therefore, we recommend the following:

- a) In the case of MWA carriers, the existing policy of assigning a maximum of 8 carriers in each of the metros & Category A LSAs and 6 carriers in each of the Category B & C LSAs, should be continued with for TSPs with Access Service Authorisation.
- b) MWB carriers should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis, with a ceiling of 2 carriers per LSA in all categories of LSAs.
- c) For TSPs holding other than Access Service Authorisation and non-TSPs, MWA/MWB carriers should continue to be assigned on a P2P link basis, in line with the extant policy.
- d) While these ceilings may effectively cater to current needs, the Government may review the same in the next 2-3 years, taking into account technological advancements and changes in the market landscape.
- e) MWA & MWB carriers are required also by TSPs with non-access authorisation and non-Telcos (TSPs). Some of these traditional/legacy spectrum bands are now being used and some more are likely to be used for other mobile/Wi-Fi/satellite services. Hence it may be required not only by TSPs but also for other entities viz. Satcom Service Providers, Wifi Service Providers, Research Institutions & Academia for fuelling innovation.

**Q2. Whether spectrum for MWA and MWB should be assigned for the entire LSA on an exclusive basis, or on Point-to-Point (P2P) link basis? Response may be provided separately for (i) TSPs with Access Service License/ Authorization, (ii) TSPs having authorizations other than Access Service License/ authorization, and (iii) Other entities (nonTSP, for non-commercial/ captive/ isolated use) in the table given below with detailed justification: Microwave bands Spectrum should be assigned for the entire LSA on an exclusive basis, or on P2P link basis for - TSPs with Access Service License/ Authorization TSPs with other than Access Service License/ Authorization other entities (non-TSP, for non-commercial/ captive/ isolated use) MWB (6/7 GHz) MWA (13/15/18/21 GHz)**

### **RESPONSE**

Currently, the MWA carriers are assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis, and to TSPs with other than Access Service Authorisation on a P2P link basis. On the other hand, MWB carriers are assigned to all users on a P2P link basis. However, it is our contention that **both MWA and MWB carriers should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis. The advantages of exclusive assignment to TSPs with Access Service Authorisation are given below:**

1. Faster rollout: Exclusive assignment reduces the time required for deployment of network.
2. Easier network planning: The whole set of microwave carriers will be known in advance, making it easier to plan microwave network with optimal

loading, minimum network outages and enhanced customer satisfaction levels.

3. Cost-effective operations: The right topology and plan will help operators to avoid frequent re-engineering, which wastes hardware and site material.

Further, the disadvantages of P2P link-based assignment to TSPs with Access Service Authorisation are as given below:

1. Logistical challenge: The microwave links per operator run into the thousands in each LSA. P2P link-based assignments would put the onus of interference management on MW carriers. This would require that extensive interference analysis with the existing operating links of other TSPs be carried out. This will be a huge challenge for WPC. Therefore, exclusive assignment is the only practical way forward. Even TRAI 2014 Recommendations recommended exclusive assignments for all MWA carriers.
2. Not in line with the charging mechanism: The spectrum charges for both MWA and MWB carriers are currently charged for the entire LSA, even though MWB carriers are assigned on a P2P link basis. In the interests of fairness and keeping the spectrum assignment in line with spectrum charging, MWA and MWB carriers should be assigned on an exclusive basis for the entire LSA.

### **P2P Assignment to TSPs with other than Access Service Authorisation and non-TSPs:**

Please refer to the response to Q1. MWA/MWB carriers should continue to be assigned to them on a P2P link basis, in line with the extant policy.

Presidential Reference to Hon'ble SC Guidelines of 2012 states that there are other ways of allocating spectrum apart from auction.

\*Para 77-83, Special Reference No. 1 of 2012 [Under Article 143(1) of the Constitution of India] states

1. *\*On the methodology, the Supreme Court noted, "...is clearly an economic policy. It entails intricate economic choices and the court lacks the necessary expertise to make them. It cannot, and shall not, be the endeavour of this court to evaluate the efficacy of auction vis-a-vis other methods. The court cannot mandate one method to be followed in all facts and circumstances. Therefore, auction, an economic choice of disposal of natural resources, is not a constitutional mandate."*

2. *The court in its opinion also stated that auction method may also suffer from problems and mere likelihood of abuse of any alienation method does not vitiate it unless there are actual problems. It was clarified that it is the prerogative of the Government to decide the methodology of alienation of other public resources, provided the method is transparent, fair and backed by social or welfare purpose.*

3. *The Court also discussed revenue maximisation theory and stated that this need not be the sole objective while alienation of public resources and in fact this is subservient to the goal of serving common good of the society. Auction is not the only option to alienate all public resources of the country.*

*The key is to ensure that the method spectrum release should have a social or welfare purpose, and should not arbitrarily benefit certain parties.*

4. In this context, we wish to quote Legal Opinion which was sought from Shri Mukul Rohatgi, former AG and one of the top most legal luminaries in the country and a senior counsel of great repute. Citing the following from the Hon'ble Court's advisory in the Presidential Reference: -

*"81... The choice of the word 'perhaps' suggests that the court considered situations requiring a method other than auction as conceivable and desirable. Further, the final conclusions summarised in para 102 of the judgement (SCC) make no mention about auction being the only permissible and intra vires method for disposal of natural resources; the findings are limited for the case of spectrum". "83... We find that the 2G case does not even consider a plethora of laws and judgement that prescribe methods, other than auction, for dispensation of natural resources; something that it would have done, in case, it intended to make an assertion as wide as applying auction to all natural resources..."*

5. *I have summarised the legal principles from the Reference, which are relevant to the present opinion, as under: i) State actions, whether it relates to the distribution of natural resources or grant of contracts, must be tested against the touchstone of Article 14 of the Constitution, and may not be struck down for being arbitrary without consideration to the actual constitutional infirmities associated with such action. ii) Auction cannot be considered invariably a "constitutional mandate", as it would stand in complete contravention to the scheme of Article 14. (iii) Allocation of natural resources to the highest bidder may not necessarily be the only way to subserve the common good and, at times, may run counter to the public good. "Distribution", as envisaged under Article 39(b) has broad contours, and cannot be limited to meaning only a singular method of resource disposal i.e., auction. The overarching and underlying principle governing distribution is the 'furtherance of common good. As the allocation of resources is primarily intended towards serving public interest and the "common good", it cannot ipso facto be interpreted that auction represents the best method for allocation. (para. 119, Reference (Supra) For example, supply and distribution of cooking gas and other essential needs of the citizenry cannot be done by auction as some of these items are subsidized. In such cases, auction cannot be resorted to, given the objective of providing essential commodities to the poor. (iv) Lastly, the potential for abuse in other resource allocation methods could not be the basis for considering auctions as a legal constitutional mandate, as there was an equal potential for abuse in an auction, v) Normally speaking, auction should be the commonly used method even for satellite spectrum akin to terrestrial spectrum, but the obstacle in the instant case is that satellite spectrum does not exclusively belong to the Government of India. It belongs, say, along with India, to the UK, Bangladesh, USA, China, etc. There is no room for exclusivity to any sovereign state for that matter. In such a situation, the normal option of sale of spectrum via auction is not possible or feasible. This has been recognized by the body of nations over the last so many years and it is, therefore, administratively assigned/allocated by Governments. **It is because of this peculiar***



**situation that auction is not the preferred option for allocation of satellite spectrum.**

6. ... **Based on my reading of the legal exposition as set out above and the distinctive features of satellite spectrum, I am of the considered opinion that auctioning satellite spectrum may not be the most appropriate and efficient method of resource allocation. In light of the Court's decision of auction not being a mandatory process for resource allocation and that the principle underlying the distribution of natural resources should be in furtherance of the common good, administrative allocation of satellite spectrum is a more efficient form of allotment of spectrum.**
7. My view in support of administrative allocation of satellite spectrum is based on the following: (i) Querist has brought to my attention that satellite spectrum is a shared resource. Therefore, it cannot be auctioned which requires exclusive allocation to one bidder, unlike the terrestrial spectrum. The basic prerequisite of a resource that is to be auctioned, is that it should be available for sale as discrete, unique products. Satellite spectrum does not satisfy this elementary criterion. (ii) Querist has informed me that satellite spectrum has no national territorial limits. It is coordinated and managed by ITU. Consequently, satellite spectrum management is subject to the radio regulation of the ITU, and the various filing requirements which are necessary for orbital slots and satellite deployment. Unlike terrestrial spectrum, satellite spectrum is never exclusively assigned to the operator but coordinated internationally and shared among multiple operators for different orbital slots and all types of satellites. Thus, the terrestrial concept of exclusivity does not apply in the case of satellite spectrum. (iii) While determining the most feasible method of spectrum allocation due consideration ought to be given to global practices.
8. In view of the above, in conclusion, I summarise my response to the queries in paragraph 2 of the present opinion as under: **(i) Whether the law requires that the only way to allocate satellite spectrum is auction? No (ii) Whether allocation of satellite spectrum for space-based communication services through a non-auction, administrative route, be permissible in law? Yes**
9. It may be noted that only Mobile Access Spectrum Licenses were cancelled in 2012 after Hon'ble SC orders; the Microwave Access (MWA) licenses and spectrum awarded against the same were not cancelled/taken back.

**Therefore, we recommend that the spectrum for MWA and MWB should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis. For TSPs holding other than Access Service Authorisation and non-TSPs, MWA/MWB carriers should continue to be assigned on a P2P link basis, in line with the extant policy.**

10. As noted by TRAI, many of these frequency bands are shared with space-based communication services like the FSS. Some satellite systems will rely on the 17.7-19.7 GHz frequencies for space-to-Earth communications to gateways and customer terminals. We urge TRAI to ensure that the assignment and licensing procedures for MWA permit the continued coexistence with space-based communication services.

Furthermore, TRAI can rely on well-established international provisions and recommendations that enable operational certainty for both terrestrial and space services that have shared the 17.7-19.7 GHz band for decades. Appendix 7 of the ITU Radio Regulations describes methods for determining the coordination area around earth station which can be used as a baseline. The channel modelling of the terrestrial path between an earth station and fixed station can be further refined using Recommendation ITU-R P.452.

11. Should TRAI decide to assign spectrum by auction for the MWA service, we urge TRAI to ensure earth stations operating with space-based communication services can continue to be sited within an LSA. These procedures could rely on the international coordination provisions viz, those in Article 9 of the Radio Regulations) to allow critical earth stations, like gateways, to obtain interference protection within the LSA while not unduly constraining the Access Service Provider. Uncoordinated satellite customer terminals should be permitted on a non-interference, non-protected basis with respect to the Access Service Provider. In other words, the operator of the uncoordinated earth station would be solely responsible for mitigating interference from the MWA service.
12. Moreover, TRAI must recognize that assignment on an exclusive basis through auctions should only be done for terrestrial services and not space-based communications services.

This is because of the following

- a) It will go against international best practices and globally harmonised framework
  - b) Will lead to inefficient utilisation of spectrum as it will remain preserve of a few deep pocket players
  - c) It will not facilitate innovations
  - d) Will decrease the economic value/utility of this band
13. It may be noted that only Mobile Access Spectrum Licenses were cancelled in 2012 after Hon'ble SC orders; the Microwave Access (MWA) licenses and spectrum awarded against the same were not cancelled/taken back.
- a) (i) For satellite specific bands viz. 18GHz,

**Space-based communication services are essential infrastructure for bridging the digital divide.**

14. We encourage TRAI to recognize the role of space-based communication services and their spectrum requirements. NGSO fixed-satellite service (FSS) systems will bring about an exponential change to telecommunications services by delivering satellite-based broadband connectivity to customers in unserved and underserved areas, as well as providing essential backhaul medium for the rollout of terrestrial mobile services throughout India. These space-based communication services can offer rapid deployment of connectivity across remote areas where terrestrial broadband or backhaul solutions are impractical. To do this effectively, satellite systems require unhindered access to globally harmonized spectrum.

15. There is spectrum overlap with these space-based communication services and MWA and MWB services in the 17.7-19.7 GHz band frequencies, as discussed in the Consultation Paper. Some satellite systems plan to use these frequencies for space-to-Earth (downlink) transmissions to gateways and customer terminals—including those used for broadband and backhaul services. Internationally, these frequencies are allocated to the FSS and terrestrial services and have successfully coexisted for decades. We urge the TRAI to adopt a balanced approach and specify technical conditions that ensure access and compatible operations between the FSS and MWA and MWB services. Such an approach will provide connectivity diversity that will benefit Indian businesses and citizens.

**b) TRAI should adopt procedures for uncoordinated earth stations in the 17.7-19.7 GHz frequencies.**

16. Another important consideration for spectrum assignment in the 17.7-19.7 GHz frequencies is the operation of uncoordinated earth stations with space-based communication services. This concept allows receiving earth stations to be deployed anywhere without constraining the operations and future development of P2P services. The Consultation Paper reports that the 18 GHz band is largely unutilized by Access Service Providers. This is evidence that uncoordinated earth stations associated with space-based communication services in the 17.7-19.7 GHz band will not (1) experience a high likelihood of interference from MWA systems and (2) not constrain future deployment of Access Service Providers in the twenty-two LSAs. Accordingly, TRAI should ensure any new procedures for MWA services will facilitate coexistence with uncoordinated earth stations operating with space-based communication services by adopting a non-interference, non-protected mechanism for ubiquitous deployment of satellite customer terminals in the 17.7-19.7 GHz band where both the fixed service (FS) and FSS have co-primary allocation status. Such an approach extends existing blanket licensing procedures to the 17.7-19.7 GHz frequency band, allowing quick and ubiquitous deployment of satellite customer terminals throughout India's national territory without imposing constraints on the MWA service.

17. For 6GHz spectrum band, the band should be made license exempt for Wi-Fi services and for applications in research and innovation. As evident through extensive co-existence studies carried out, existing incumbent FS & FSS services can harmoniously co-exist with Wi-Fi/RLAN services. Link to the Co-existence Study Report is provided herewith ([https://broadbandindiaforum.in/wp-content/uploads/2021/11/Frequency-Sharing-for-RLANs-in-the-6GHz-band-in-India\\_Accessible.pdf](https://broadbandindiaforum.in/wp-content/uploads/2021/11/Frequency-Sharing-for-RLANs-in-the-6GHz-band-in-India_Accessible.pdf))

**Q3. Keeping in view the provisions of ITU's Radio Regulations on coexistence of terrestrial services and space-based communication services for sharing of the same frequency range, do you foresee any challenges in ensuring interference-free operation of terrestrial networks**

(i.e., MWA/ MWB point to point links in 6 GHz, 7 GHz, 13 GHz, and 18 GHz bands) and space-based communication networks using the same frequency range in the same geographical area? If so, what could be the measures to mitigate such challenges? Suggestions may kindly be made with justification.

## **RESPONSE**

1. As captured in TRAI's Consultation Paper on "Assignment of Spectrum for Space-based Communication Services" dated 06.04.2023, DoT has stated that, "*Coexistence of satellite networks or satellite-based communication within the country is ensured through various provisions in RR, ITU recommendations, WRC Resolutions, NFAP and License conditions for the satellite and MW services.... Moreover, as per the current practice to assign spectrum administratively, all frequency assignments/operations are issued on non-interference/non-protection basis.*" **We concur with DoT in this regard.**
2. To mitigate interference, ITU prescribes varying measures in ITU-RR which have been duly captured in the said Consultation Paper dated 06.04.2023 as well.
3. **In view of the above, there are sufficient mechanisms and processes that exist under the ITU framework<sup>1</sup> and global best practices that should be leveraged. We do not foresee any concerns at this stage that may warrant any ex-ante measures.**
4. Yes. Co-existence studies have shown that low power ( both indoor & outdoor ) and very low power ( indoor and outdoor ) Wifi/RLAN services can harmoniously co-exist with incumbent FS & FSS services in the 6GHz band ( Kindly refer to : ( [https://broadbandindiaforum.in/wp-content/uploads/2021/11/Frequency-Sharing-for-RLANs-in-the-6GHz-band-in-India\\_Accessible.pdf](https://broadbandindiaforum.in/wp-content/uploads/2021/11/Frequency-Sharing-for-RLANs-in-the-6GHz-band-in-India_Accessible.pdf) )
5. Coexistence between terrestrial networks like the MWA service and space-based communication services cannot be generalized Sharing studies need to be carried out in the other bands viz. 7GHz, 13GHz and 18GHz bands also to determine feasibility of peaceful and harmonious co-existence between terrestrial and space based services and sharing of frequencies in those bands.
6. Specifically, TRAI should adopt technical conditions applicable to the MWA service that follow ITU-R Recommendations for the fixed service applications in the 18 GHz frequency band. For example, Recommendation ITU-R F.699 contains antenna patterns for stations in the fixed service. Such antenna patterns facilitate compatibility with space-based communication services by managing off-axis emissions. Recommendation ITU-R F.595 contains channel arrangements which enhance operational transparency. Applying these Recommendations and coordination provisions like those in the ITU Radio Regulations are sufficient for space-based communication services to anticipate the magnitude and behaviour of interference. With predictable and transparent spectrum assignment

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<sup>1</sup> <https://www.itu.int/en/ITU-R/terrestrial/fmd/Pages/coordination.aspx>.

procedures for MWA services and technical conditions following international standards, the interference magnitude and likelihood from the MWA service becomes deterministic, which is mission critical for space-based communication services—particularly for earth stations like gateways. Finally, the MWA service is protected from space-based communication services using the power flux-density limits contained in Article 21 of the ITU Radio Regulations.

7. We request TRAI to extend the practice of blanket licensing for satellite customer terminals to the 17.7-19.7 GHz frequency band to permit ubiquitous deployments of uncoordinated earth stations. The European Conference of Postal and Telecommunications Administrations (CEPT) Electronic Communications Committee (ECC) has studied the compatibility between the fixed service and FSS in ECC Report 232. This report concludes that compatibility can be ensured in the long-term in less populated areas. In urban areas, FSS earth stations could use more than 65% of the 17.7-19.7 GHz band. The study showed that if interference occurred, there were alternative frequencies available to which the FSS earth station could move its traffic. We agree with these conclusions, which support TRAI actions to adopt spectrum assignment methodologies for uncoordinated earth stations in the 17.7-19.7 GHz frequency band. Those uncoordinated earth stations operating with space-based communication services should follow a national-level administrative assignment methodology and operate on a non-protected basis with respect to the MWA service. This ensures that future operations of MWA are not encumbered with regulatory uncertainty by a potentially large deployment of earth stations (e.g., customer terminals) receiving in the 17.7-19.7 GHz frequency band. TRAI can refer to the CEPT ECC Decision (00)07 adopted in October 2000 (amended March 2016) for more information regarding possible procedural considerations for uncoordinated earth stations.

**Q4. What should be the carrier size for MWA and MWB carriers in each band viz. 6/7/13/15/18/21 GHz bands? Whether there is a need to prescribe a different carrier size based on different LSA categories or different user categories viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with other than Access Service License/ Authorization and (iii) other users (non-TSP, for non-commercial/ captive/ isolated use)? If yes, suggestions may be made in the table given below with detailed justification. Microwave bands Carrier size (in MHz) for - TSPs with Access Service License/ Authorization TSPs with other than Access Service License/ Authorization other users (nonTSP, for noncommercial/ captive/ isolated use) MWB (6/7 GHz) MWA (13/15/18/21 GHz)**

#### **RESPONSE**

**We propose that the present carrier size should be continued with, i.e., 28 MHz for both MWA and MWB in each band viz. 6/7/13/15/18/21 GHz bands.**

#### **Consequences of altering the carrier size:**

If the carrier size is altered, say, if it is made smaller, there is a high likelihood of the TSP in question not being able to acquire contiguous carriers totaling up to 28 MHz, thereby rendering the existing radios unusable. Similarly, if the size is increased beyond 28MHz, it may render the spectrum under-utilized.

### **International practices support the carrier size of 28 MHz:**

The channeling plan defined by the ITU, for MWA and MWB carriers, permits the use of carrier sizes in the multiples of 28 MHz in each band.

Nevertheless, while the carrier size is standardized at 28 MHz, TSPs can even currently utilize carrier bandwidths of higher sizes, i.e., 56/84/112 MHz, within their allocated spectrum, as per their requirements in line with the ITU-R Recommendations and international practices and hence carrier size must continue to be the same. If any TSP requires a larger carrier size, they have the option of obtaining two or more contiguous carriers to maintain the required spectral efficiency for increasing the same.

For example, in the 900 MHz band with a 0.2 MHz block size, a TSP might procure 50 blocks, deploying its entire 10 MHz holding as a singular spectrum chunk or two in the ratio of 5MHz each.

### **No need for different carrier sizes for different LSAs/user categories:**

We also believe that there is no need to prescribe different carrier sizes based on different LSA categories or different user categories. TSPs operating in multiple LSAs usually have a centralised system for procurement of equipment – for cost saving and efficiency. Having different carrier sizes in different LSAs would impose an unwarranted financial burden on such TSPs. Even in the case of access spectrum, carrier sizes are uniform across different LSAs and user categories.

### **Therefore, we recommend that the carrier size in each of the MWA/MWB bands should be 28 MHz as per prevailing practice.**

**Q5. Whether there is a need to assign MWA and MWB carriers in such a way that if a TSP acquires more than one carrier in a band, all assigned carriers are contiguous, and assigned frequency range(s) can be catered through a single equipment? If yes, kindly provide details of the frequency range(s) supported by the available equipment in each band. Any other suggestion(s) may kindly be made with detailed justification?**

### **RESPONSE**

Yes, there is a need to assign MWA and MWB carriers in such a way that if a TSP acquires more than one carrier in a band, all new assigned carriers are contiguous as far as possible based on availability.

### **Assignment of new carriers should be contiguous wherever feasible:**

As stated in the response to Q4, the carrier size for MWA and MWB should be 28 MHz and, in line with the prevailing practice, TSPs should be allowed the flexibility to utilise carrier bandwidths of varying sizes, ranging from 28 MHz to 112 MHz,

within their allocated spectrum, as per requirements. This approach will help to significantly enhance spectral and spatial efficiency.

It is possible for a TSP to increase the carrier bandwidth from 28 MHz to 56/84/112 MHz only if it has contiguous carriers. Thus, to the extent feasible, attempts must be undertaken to ensure that new carriers are assigned to TSPs in such a way that every TSP's holding is contiguous, without adversely affecting the existing network of legacy operators, imposing unnecessary financial burden on them or impacting the quality of services being offered by them.

### **Harmonisation exercise in MWA/MWB must be voluntary:**

In the case of access spectrum, achieving harmonisation is much easier since access to radio equipment can fully support the entire frequency range within the band. However, in legacy networks, the availability of such backhaul radios, where a single piece of equipment is capable of supporting multiple MWA/MWB frequency carriers in a band or sub-band, may vary among different OEMs.

Consequently, compared to access spectrum, achieving complete and non-disruptive harmonisation for microwave spectrum will not be possible, owing to the restrictions posed by sub-bands in legacy backhaul radios. Imposing a mandatory requirement of harmonization would render the legacy equipment redundant, necessitating an overhaul of the entire network. Apart from putting unwarranted financial costs on legacy operators, it will also disturb the quality and continuity of services for the customers, which must be prevented at all costs.

Thus, any harmonisation of currently assigned MWA/MWB carriers must be strictly voluntary. Accordingly, harmonisation may be considered in case there are any vacant spots available with the Government or in case TSPs are willing to swap.  
**In no case should a TSP be mandated to give up its existing spot.**

Therefore, we recommend the following:

- (i) Any endeavor towards maintaining contiguity in carriers or any harmonization exercise must adhere to the principles of prioritizing the stability of existing networks, safeguarding legacy networks, preventing unnecessary financial burden on TSPs and upholding the requisite standards for the quality of services being offered to customers.
- (ii) New MWA and MWB carriers should be assigned in such a way that in situations where a TSP acquires more than one carrier in a band, all assigned carriers are contiguous as much as possible, and assigned frequency range(s) can be catered through a single equipment, wherever feasible.
- (iii) In the case of already assigned carriers, any harmonisation exercise must be voluntary and not mandatory.

- (iv) Under no circumstances should the existing legacy networks be compelled to relinquish their current assignments or substitute them with assignments in other bands or frequency spots. Such an approach will ensure the continuity of network stability, protection of legacy infrastructure and massive investments made in backhaul network, and prevent unnecessary disruptions that may arise from imposing changes to existing assignments.

**Q6. For the existing service licensees holding MWA/ MWB carriers, whether there is a need to create some specific provisions (as discussed in para 2.38 of this CP) such that if the licensee is successful in acquiring the required number of carriers through auction/ assignment cycle, its services are not disrupted? If yes, kindly provide a detailed response with justification.**

**RESPONSE**

We submit that the fundamental purpose of assignment methodology should be to prioritise network stability, cost-effectiveness for existing users and the preservation of high QoS without causing network disruption.

**Administrative assigning of backhaul spectrum will achieve better policy outcomes and support public interest better than an auction will and thus MWA/MWB carriers should be assigned on an administrative basis.**

Our detailed submissions are as follows:

**Criticality for service rollout:**

1. As elaborated in the Preamble and response to Q1 earlier, with continuously increasing volume of mobile data traffic, backhaul systems and capacities should also be sufficiently bolstered so that they are able to support access aggregation.
2. Due to backhaul spectrum being quickly scalable, highly reliable and rapidly deployable at relatively lower costs than fiber, wireless backhaul is the only practical solution available – more so in certain rural and remote areas and even congested urban areas where fiber is too costly. India has only succeeded in achieving one of the fastest and most cost-effective 5G rollouts globally due to availability of backhaul spectrum.

**Inflexibility to change vast legacy networks:**

3. In India, presently, ~5 lakh microwave hops are already deployed. The legacy backhaul equipment has inherent limitations related to 'occupied bandwidth' ("OBW") and 'instantaneous bandwidth' ("IBW").



4. The designs of these systems are optimised for performance within specific frequency bands and sub-bands. Attempting any modifications to these systems could render existing backhaul equipment obsolete. Therefore, practically, there is no flexibility to change the currently assigned spots.
5. If such an exercise were undertaken, it would not only be a huge costly affair for TSPs, but also a colossal and time-consuming undertaking – as new links would have to be commissioned in place of existing links, followed by a change-over, and finally the withdrawal of the old links.
6. Moreover, there may be two scenarios in case of change in frequency: (1) the operator is assigned a different sub-band within the same band, and (2) the operator is assigned a different band altogether. While a different sub-band may require only a change in radios (which itself would be a massive exercise), a different band (especially when the bands are widely separated) would disturb the entire link planning that the operator's network would be based on.
7. For instance, in case an operator currently has spots in the 15 GHz band, it would have planned its network, including the number of links, their locations, etc., on the basis of the capacity of the 15 GHz band and its radiation and penetration characteristics. These factors would be very different for the 21 GHz band and would essentially require the operator to re-plan its network from scratch, in case it is assigned spots in the 21 GHz band instead of the 15 GHz band.
8. To prevent this, it is essential that each TSP re-obtains the same frequencies in the same band and sub-band. Such an outcome is only possible in the case of an administrative assignment.
9. **Impact on consumers:** As explained above, any change in the existing frequency spots assigned to MWA/MWB carriers would require the overhauling of the entire legacy backhaul systems. This would potentially cause service disruptions for hundreds of millions of subscribers of legacy operators.
10. As per the latest TRAI data, the huge customer base of the legacy operators would be adversely affected in case of any service disruption.
11. Since the prime objective of any policy has to be protection of interests of the consumers and public at large, the Government would do well to avoid taking the mammoth risk of auctioning the backhaul spectrum at all costs.
12. **Competition issues:** The scale of fiberisation in India is very low, and the situation is not going to change materially for the next few years. In case the backhaul spectrum is auctioned, only the TSP with a large fiber footfall and without a legacy network will benefit. The networks of all other TSPs will be massively disrupted. This would give the competitive advantage to

only one TSP, at the expense of others. Hence, making backhaul spectrum available to TSPs administratively is vital.

**13. Risk to massive investments in access network (access spectrum):**

TSPs have sunk lakhs of crores into obtaining access spectrum through auctions over the years. To provide context, a prominent TSP of the country has acquired spectrum worth 1.78 Lakh Crores till date. For stability of investment, it is imperative to ensure that TSPs are able to monetise their access spectrum. Such certainty is possible only with continued administrative allocation of backhaul spectrum.

14. Further, in addition to affecting the investments already made, any risk or uncertainty about the backhaul will also have an adverse impact on the auction of access spectrum going forward. This would represent a regressive move for the telecom sector, just as the Cabinet decision is commencing its efforts to bolster and stabilise the industry following years of instability. Furthermore, it would run counter to the Government's vision of enhancing the ease of doing business in the country.

15. **Supporting role of backhaul spectrum:** Backhaul spectrum is only complementary to the auctioned access spectrum. The backhaul spectrum does not generate any revenue on its own and, hence, there is no rationale for auctioning the same.

16. **Additionally, auctioning access spectrum is fundamental from a market access and competition perspective. However, Access and backhaul spectrum cannot be equated and should not be treated in a similar way.**

17. A one-size-fits-all approach that does not take into account the diverse scope, needs and nuances of the telecommunications sector is neither apposite, nor prudent. Rather, a balanced and well-considered approach that incorporates the vast variety of allocation methods employed to accommodate the sector's myriad requirements while promoting serviceability, competition and orderly growth would be the best way forward.

18. **Consequences of auctioning backhaul spectrum:** The operators with legacy backhaul allocations do not have any flexibility to change their currently assigned spots. Given that relinquishing their existing spectrum allocations will be very difficult, such operators will be at significant risk of getting disturbed/disrupted by destructive bidding during auction.

19. In such a situation, TSPs will be obliged to acquire the same spectrum that has already been invested in since they will, otherwise, face various risks, including (but not limited to) substantial costs of replacing equipment, potential network disruptions and deteriorated QoS for the public. Such a

situation might also result in inadvertently conferring an unwarranted competitive advantage to competitors.

20. Even if existing spectrum holders were to be granted the right of first refusal (RoFR) in auctions, it would still become a winner's curse for the legacy operators as they would have to outbid the other bidders. An auction may also potentially see attempts of spectrum hoarding, to hurt the interests of TSPs with legacy networks.
21. **No supply constraints in MWA/MWB carriers that justify an auction approach:** As is evident from Table 2.4 of the Consultation Paper, there is no dearth of MWA carriers with 76% of carriers already lying vacant with the government. Even in the case of MWB carriers, there is no instance of shortage or limited availability. Even with the current assignment methodology, it is evident that 53% of carriers in the 13GHz band, 22% in the 15GHz band, 83% in the 18GHz band, and 93% in the 21GHz band remain unutilised.
22. Considering this, there does not seem to be any logic to auctioning MWA/MWB carriers where supply is in abundance, demand limited and less than supply.
23. **International precedents:** MW carriers are assigned administratively in most jurisdictions – as either a bundle or mandatory allocation (with nominal charge), whenever access spectrum is assigned. TRAI Consultation Paper has also not provided any instances where backhaul spectrum has been auctioned. It is therefore fair to argue that India should also follow international practices in this regard.
24. **TRAI favoured administrative assignment in 2014:** Even TRAI in its earlier Recommendations in 2014 on this issue after due consideration concluded that *"...(a) the assignment of spectrum for MW fixed point-to-point links is done administratively in most countries; (b) there is no shortage of MWA/MWB carriers; (c) MW carriers are essential for the roll-out of network; and, (d) since the access spectrum is being assigned through auction, there seems to be no justification for another auction for the assignment of MW carriers as these will be used by only those TSPs who have got the access spectrum..."*
25. Accordingly, the Authority recommended that assignment of MWA and MWB carriers should continue on an administrative basis. Since the situation has not changed materially since 2014 and the rationale given by the TRAI stands true even today, it is only appropriate that TRAI continue in its recommendation of administrative assignment of MWA/MWB carriers.
26. In fact, the TRAI Act provides that the objectives of establishment of the Authority is to protect the interests of both the service providers and the consumers and ensure orderly growth of the telecom sector. However, as

explained above, backhaul spectrum auctions would be in conflict with each of these objectives. Thus, in case the Authority now takes a view contrary to its 2014 Recommendations, it would go contrary to its mandate under the TRAI Act itself.

27. **The 2G Judgment did not mandate auction as the sole method in every case:** The Hon'ble Supreme Court Order in the 2G matter was in the context of arbitrary grant of access spectrum. It neither extends to allocation of all natural resources in general nor prohibits administrative allocation of natural resources.
28. The Hon'ble Supreme Court had specifically observed that the submission that the mandate of Article 14 requires that *disposal of a natural resource for commercial use must be for revenue maximisation and thus by auction* is based neither on law nor logic. Even the mandate of 39(b) imposes no restrictions on the means adopted to subserve the public good and uses the broad term 'distribution', suggesting that the methodology of distribution is not fixed.
29. The economic logic of alienation/allocation of natural resources to the highest bidder may not necessarily be the only way to subserve the common good and, at times, may even run counter to the public good. Hence, it needs little emphasis that the disposal of all natural resources through auctions is clearly not a constitutional mandate. There is no directive under the 2G Judgement that natural resources can be allocated only through auctions.
30. Moreover, and importantly, as already highlighted previously, backhaul spectrum is there to complement the access spectrum, not to replace it/compete with it in the access market. Therefore, the logic of auctions does not hold in the case of backhaul spectrum. It is also pertinent to note that the 2G Judgement came much before the TRAI 2014 Recommendations, and it did not act as a bar for TRAI recommending administrative assignment of backhaul spectrum then. Therefore, we contend that the same approach should continue to be followed even now.
31. Even if we consider that the 2G Judgment does bar the assignment of spectrum through any methodology other than auction, then even delicensing of spectrum would fall foul of it. However, even after the 2G Judgment, TRAI has recommended for and DoT has actually delicensed various spectrum bands, for use cases like short-range devices, tracking and telemetry, etc. Hence, it follows that 2G Judgment does not mandate auction as the only methodology for assignment of spectrum.

**In view of the above, we recommend the following:**

- (i) MWA & MWB carriers must be assigned on an administrative basis following a well-defined process.**

- (ii) **Legacy operators should not be compelled to give up their existing MWA/MWB spots or change the carriers.**
- (iii) **At best, the Government may alternatively consider allocating the MWA/MWB spectrum bundled with the access spectrum on a prospective basis, as the latter is already auctioned. This would assure continued availability of adequate backhaul spectrum.**
- (iv) **By adhering to these principles, a fair and balanced approach that benefits all stakeholders in the industry can be ensured.**

**Q7. Whether there is a need to review the existing ceiling on number of MWA carriers that can be held by a licensee? In case it is decided to review the ceiling on the number of MWA carriers that a licensee can hold, (a) Whether a separate ceiling for each band (13 GHz/ 15 GHz/ 18 GHz/ 21 GHz) should be prescribed or an overall ceiling for MWA carriers taking all bands together? (b) Whether different ceilings based on the service area category i.e., Metro/ Category 'A' Circles/ Category 'B' Circles/ Category 'C' Circles, needs to be prescribed? (c) What should be the ceiling in terms of the number of carriers of 28 MHz per licensee in each case i.e., band-wise ceiling and overall ceiling for each service area category for - (i) TSPs with Access Service License/ Authorization, and (ii) TSPs with other than Access Service License/ Authorization? (d) Any other relevant suggestion may be made with justification. Kindly justify your response.**

#### **RESPONSE**

- 1. No, there is no need to review the existing ceiling on the number of MWA carriers** that can be held by a licensee.
- 2.** As per the Addendum dated 25.07.2022 to the Guidelines dated 16.10.2015 regarding allotment of MWA/MWB carriers to TSPs with Access Service Authorisation/License, the maximum number of MWA carriers that can currently be assigned to a TSP with Access Service Authorisation is as follows:
  - 8 carriers in each of the Metros and Category-A LSAs
  - 6 carriers in each of the Category-B and C LSAs
- 3.** Considering the presence of 4 TSPs and the fact that there has been no discernible shortage in the demand-supply dynamics of the available backhaul spectrum, the requirements of the industry are adequately met by the existing ceiling on MWA carriers. Thus, there is no need to review the same.
- 4.** It is pertinent to mention that none of the TSPs have fully utilised their allocated capacity and, in some cases, have even relinquished their MWA/MWB carriers based on their fiber deployment progress. Therefore, the current ceiling is adequate at this stage. However, as highlighted earlier,

the numbers are subject to change in the future with the growth in the volume of traffic and a variety of other factors.

**Therefore, we recommend that the existing ceiling on the number of MWA carriers for TSPs with Access Service Authorisation, as prescribed by the Addendum dated 25.07.2022, should be continued with.**

**(a) Whether a separate ceiling for each band (13 GHz/15 GHz/18 GHz/21 GHz) should be prescribed or an overall ceiling for MWA carriers taking all bands together?**

1. In line with the extant policy, there is **no requirement to prescribe a separate ceiling for each band** (13 GHz/15 GHz/18 GHz/21 GHz). An **overall ceiling** for MWA carriers, taking all bands together, should be prescribed.
2. The existing networks have evolved over the last 2 decades within a framework where there was no distinct band-wise limitation. Furthermore, operators have been assigned frequencies in specific bands over time based on the availability of backhaul spectrum in a particular band at that point in time.
3. For instance, an operator was assigned 2 carriers in the 13 GHz band in a metro in 2016, followed by an additional 2 carriers in the same 13 GHz band in 2018. Now, if an individual band-wise ceiling is introduced, such as limiting carriers to 2 per band, the operator would be required to surrender 2 of its carriers in 13 GHz band and instead acquire carriers in other bands. However, as previously explained, legacy networks are incompatible with frequency changes. Consequently, the introduction of an individual band-wise ceiling would effectively entail the operator giving up its existing spectrum holdings, leading to a complete disruption in services.
4. The existing overarching ceiling has proven effective for the last 2 decades. Therefore, it will be proper to maintain continuity with the same policy.

**(b) Whether different ceilings based on the service area category i.e., Metro/Category 'A' Circles/Category 'B' Circles/Category 'C' Circles, needs to be prescribed?**

1. **Yes, different ceilings based on service area categories**, i.e., Metro/Category 'A' Circles/Category 'B' Circles/Category 'C' Circles, need to be prescribed. This is because the subscriber base, volume of traffic, network density and other parameters affecting the requirement of MWA carriers are different in different categories of circle.
2. Thus, **in line with the extant policy**, the ceiling should be as follows:
  - 8 carriers in each of the Metros and Category-A LSAs

- 6 carriers in each of the Category-B and C LSAs
- (c) **What should be the ceiling in terms of the number of carriers of 28 MHz per licensee in each case i.e., band-wise ceiling and overall ceiling for each service area category for –**
- (i) **TSPs with Access Service License/Authorization, and**
  - (ii) **TSPs with other than Access Service License/Authorization?**
1. Please refer to the response to points (a) and (b) above. There is **no need for a band-wise ceiling on MWA carriers**. An overall ceiling per LSA, in line with the extant policy, is sufficient.
  2. **For TSPs with Access Service Authorisation**, the overall ceiling, in terms of number of carriers of 28 MHz per licensee, should be as follows:
    - **8 carriers in each of the Metros and Category-A LSAs**
    - **6 carriers in each of the Category-B and C LSAs**
  3. **For TSPs with other than Access Service Authorisation**, please refer to our response to Q1 and Q2 above. MWA/MWB carriers should continue to be assigned to them on a **P2P link basis**, in line with the extant policy.

**Q8. In case it is decided to assign MWB carriers exclusively on LSA basis to the TSPs, whether there is a need to prescribe any ceiling on the maximum number of MWB carriers that can be held by a TSP? Kindly justify your response.**

#### **RESPONSE**

Please refer to the response to Q1 and Q2. MWB carriers should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis. Further, **yes, there should be a ceiling on the maximum number of MWB carriers that can be held by such a TSP.**

It is necessary to prevent hoarding of spectrum by any TSP. It is estimated that TSPs with limited fiber infrastructure would need 2 MWB carriers initially to meet their backhaul requirements – hence a ceiling of 2 MWB carriers per LSA per TSP should be prescribed in all categories of LSAs.

**Therefore, we recommend that MWB carriers should be assigned for the entire LSA on an exclusive basis, with a ceiling of 2 carriers per LSA in all categories of LSAs.**

**Q9. In case it is decided to prescribe a ceiling on the number of MWB carriers that a TSP can hold, (a) Whether separate ceiling for each band (6 GHz, 7 GHz (7.125- 7.425 GHz) and 7 GHz (7.425-7.725 GHz)) should be prescribed or an overall ceiling for MWB carriers should be prescribed? (b) Whether different ceiling based on the service area category i.e.,**

**Metro/ Category 'A' Circles/ Category 'B' Circles/ Category 'C' Circles, needs to be provided? (c) What should be the ceiling in terms of number of carriers of 28 MHz per licensee in each case i.e., band-wise ceiling and overall ceiling for each service area category for (i) TSPs with Access Service License/ Authorization, and (ii) TSPs with other than Access Service License/ Authorization? (d) Any other relevant suggestion may be made with justification.**

## **RESPONSE**

Please refer to the responses to Q1, Q2 and Q8. MWB carriers should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis, with a ceiling of 2 carriers per LSA in all categories of LSAs.

- (a) Whether separate ceiling for each band (6 GHz, 7 GHz (7.125-7.425 GHz) and 7 GHz (7.425-7.725 GHz)) should be prescribed or an overall ceiling for MWB carriers should be prescribed?**

**No.** There is **no need to prescribe a separate band-wise ceiling** [6 GHz, 7 GHz (7.125-7.425 GHz) and 7 GHz (7.425-7.725 GHz)]. An **overall ceiling** for MWB carriers will suffice.

As highlighted in the response to Q7, the prevailing Guidelines prescribe only an overall ceiling on the number of MWA carriers that can be held by a TSP with Access Service Authorisation, and there is no separate/bandwise Individual ceiling for each MWA band (13 GHz/15 GHz/18 GHz/21 GHz).

We recommend that a similar approach be adopted in the case of MWB carriers, i.e., an overall ceiling of 2 MWB carriers per LSA, in all categories of LSAs. There is no need to set distinct limits for each MWB band separately.

**In summary, we recommend that MWB carriers should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis, with an overall ceiling of 2 carriers per LSA in all categories of LSAs.**

- (b) Whether different ceiling based on the service area category i.e., Metro/ Category 'A' Circles/ Category 'B' Circles/ Category 'C' Circles, needs to be provided?**

**No,** there is no need to provide different ceilings based on service area category, i.e., Metro/Category 'A' Circles/Category 'B' Circles/Category 'C' Circles.

The requirement of MWB carriers is estimated to be similar in all categories of LSAs. Therefore, the ceiling on the number of MWB carriers that can be held by a TSP should be uniform across all categories of LSAs.



**In summary, we recommend that MWB carriers should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis, with an overall ceiling of 2 carriers per LSA in all categories of LSAs.**

- (c) **What should be the ceiling in terms of number of carriers of 28 MHz per licensee in each case i.e., band-wise ceiling and overall ceiling for each service area category for**
- (i) **TSPs with Access Service License/Authorization, and**
  - (ii) **TSPs with other than Access Service License/Authorization?**

Please refer to the responses to points (a) and (b) above. There is **no need for a band-wise ceiling on MWB carriers**. An overall ceiling per LSA should be prescribed and it should be **uniform across all categories of LSAs**.

- (i) **For TSPs with Access Service Authorisation**, the overall ceiling, in terms of number of carriers of 28 MHz per licensee, should be 2 carriers per LSA in all categories of LSAs.
- (ii) **For TSPs with other than Access Service Authorisation**, please refer to our response to Q1 and Q2 above. MWA/MWB carriers should continue to be assigned to them on a **P2P link basis**, in line with the extant policy. Accordingly, there is **no need for prescribing any ceiling** in case of TSPs holding other than Access Service Authorisation.

**Q10. Which methodology should be used for assignment of MWA carriers? Response may be provided in the table given below: User category Assignment methodology [Auction/ Administrative/ Any other (please specify)] Justification (i) TSPs with Access Service License/ Authorization (ii) TSPs with other than Access Service License/ authorization (iii) Other entities (nonTSP, for noncommercial/ captive/ isolated use)**

## **RESPONSE**

Please refer to our response to Q6

Administrative methodology using formula based mechanism is the ideal way of charging, instead of Auction based. This would ensure reasonable pricing of assigned spectrum, availability of the spectrum for new players in future/cater to future demand and better and efficient need-based utilisation of the spectrum. Also assignment of Satellite Spectrum Bands viz. 18GHz bands which is a shared spectrum band, should only be done administratively as any other method of assignment viz. Auction would lead to inefficient utilisation of the band and will deter use of Satcom to serve the unconnected and the under connected in the country.

**Q11. In case you are of the opinion that certain user categories should be assigned MWA carrier P2P links by any methodology other than auction, should some MWA carriers be earmarked for such users? If yes, how many carriers should be earmarked for each of such user category? Kindly justify your response.**

**RESPONSE**

Please refer to the responses to Q1, Q2, Q6, Q10 and Q12. MWA/MWB spectrum should be assigned administratively. For TSPs with Access Service Authorisation, it should be assigned for the entire LSA on an exclusive basis. For TSPs with other than Access Service Authorisation and non-TSPs, the existing policy of P2P assignment should be continued with.

It may be appreciated that MWA spectrum is assigned, even currently, to TSPs with other than Access Service Authorisation and non-TSPs on P2P link basis, simultaneously while it is assigned on exclusive basis to TSPs with Access Service Authorisation. Since this approach has served well the purposes of all users thus far, we suggest that the same should be continued with and adopted in case of MWB spectrum as well.

**In summary, we recommend the following:**

**(i) The extant policy of assigning MWA spectrum on an administrative basis, such that TSPs with Access Service Authorisation are assigned the spectrum on an exclusive basis for the entire LSA and TSPs with other than Access Service Authorisation and non-TSPs are assigned P2P links, should be continued with.**

**(ii) The same approach should be adopted in case of MWB spectrum as well.**

All MWA carriers must be assigned only through administrative methodology as is the case today. It should not be auctioned.

**Q12. Which methodology should be used for assignment of MWB carriers? The response may be provided in the table given below: User category Assignment methodology [Auction/ Administrative/ Any other (please specify)] Justification (i) TSPs with Access Service License/ Authorization (ii) TSPs with other than Access Service License/ Authorization (iii) Other entities (nonTSP, for non-commercial/ captive/ isolated use)**

**RESPONSE**

Please refer to our response to Q11.

**Q13. In case you are of the opinion that certain user categories should be assigned MWB carrier by any methodology other than auction, should**

**some MWB carriers be earmarked for such users? If yes, how many carriers should be earmarked for such users? Kindly justify your response.**

### **RESPONSE**

Please refer to our response to Q11.

**Q14. In case it is decided to assign MWA/MWB carriers to the TSPs with Access Service License/ Authorization through auction and to continue the existing P2P assignment of MWA/MWB carriers for TSPs other than Access Service License/ Authorization, who may be requiring to establish only a few links, what threshold limit in terms of number of links, may be prescribed, beyond which, the TSPs with other than Access Service License/ Authorization should also be required to acquire MWA/ MWB carriers through auction? Kindly justify your response.**

### **RESPONSE**

1. Please refer to the response to Q1, Q2, Q6, Q10 and Q12. MWA/MWB spectrum should be assigned administratively. For TSPs with Access Service Authorisation, it should be assigned on an exclusive basis for the entire LSA. For TSPs with other than Access Service Authorisation and non-TSPs, it should be assigned on P2P link basis.
2. We submit that assigning MWA/MWB carriers to the TSPs with Access Service License/ Authorisation through auction and continuing the existing P2P assignment of MWA/MWB carriers for TSPs without Access Service License/Authorisation would be prejudicial and lead to the creation of a non-level playing field. Further, prescribing any threshold in terms of number of links, beyond which the TSPs with other than Access Service License/ Authorisation should also be required to acquire MWA/MWB carriers through auction, would be artificial.

### **3. Same resource – same approach:**

Both TSPs with Access Service Authorisation and those without intend to use MWA/MWB carriers for commercial purposes. Different approaches cannot be followed for two users intending to monetise the same resource. Hence, the methodology of assignment of MWA/MWB carriers must be uniform for all service providers – whether having Access Service Authorisation or not.

### **Precedence of uniform approach:**

4. A similar situation presented itself in 2010, when the 3G and BWA auctions were conducted. Both UASL and ISP licensees were eligible for the spectrum. However, both types of licensees had to participate in the auction process and make a payment under uniform terms and conditions, even though the usages of the spectrum by the licensee groups were significantly different (one for voice/data and the other for data only). Thus, we believe that there is no need to formulate different policies for different user groups

when the resource to be allocated is the same. The policy framework should be simple and maintain a level playing field in a non-discriminatory manner.

### **Risk of misuse in different approaches:**

5. Many TSPs holding Access Service Authorisation may also hold other service authorisations like NLD, ISP, etc. Having a differential approach of spectrum assignment for different service authorisations would only prompt TSPs to bypass the regime by acquiring MWA/MWB carriers through authorisations other than Access Service. In that scenario, a TSP with only Access Service Authorisation will be forced to participate in the auction whereas a TSP with other service authorisations will be able to continue the existing administrative assignment.
6. TRAI itself in its consultation paper has recognized that the Government is assigning MWA and MWB carriers to operators holding different service authorizations, based on their requirements. Further, it is also a fact that the operator holding NLD authorization can provide the backhaul to the operator holding Access Service Authorization. So, an operator can choose to acquire the backhaul spectrum administratively under NLD service authorization and can offer the same network to the Access Service Provider instead of acquiring the same through auction under Access service authorization and build under the same service authorization.
7. Therefore, a differential assignment methodology will incentivize the operators to buy the spectrum other than the access spectrum, creating a non-level playing field. Any differential assignment policy, along with a differential charging mechanism, will prompt various stakeholders to create arbitrage opportunities. Such devious situations must be avoided.
8. **Therefore, we recommend that MWA/MWB carriers must be assigned to all user categories through a uniform methodology, i.e., administrative assignment.** We are not in favour of assignment of spectrum to anyone in these bands through an auction based mechanism.

**Q15. In case it is decided to assign MWA/ MWB carriers to all types of licensed TSPs through auction, should such TSPs be permitted to lease their spectrum acquired through auction, on P2P link basis, to other TSPs and other entities (non-TSP, for non-commercial/ captive/ isolated use) who may be requiring establishing only a few links? If yes, (a) suggest a mechanism and regulatory framework for such leasing arrangement. (b) Do you foresee any regulatory issues and potential misuse of such a regime? If yes, what measures could be put in place to mitigate the concerns? Kindly justify your response.**

### **RESPONSE**

We do not support assignment of MWA/MWB through auction for the reasons elaborated in the responses to Q6, Q10 and Q12. It is our recommendation that

**MWA/MWB carriers should continue to be assigned on an administrative basis.**

**Q16. In case MWA/MWB carriers are decided to be assigned through auction, (a) Should the auction be conducted based on Simultaneous Multiple Rounds Ascending Auction (SMRA) method as adopted for IMT spectrum auction? Any other auction method may be suggested with detailed justification. (b) what quantum of spectrum in each band (6/7/13/15/18/21 GHz) should be put to auction? Kindly justify your response.**

**RESPONSE**

Please refer to our response to Q15.

We are not in favour of any assignment of MWA/MWB carriers through auction. It should be assigned administratively.

**Q17. In case it is decided to assign MWA and MWB carriers through auction, (a) What should be the validity period of the assigned spectrum? (b) Whether there is a need to create a provision for surrender of MWA / MWB carriers? If yes, what should be the lock-in period and other associated terms and conditions? Response may be given for each user category viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with other than Access Service License/ Authorization, and (iii) Other entities (nonTSP, for non-commercial/ captive/ isolated use) with detailed justification.**

**RESPONSE**

Please refer to our response to Q15

We are not in favour of any assignment of MWA/MWB carriers through auction. It should be assigned administratively.

**Q18. In case it is decided to continue with the existing methodology of assignment of MWA/ MWB carriers, whether any change in the validity period, or process for augmentation/ surrender of carriers is required to be made? If yes, suggestions may be made with detailed justification.**

**RESPONSE**

Please refer to the responses to Q1, Q2, Q6, Q10 and Q12. Both MWA/MWB spectrum should be assigned administratively. For TSPs with Access Service Authorisation, it should be assigned on an exclusive basis for the entire LSA. For TSPs with other than Access Service Authorisation and non-TSPs, it should be assigned on P2P link basis.

**No change is required to be made in the validity period or process for augmentation/ surrender of carriers** if the existing methodology of assignment of MWA/MWB carriers is persisted with.

Currently, the validity period of the MWA/MWB carriers assigned to a TSP is co-terminus with its license. For augmentation, a TSP must submit a request to DoT, which evaluates the requirement and whether it falls within the spectrum cap. Further, as per the extant guidelines, a TSP may surrender an MWA/MWB carrier assigned to it by serving an advance notice of 30 days to DoT. The same should be continued with.

**Therefore, we recommend that the existing methodology of assigning MWA/MWB carriers administratively should be continued with. Accordingly, there is no need for any change in the extant validity period, augmentation process as well as the surrender guidelines.**

**Q19. What should be the eligibility conditions and associated conditions for assignment of spectrum in 6/ 7/ 13/ 15/ 18/ 21 GHz bands? Response may kindly be given for each user category viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with other than Access Service License/ Authorization, and (iii) Other entities (nonTSP, for non-commercial/ captive/ isolated use) with detailed justification.**

#### **RESPONSE**

Please refer to Response to Q2.

We suggest status quo be maintained for assignment of spectrum for MWA/MWB carriers in all the said spectrum bands.

**Q20. Whether there is a need to prescribe any roll out obligations for MWA/ MWB carrier assignment? Should the roll out obligations be linked to the number of carriers assigned to a TSP? Kindly justify your response.**

#### **RESPONSE**

**No, there is no need to prescribe any roll out obligations for MWA/MWB carrier assignment.** TSPs holding access spectrum are already subject to **rollout obligations specific to access services**. These rollout obligations are designed to ensure that TSPs extend their network coverage to provide services to end-users within a defined timeframe and geographic area. This involves deploying cell sites, base stations and infrastructure to provide coverage to subscribers.

**Backhaul spectrum, on the other hand, is not meant to provide coverage at the access level;** rather, its primary purpose is to establish high-capacity data links among various network elements. It only plays a supporting (and complementary) role in the telecommunications ecosystem by facilitating the efficient transport of network traffic between access points (e.g., cell towers) and the core network. Hence, there is no logical reason for having separate roll out obligations for MWA/MWB carriers.

**Accordingly, we recommend that there should not be any (separate) roll out obligations towards MWA/MWB carrier assignment for TSPs holding access spectrum.**

No. There are no roll-out obligations currently for MWA/MWB carriers and the same should continue.

**Q21. In case it is decided to prescribe roll out conditions, what should be the roll-out obligations associated with the assignment of spectrum in 6/ 7/ 13/ 15/ 18/ 21 GHz bands? What provisions should be prescribed for non-fulfilment of the prescribed roll-out obligations? Response may kindly be given for each user category viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with other than Access Service License/ Authorization, and (iii) Other entities (nonTSP, for non-commercial/ captive/ isolated use) with detailed justification.**

**RESPONSE**

We are not in favour of any roll out obligations for MWA/MWB carriers as is the case presently. Please refer to our response to Q20.

**Q22. Any other suggestions relevant to assignment of spectrum for MWA and MWB in 6/ 7/ 13/ 15/ 18/ 21 GHz frequency bands, may kindly be made with detailed justification.**

**RESPONSE**

As mentioned earlier, we wish to reiterate the following:

MWA carriers: We are in favour of all assignment of MWA carriers should be done administratively on a LSA basis in an exclusive manner. In case it is assigned/allocated on a link-by-link basis, then it becomes very difficult for TSPs to manage interference, as the same spots are being reused over short distances especially in towns / cities.

Also the same spots may be given to the same TSPs across other LSAs as well. This will optimise overall Capex and bring in higher efficiencies,

Charging should be done through a formula based administrative mechanism, as is being done presently. However, the overall charges must be reduced. There should be no auction for any of the spectrum bands. Responses to the earlier questions above provide detailed justification in support of our response.

**E & V bands**

- a) Q23. What quantum of spectrum in E-band (71-76 / 81-86 GHz) and Vband (57-64 GHz) is required to meet the demand of TSPs with Access Service License/ Authorization? Whether spectrum in E-band and Vband is also required by the TSPs other than Access**

**Service License/ Authorizations, and other entities (non-TSP, for non-commercial/ captive/ isolated use)? Information on present demand and likely demand after five years may kindly be provided as per the proforma given below: (i) Present demand Band Quantum of spectrum required (per entity per LSA) TSPs with Access Service License/ Authorization TSPs with other than Access Service License/ Authorization Other entities (non-TSP, for noncommercial/ captive/ isolated use) E-band (71-76/81-86 GHz) V-band (57-64 GHz) (ii) Likely demand after five years Band Quantum of spectrum required (per entity per LSA) - TSPs with Access Service License/ Authorization TSPs with other than Access Service License/ Authorization Other entities (non-TSP, for noncommercial/ captive/ isolated use) E-band (71-76/81-86 GHz) V-band (57-64 GHz)**

## **RESPONSE**

### **Background:**

#### **E Band (71-76 GHz paired with 81-86 GHz)**

1. This Band is meant to be used for high capacity (Multi-Gigabit) backhaul in dense urban/congested areas, in non-feasible areas and also in semi-urban and rural areas where laying of fiber is a huge challenge and/or traffic requirements are very high
2. It should be assigned in a light licensed manner on a link-by-link basis with carrier /channel size of 250Mhz Anyone desirous of wanting more spectrum maybe given 2 or more contiguous carriers. This is to be determined by the spectrum manager/administrator and should be based on demand. This is aligned to the international best practices being followed in over 100 countries. TRAI itself has quoted examples of several countries following this methodology in the CP itself.
3. The assignment of the links should be done through self-registration by users on an online web portal, responsibility for which should lie with WPC wing of DoT. Responsibility for interference analysis should rest with the seeker of the spectrum, who needs to check the WPC link database prior to link registration. Links should be assigned and protected on a 'first come, first served' basis.
4. This Band should be permitted to be used by all- TSPs, ISPs and any other registered entity who would require P2P dedicated links to connect their establishments eg. Private networks, etc.
5. The link charges should be suitably determined by the regulator through due process of public consultation and should be reasonable.

#### **Background Note on the Frequencies under Consideration in BIF's Response**

- (i) In several countries across the world, V band has been considered from 57-71GHz. This includes several countries like USA, UK, Korea, China, Brazil besides several others.



- (ii) In all the aforementioned countries and leading economies of the world, the entire V band (14GHz from 57-71GHz) has been delicensed
- (iii) BIF accordingly recommends that the entire V band (57-71GHz) may be considered for the scope of this Consultation.
- (iv) BIF recommends that the band be treated in two distinct parts viz. Lower V band (57-66GHz) and Extended/Upper V band (66-71GHz)

### **Characteristics of the V band (57-66GHz) and extended V band (66-71GHz)**

1. Unique propagation characteristics: Hence needs to be treated differently than other spectrum bands
2. Suffers from oxygen molecular absorption across 86% of the band
3. Unsuitable for traditional multi-kilometer fixed backhaul links but suitable for higher capacity, lower coverage applications
4. Very low probability of interference between 60 GHz band systems
5. Potential for ultra-high capacity (2-20 Gbps) point to point, and point to multipoint links

### **Deployment use cases: (57-66GHz)**

1. In-building and in-campus Wi-Fi solutions
2. SRDs (Short Range Devices) i.e. medical diagnostics, RFID, telemetry, radar, etc
3. Research & innovation

### **Deployment for extended V band ( 66-71GHz)**

Fronthaul and Backhaul Connectivity to 5G base stations

### **Spectrum Assignment -Global Scenarios**

1. Over 80 countries have delicensed use of V band
2. Leading countries include Australia, Brazil, Canada, China, Europe, Japan, Mexico, New Zealand, South Africa, Sweden, UK and US, have all delicensed the V band
3. US, UK, EU, Brazil and Canada have delicensed entire band (57-71 GHz)
4. China, Korea, Japan, Malaysia, Singapore, Australia – have delicensed the band (57-64/66 GHz)

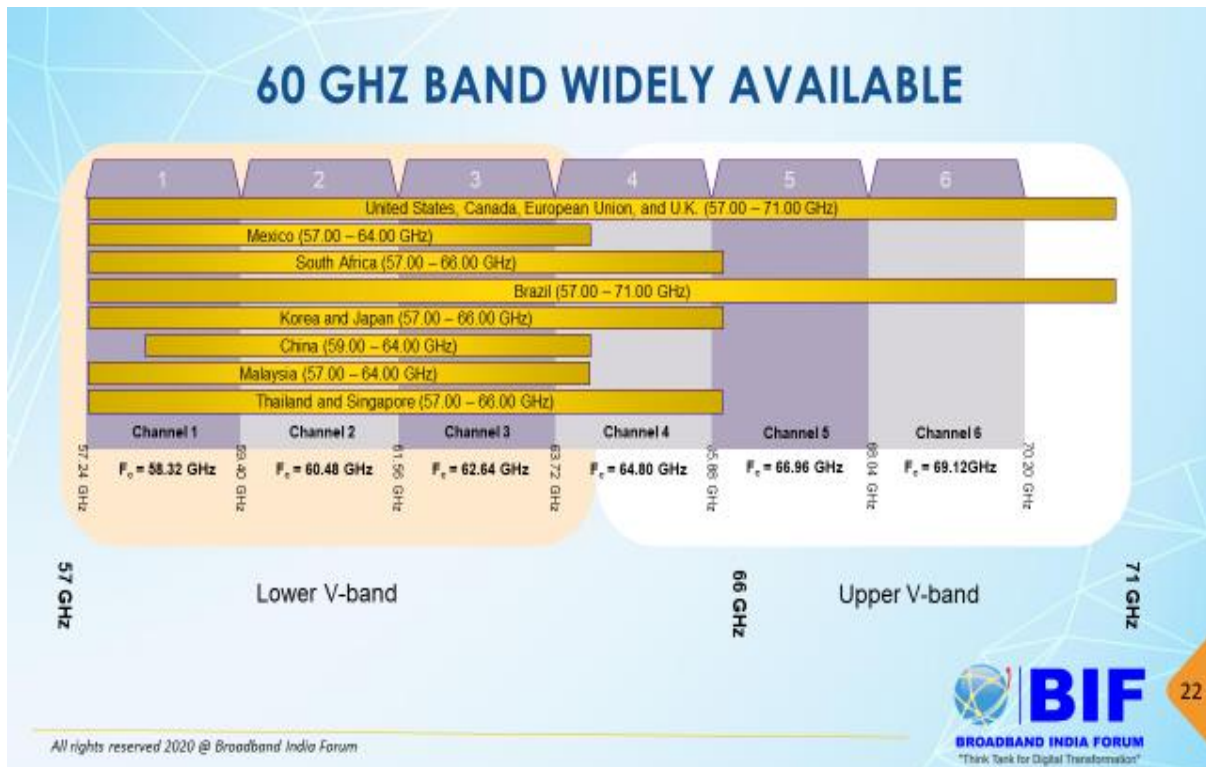
### **Auction of V band is not recommended as it will:**

1. Go against international best practices and globally harmonized framework,
2. Go against TRAI Recommendations of August 2014
3. Will lead to inefficient utilization of spectrum, if allocated only to a few ( if auctioned)
4. If allocated to only a few, it will not facilitate innovations,
5. Will decrease the economic value/utility of this band.

### **Recommendation for assignment of V band**

- Lower V band (57-66GHz) should be delicensed at par with international best practices
- Extended V band (66-71GHz) -may be assigned to TSPs for backhaul as it does not have oxygen absorption characteristics associated with lower V band.

## **Global Regulatory Status - Countries around the World Are Adopting a License-Exempt Approach in the V-Band**



## EU MANDATE (27 MEMBER STATES)

Band no	Frequency band	Category of short-range devices	Transmit power limit/field strength limit/power density limit	Additional parameters (channeling and/or channel access and occupation rules)	Other usage restrictions	Implementation deadline
75	57-71 GHz	Wideband data transmission devices	40 dBm e.i.r.p. and 23 dBm/MHz e.i.r.p. density	Requirements on techniques to access spectrum and mitigate interference apply [7].	Fixed outdoor installations are excluded.	1 January 2020
75a	57-71 GHz	Wideband data transmission devices	40 dBm e.i.r.p., 23 dBm/MHz e.i.r.p. density and maximum transmit power of 27 dBm at the antenna port or ports	Requirements on techniques to access spectrum and mitigate interference apply [7].		1 January 2020
75b	57-71 GHz	Wideband data transmission devices	55 dBm e.i.r.p., 38 dBm/MHz e.i.r.p. density and a transmit antenna gain $\leq$ 30 dBi	Requirements on techniques to access spectrum and mitigate interference apply [7].	This set of usage conditions is only available to fixed outdoor installations.	1 January 2020

See SRD 7<sup>th</sup> update Decision (EU) 2019/1345 adopted on 2 August 2019 and published at <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1567676305871&uri=CELEX:32019D1345>

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## CEPT (48 MEMBER STATES) ERC RECOMMENDATION 70-03

ERC RECOMMENDATION (70-03) Page 13

### ANNEX 3: WIDEBAND DATA TRANSMISSION SYSTEMS

#### Scope of Annex

This annex covers frequency bands and regulatory as well as informative parameters recommended for Wideband Data Transmission Systems.

Table 3: Regulatory parameters

	Frequency Band	Power / Magnetic Field	Spectrum access and occupation requirements	Modulation / maximum bit/second bandwidth	ECC/ERC Derivables	Notes
a1	863-868 MHz	25 mW e.i.r.p.	$\leq$ 10% duty cycle for network access points and public spectrum access, $\leq$ 2.4% duty cycle otherwise and public spectrum access	$\leq$ 600 kHz $\leq$ 1 MHz		Wideband data transmission in data networks (note 1). The frequency band is also identified in Annexes 1, 2, 10 and 11
a2	915.5-919.4 MHz	25 mW e.i.r.p.	$\leq$ 10% duty cycle for network access points and public spectrum access, $\leq$ 2.4% duty cycle otherwise and public spectrum access	$\leq$ 600 kHz $\leq$ 1 MHz		Wideband data transmission in data networks (note 1 and 2). All network and mobile stations within the data network shall be controlled by a master network access point (NAP). The frequency band is also identified in Annexes 1, 2 and 11
b	2400-2483.5 MHz	100 mW e.i.r.p.	Adequate spectrum sharing mechanism (e.g. LBT and SRR) shall be implemented	Not specified		For wideband modulations other than FSSB, the maximum e.i.r.p. density is limited to 10 mW/MHz
a1	57-71 GHz	40 dBm e.i.r.p., 23 dBm/MHz e.i.r.p. density	Adequate spectrum sharing mechanism shall be implemented	Not specified		Fixed outdoor installations are not allowed
a2	57-71 GHz	40 dBm e.i.r.p., 23 dBm/MHz e.i.r.p. density and maximum transmit power of 27 dBm at the antenna port or ports	Adequate spectrum sharing mechanism shall be implemented	Not specified	ECC Report 205	
a3	57-71 GHz	55 dBm e.i.r.p., 38 dBm/MHz e.i.r.p. density and transmit antenna gain $\leq$ 30 dBi	Adequate spectrum sharing mechanism shall be implemented	Not specified	ECC Report 205	Applies only to fixed outdoor installations

Note 1: A network access point in a data network is a fixed terrestrial short range device that acts as a connection point for the other short range devices in the data network to service platforms located outside of that data network. The term data network refers to several short range devices, including the network access points, on network components and to the wireless connections between them.

October of June 2019

See ERC Recommendation 70-03, Annex 3 <https://www.ecodocdb.dk/download/25c41779-cd6e/Rec7003e.pdf>

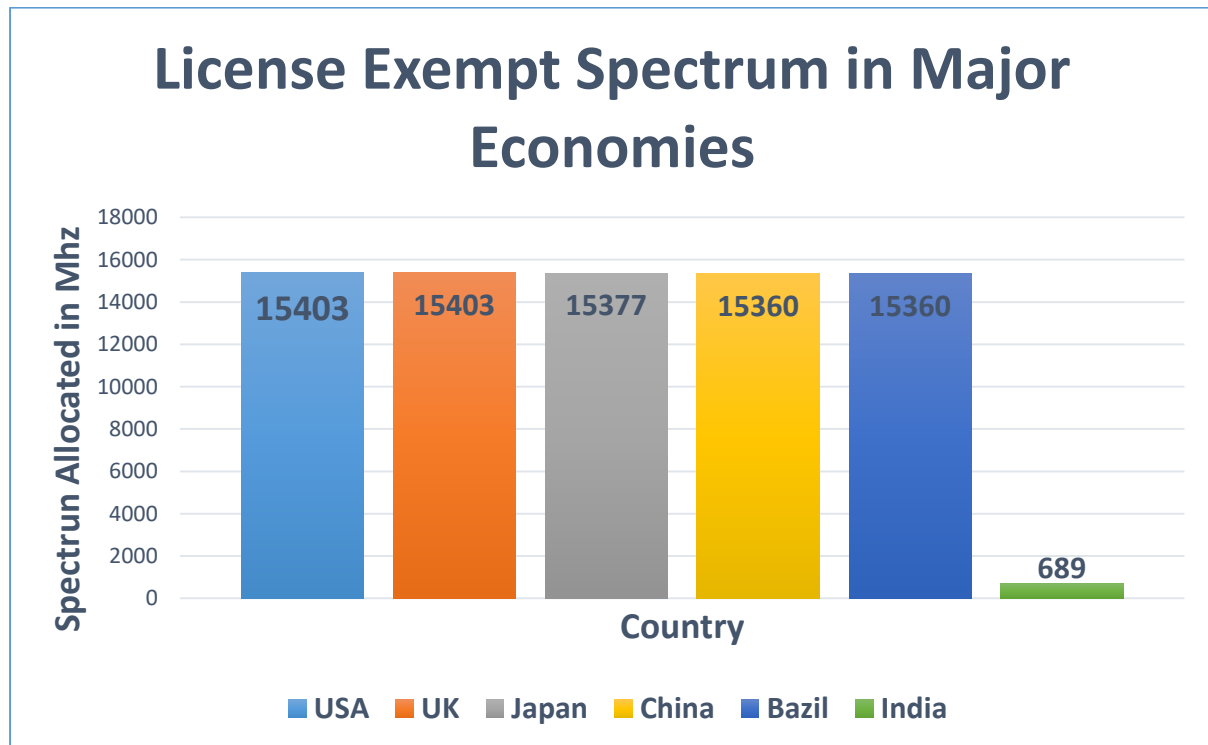
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## Methodology of Spectrum Allocation for E-Band

- Spectrum in the E-band should be allocated using administrative method of allocation.
- Page 87 of the TRAI CP itself indicates that a large number of developed economies have opted for administrative method of allocation for E-band.

A Graph comparing the International Position on delicensing of spectrum is given below

**Comparative Position of India vs other Countries as regards quantum of Unlicensed Spectrum**



From the above it is evident that India is lagging behind other developed economies in terms of quantum of delicensed spectrum. India has one twentieth of the unlicensed spectrum that leading economies have. The two primary bands that India is yet to delicense are

- b) The entire 1200 MHz in the 6GHz band (5925-7125MHz)
- c) The entire 14000 Mhz (or 14GHz) in the V band (57-71GHz)

**Specific Response to Q23:**

1. Please refer to the response to Q1 above in the context of MWA/MWB carriers and regarding the increasing demand for high-speed telecom services, leading to enhanced demands for backhaul spectrum, in the present and future.
2. With the onset of 5G while the access networks support high data rates and higher capacities, the backhaul networks which are dependent on legacy microwave systems are getting choked. It is a reality that while all stakeholders are trying to deploy more and more fiber, getting fiber everywhere is a huge challenge both in terms of costs as well as deployment challenges.
3. This is where the E band and also the upper V band (66-71GHz) would become very useful. As is known popularly, they are known as 'Wireless Fiber'. The E band helps plug the backhaul connectivity gaps. It provides Fiber like connectivity across streets in dense urban areas where laying

Fiber is next to impossible and also across large expanses of Rural areas in a cost effective manner and that too in much shorter timeframes than laying of fiber.

### **Importance of E band:**

4. It is undisputed that the overall mobile data consumption and, consequently, the backhaul requirement per site, has grown by leaps and bounds in manifold different ways. The conventional microwave spectrum can barely keep up with the current needs of 200-300 Mbps per site for even 4G, leave aside 5G. Simply put, the volume of traffic the access network is expected to witness necessitates a multifold capacity augmentation at the backhaul level – possible only with high-capacity bands like E band. In fact, it would be fair to say, that India would not have been able to achieve one of the fastest 5G rollouts in the world were it not for the availability of the E-band spectrum.

### **Quantification of demand for E band:**

5. As in the case of MWA/MWB carriers, the exact quantification of demand for E band has to take into account multiple factors, like the present (and future) subscriber base, the access technology deployed, the required backhaul capacity per site, mobile network density, hub density, existing fiber penetration & planned fiber deployment, evolution of existing network, suboptimal angular separations, line of sight availability, infrastructure limitations, etc.
6. As mobile networks are in a continuously evolving stage, most of these parameters cannot be evaluated on static ground. The demand for backhaul carriers will keep changing as these parameters undergo change, making it difficult for TSPs to predict specific backhaul carrier requirements for the long term. Therefore, determining the precise requirement for E band spots and coming up with an exact number is a challenging task.
7. **Demand for E-band:** Currently, there is a ceiling of 2 carriers per LSA in E-band. However, with the rapid increase in internet traffic, the current ceiling is not adequate to meet the constantly growing requirements and should immediately be increased to **4 carriers per LSA**.
8. As stated previously, since the demand for E band spectrum is dependent on a variety of factors, which are in a state of constant change, the carrier count suggested above will be subject to reviews, taking into account specific requirements and spectrum availability.

### **Requirements of TSPs with other than Access Service Authorisation and non-TSPs:**

9. Telecom operators holding access spectrum are using E-band to provide high-speed backhaul services. The assignment of E-band has enabled the

Indian telecom companies to rollout one of the fastest 5G network rollout in the world. Neither TRAI nor DoT have outlined any use case or instance where the TSPs holding non-access service authorization or non-TSPs require the E band at all.

10. Even the extant policy for assignment of E-band is limited to TSPs with Access Service Authorization. Hence, there is no need to assign E band spectrum to TSPs with other than Access Service Authorization and non-TSPs. It should be assigned only to TSPs with Access Service Authorisation.

**Therefore, we recommend the following:**

**(i) For E-band, the current ceiling of 2 carriers should be increased to 4 carriers per LSA immediately.**

**(ii) There is no need to assign E band spectrum to TSPs with other than Access Service Authorization and non-TSPs.**

11. The V band due to its shorter propagation characteristics can help connect the street furniture together, which are essential part of the 5G urban infrastructure. Street furniture would include electricity poles, bus shelters, and other public infrastructure located ubiquitously over short distances to help provide 5G coverage.

12. New services and applications require larger bandwidths to support the consumer demand for data-intensive applications. In addition, the splitting of frequency bands increases the costs and thus causes delay in manufacturing and bringing new devices to market because of regulatory uncertainty.

13. While we note that the WRC-19 amended the Radio Regulations to include an IMT identification in the 66-71 GHz frequency range, it is clearly stated that "This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations". It is important to avoid fragmenting 57-71 GHz. This would effectively create a hard-border splitting the 57-71 GHz with IEEE technologies in 57-66 GHz and 3GPP technologies in 66-71 GHz. The footnote in the Radio Regulations for 66-71 GHz addresses this point nicely.

14. That said, we support licence-exempt use in the 57-66 GHz since it provides greater market certainty, because it avoids the IMT identified bands in 66-71 GHz and provides a valuable guard band.

**Present demand:**

15. Present applications in other countries include high data rate short range communications and high-resolution field disturbance sensors. Other typical

uses include telemetry, tele command, alarms, data transmissions in general and other applications.

**Likely demand after five years:**

16. We believe that demand will increase and further expansion of communications and sensing applications are projected in this entire band of lower 9 GHz (57 - 66 GHz) under a license-exempt regulatory regime.

- (i) Quantum of Spectrum in both E band and V band that should be made available is as follows:
  - (a): E band: Entire 5+5 Ghz should be offered. However, this should be allocated on a shared basis to all service providers (TSPs and non-TSPs and others), based on a first come first serve principle through a transparent web portal
  - (b) V band: 5GHz (66-71Ghz) should be exclusively allocated to TSPs for backhaul purposes, while the lower V band (57-66GHz) should be delicensed for use by all
- (ii) Spectrum in both E & V bands is required by TSPs –both with Access Authorisation as well as those with non-Access authorisations as well as non-TSPs. However, access to the bands should be permitted as mentioned in response to (i) above

17. With the onset of 5G while the access networks support high data rates and higher capacities, the backhaul networks which are dependent on legacy microwave systems are getting choked. It is a reality that while all stakeholders are trying to deploy more and more fiber, getting fiber everywhere is a huge challenge both in terms of costs as well as deployment challenges.

18. This is where the E band and also the upper V band (66-71GHz) would become very useful. As is known popularly, they are known as 'Wireless Fiber'. The E band helps plug the backhaul connectivity gaps. It provides Fiber like connectivity across streets in dense urban areas where laying Fiber is next to impossible and also across large expanses of Rural areas in a cost effective manner and that too in much shorter timeframes than laying of fiber.

19. The V band due to its shorter propagation characteristics can help connect the street furniture together, which are essential part of the 5G urban infrastructure. Street furniture would include electricity poles, bus shelters, and other public infrastructure located ubiquitously over short distances to help provide 5G coverage.

20. New services and applications require larger bandwidths to support the consumer demand for data-intensive applications. In addition, the splitting of frequency bands increases the costs and thus causes delay in

manufacturing and bringing new devices to market because of regulatory uncertainty.

21. While we note that the WRC-19 amended the Radio Regulations to include an IMT identification in the 66-71 GHz frequency range, it is clearly stated that "This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations". It is important to avoid fragmenting 57-71 GHz. This would effectively create a hard-border splitting the 57-71 GHz with IEEE technologies in 57-66 GHz and 3GPP technologies in 66-71 GHz. The footnote in the Radio Regulations for 66-71 GHz addresses this point nicely.

22. That said, we support licence-exempt use in the 57-66 GHz since it provides greater market certainty, because it avoids the IMT identified bands in 66-71 GHz and provides a valuable guard band.

#### **Present demand:**

23. Present applications in other countries include high data rate short range communications and high-resolution field disturbance sensors. Other typical uses include telemetry, tele command, alarms, data transmissions in general and other applications.

#### **Likely demand after five years:**

24. We believe that demand will increase and further expansion of communications and sensing applications are projected in this entire band of lower 7 GHz (57 - 64 GHz) under a license-exempt regulatory regime.

**Q24. Whether spectrum in E-band and V-band should be assigned exclusively on an LSA-basis, or on P2P link basis? Response may be provided separately for (i) TSPs with Access Service License/ Authorization, (ii) TSPs other than Access Service License/ Authorization, and (iii) other users (non-TSP, for non-commercial/ captive/ isolated use) in the table given below with detailed justification.**

#### **RESPONSE**

1. Currently, E-band carriers are assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis. It is our suggestion that **spectrum in E-band should be assigned to TSPs with Access Service Authorisation exclusively on an LSA-basis.**

#### **Exclusive assignment to TSPs with Access Service Authorisation:**

2. As also submitted in the context of MWA/MWB carriers in the response to Q2 above, exclusive assignment considerably reduces the time required for deployment of network, enabling faster rollout of services. In fact, India



witnessing one of the fastest 5G rollouts in the world has been possible only because of the availability of E-band spectrum on an exclusive basis. Exclusive assignment helps WPC to avoid the huge logistical challenges involved in the same.

P2P assignment on the other hand would require carrying out extensive interference analysis among the specific links assigned to various TSPs. Hence, the spectrum in E band should be assigned to TSPs with Access Service Authorisation on an exclusive basis for the entire LSA. Hence, there is no need of assignment of E band to TSPs with other than Access Service Authorisation and non-TSPs:

3. With regard to the assignment of spectrum in E band to other entities/non-TSPs, please refer to the response to Q23 earlier. There is no need to assign E band spectrum to TSPs with other than Access Service Authorisation and non-TSPs, as there is no case for its use by such entities.

**4. Therefore, we recommend the following:**

**(i) The spectrum in E band should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis.**

**(ii) There is no need to assign E band spectrum to TSPs with other than Access Service Authorisation and non-TSPs.**

5. V band: 5GHz in the upper V band (66-71Ghz) should be exclusively allocated to TSPs for backhaul purposes. This should be allocated again on a P2P link by link basis. The lower V band (57-66GHz) which has different propagation characteristics, should be delicensed for use by all stakeholders (TSPs and non-TSPs). The lower 9 GHz (57-66 GHz) range should be designated for technology neutral, licence-exempt shared use.

**Q25. Do you agree that the issues relating to the assignment of E-band and V-band for space-based communication services and its coexistence with terrestrial networks may be taken up at a later date? If not, the concerns and measures to overcome such concerns may kindly be suggested with relevant details.**

**RESPONSE**

1. Please refer to the response to Q3 above in respect of co-existence of MWA/MWB carriers with space-based communication services.
2. As captured in TRAI's Consultation Paper on "Assignment of Spectrum for Space-based Communication Services" dated 06.04.2023, DoT has stated that, "*Coexistence of satellite networks or satellite-based communication within the country is ensured through various provisions in RR, ITU recommendations, WRC Resolutions, NFAP and License conditions for the satellite and MW services. ... Moreover, as per the current practice to assign*

*spectrum administratively, all frequency assignments/operations are issued on non-interference/non-protection basis."* **We concur with DoT in this regard.**

3. To mitigate interference, ITU prescribes varying measures in ITU-RR which have been duly captured in the said Consultation Paper dated 06.04.2023 as well.
- 4. In view of the above, there are sufficient mechanisms and processes that exist under the ITU framework<sup>2</sup> and global best practices that should be leveraged. We not foresee any concerns at this stage that may warrant any ex-ante measures.**
5. Utilization of the V-band under a license-exempt regime with the applications and power levels authorized in other countries do not present an interference or coexistence risk to space-based services.

**Q26. Whether it will be appropriate to continue with the Frequency Division Duplexing (FDD) based configuration as adopted for the provisional assignment of E-band carriers or Time Division Duplexing (TDD) based configuration should be adopted? Kindly justify your response.**

#### **RESPONSE**

1. It will be appropriate to **continue with the Frequency Division Duplexing (FDD) based configuration** as adopted for the provisional assignment of E-band carriers.

#### **Current equipment ecosystem – only supports FDD based usage:**

2. The ITU-R Recommendation F.2006 mentions both FDD and TDD as potential frequency arrangements for E-band. However, it is to be noted that E-band is primarily suited for high-capacity, low-latency mobile backhaul and fronthaul applications, where the FDD arrangement is considered mandatory.
3. Moreover, it is clear from the OEMs' extensive global experience that commercial equipment currently available for E-band primarily supports only FDD configuration, particularly when considering mobile transport services. Hence, FDD based configuration must be persisted with.

#### **Disadvantages of TDD configuration:**

4. While the TDD configuration is theoretically feasible, there are some disadvantages when compared to FDD. TDD configuration prevents a TSP from using adjacent channels, leading to reduced spectral efficiency – up to 50% reduction in net throughput. This, in turn, results in increased latency.

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<sup>2</sup> For detailed coordination of terrestrial stations operating in the bands shared with space service, visit <https://www.itu.int/en/ITU-R/terrestrial/fmd/Pages/coordination.aspx>.

**Therefore, we recommend that FDD based configuration, as adopted for the purpose of provisional assignment of E-band spectrum, should be continued with.**

5. Since E band is assigned in a paired manner, as per international best practices, with UL (in the 81-86GHz band, paired with a carrier in the 71-76GHz for DL, the FDD configuration of assignment may be persisted with as it provides for higher capacities and higher speeds.

**Q27. Whether Frequency Division Duplexing (FDD) or Time Division Duplexing (TDD) based configuration should be adopted for V-band carriers? In case you are of the opinion that FDD based configuration should be adopted, detailed submissions may be made with band plan, ecosystem availability, and international scenario.**

### **RESPONSE**

As mentioned in response to Q23, lower V band should be delicensed, while the upper V band could be allocated to operators along with Access Spectrum for backhaul purposes.

We would recommend in not imposing restrictions to choose between FDD or TDD for the V band as it will restrict applications. We would recommend that for licence-exempt use in the V-band; a technology neutral approach may be adopted with FDD or TDD operations dictated by the specific applications.

**Q28. What should be the carrier size for assignment of spectrum in E-band (71-76/81-86 GHz) and V-band (57-64 GHz)? Whether there is a need to prescribe a different carrier size based on different LSA categories or different user categories viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs other than Access Service License/ Authorization and (iii) other users (non-TSP, for non-commercial/ captive/ isolated use)? If yes, suggestions may be made with detailed justification.**

### **RESPONSE**

1. **The carrier size for assignment of spectrum in E-band (71-76/81-86 GHz) should be 250 MHz.** Even under the extant regime, the carrier size for E-band is 250 MHz, as per TRAI's 2014 Recommendations. There is no reason to deviate from the same.
2. In addition, there is **no need to prescribe a different carrier size based on different LSA categories or different user categories.** As also submitted in the context of MWA/MWB carriers in response to Q4 above, carrier size should be uniform across all LSAs and user categories. Different carrier sizes will only add to the complications in network planning as well as impact the cost efficiency of operations, especially for Pan-India operators; and there is no need to introduce additional complexity in the regulatory framework.

**Therefore, we recommend that the carrier size for E-band should be 250 MHz, as per prevailing practice and TRAI's Recommendations.**

3. BIF advocates delicensing of the lower V band (57-66 GHz). Choice of Carrier/channel bandwidth may be left to the service provider.
4. WiGig, alternatively known as 60 GHz Wi-Fi, refers to a set of 60 GHz wireless network protocols. It includes IEEE 802.11ad standard and also the IEEE 802.11ay standard. The WiGig specification allows devices to communicate at multi-gigabit speeds and access the 60 GHz frequency band with wide channels (of channel size of 2.16 GHz) to transmit data efficiently at multi-gigabit per second speeds.

**Q29. Whether there is a need to assign spectrum in E-band and V-band in such a way that if a TSP acquires more than one carrier, all the assigned carriers to a TSP are contiguous? Kindly justify your response.**

**RESPONSE**

1. Yes, there is a need to assign spectrum in E-band in such a way that if a TSP acquires more than one carrier, all the assigned carriers to a TSP are contiguous.

**Importance of Contiguity in Carriers:**

2. As stated in the response to Q28 above, the carrier size for E-band should be fixed at 250 MHz and 50 MHz, respectively. Further, in line with prevailing practice in the case of MWA/MWB carriers, TSPs must be allowed to utilise carrier bandwidths of different sizes within their allocated spectrum in E band as well, to enable them to enhance spectral and spatial efficiency. In order to achieve this, it is crucial to ensure that TSPs are assigned contiguous carriers for them to expand their carrier bandwidth without disruption in existing networks.
3. Recognising the importance of contiguity, the E-band carriers assigned at present have been assigned in such a way that the 2 carriers of a TSP are contiguous (the extant policy allows for the assignment of a maximum of 2 E-band carriers per TSP).

**Harmonisation in E-band:**

4. In the response to Q5 above, we have submitted that there is no flexibility in cases of currently assigned MWA/MWB carriers because of the restrictions posed by sub-bands in legacy microwave backhaul radios. However, this is not the case for E-band since backhaul radios in this band are new generation and they support entire frequency ranges and, hence, are compatible with harmonisation. Thus, harmonisation exercises may be carried out in E-band, if required, as is being done in the case of access spectrum for the past several years.

5. Accordingly, while E-band carriers will be reassigned as per the assignment methodology that will be finalised, there is no need to create a provision such that the TSP is given a choice to retain the same frequency carrier as long as such a TSP is able to acquire the carriers in the new regime. There is an alternative suggestion in this regard, which is discussed in the subsequent paras.

**Provision for future requirements:**

6. As submitted in the response to Q23 above, the current ceiling of 2 E-band carriers is not adequate to meet the rapidly rising demands of the industry, and it should be increased to 4 carriers per LSA.
7. In this regard, even though it is easier to carry out harmonisation in E-band as compared to MWA/MWB carriers, such exercises still lead to disruption in the network – however brief that might be. In order to ensure minimal network disruptions in the future, 4 contiguous carriers should be reserved for each TSP at this initial stage itself, which would help to avoid frequent harmonisation exercises.

**Therefore, we recommend the following:**

- (i) **Spectrum in E band should be assigned in such a way that if a TSP acquires more than one carrier in a band, all assigned carriers are contiguous and assigned frequency range(s) can be catered through a single equipment.**
  - (ii) **To avoid frequent harmonisation in the future, 4 contiguous carriers should be reserved for each TSP at this initial stage itself.**
8. **V band:** 5GHz in the upper V band (66-71Ghz) should be exclusively allocated to TSPs for backhaul purposes. This should be allocated again on a P2P link by link basis. The lower V band (57-66GHz) which has different propagation characteristics, should be delicensed for use by all stakeholders (TSPs and non-TSPs)

**Q30. Since E-band carriers will be reassigned as per the assignment methodology that will be finalized, to avoid any disruption of services to the consumers of the existing TSPs holding E-band carriers, whether there is a need to create a provision such that the TSP is given a choice to retain the same frequency carrier as long as such TSP is able to acquire the carriers in the new regime? Kindly justify your response.**

**RESPONSE**

Please refer to our response to Q29.

**Q31. Whether there is a need to prescribe the maximum number of carriers that can be held by a TSP in E-band and V-band? Kindly justify your response.**

**RESPONSE**

Please refer to our response to Q23 above. Spectrum in E band should only be assigned to TSPs with Access Service Authorisation. Further, **yes**, there is a **need to prescribe the maximum number of carriers that can be held by a TSP with Access Service Authorisation in E-band** to prevent any type of hoarding of spectrum by any single TSP.

Currently, there is a ceiling of 2 carriers per LSA in E-band. However, with the rapid increase in internet traffic, the current ceiling is not adequate to meet the constantly growing requirements, especially considering the level of network densification required in case of 5G. Hence, the ceiling for E-band should be increased to 4 carriers per LSA.

**Therefore, we recommend that, E-band, the current ceiling of 2 carriers should be increased to 4 carriers per LSA. There is no need to assign E band spectrum to TSPs with other than Access Service Authorization and non-TSPs.**

**V band:** 5GHz in the upper V band (66-71GHz) should be exclusively allocated to TSPs for backhaul purposes. This should be allocated again on a P2P link by link basis. The lower V band (57-66GHz) which has different propagation characteristics, should be delicensed for use by all stakeholders (TSPs and non-TSPs)

**Q32. In case it is decided to prescribe a ceiling on the number of carriers that a licensee can hold in E-band and V-band, (a) Whether different ceilings based on the service area category i.e., Metro/ Category 'A' Circles/ Category 'B' Circles/ Category 'C' Circles, need to be prescribed? (b) Considering a carrier of 250 MHz (paired) spectrum for E-band, and 50 MHz (unpaired) spectrum for V-band, what should be the ceiling in terms of the number of carriers per licensee for each service area category for (i) TSPs with access service License/ authorization holding IMT spectrum, (ii) TSPs with access service License/ authorization not holding IMT spectrum, and (iii) TSPs with other than Access Service License/ Authorization? (c) Any other relevant suggestion may be made with justification.**

### **RESPONSE**

1. Please refer to the response to Q32 above. **The current ceiling of 2 carriers in E-band should be increased to 4 carriers per LSA.**

**(a) Whether different ceilings based on the service area category i.e., Metro/Category 'A' Circles/Category 'B' Circles/Category 'C' Circles, need to be prescribed?**

**No, there is no need to prescribe different ceilings based on the service area category, i.e., Metro/Category 'A' Circles/Category 'B' Circles/Category 'C' Circles.**

2. The requirement of the E band spectrum is estimated to be similar in all categories of LSAs. Therefore, the ceiling on the number of E band carriers that can be held by a TSP should be uniform across all categories of LSAs.

**Therefore, we recommend that the ceiling for E-band should be the same in all categories of LSAs – at 4 carriers.**

- (b) Considering a carrier of 250 MHz (paired) spectrum for E-band what should be the ceiling in terms of the number of carriers per licensee for each service area category for
- (i) TSPs with access service License/authorization holding IMT spectrum,
  - (ii) TSPs with access service License/authorization not holding IMT spectrum, and
  - (iii) TSPs with other than Access Service License/Authorization?

1. Please refer to the response to point (a) above. The ceiling on the number of E band carriers should be kept **uniform across all categories of LSAs.**
2. Please also refer to our responses to Q23 and Q31 above. There is no need to assign E band spectrum to TSPs with other than Access Service Authorization and non-TSPs.
3. As far as the requirement of E band spectrum for TSPs with Access Service Authorisation but not holding IMT spectrum is concerned, neither DoT nor TRAI have outlined any specific use cases where such operators may require E band spectrum. In any case, even if there is some requirement, it may be minor and the same may be served through P2P link based assignment.
4. Thus, we submit that E band spectrum should be assigned to TSPs with Access Service Authorisation holding IMT spectrum on an exclusive basis for the entire LSA. On the other hand, for TSPs with Access Service Authorisation but not holding IMT spectrum, P2P link-based assignment approach should be used.
5. Accordingly, considering a carrier of 250 MHz (paired) spectrum for E-band, **the ceiling in terms of the number of carriers for each service area category should be 4 E-band carriers per TSP with Access Service Authorisation holding access spectrum.**
6. **Therefore, we recommend the following:**
  - (i) **E band spectrum should only be assigned to TSPs with Access Service Authorisation.**
  - (ii) **For TSPs with Access Service Authorisation holding IMT spectrum, it should be assigned on an exclusive basis for the entire LSA.**

**(iii) In case of any requirement by TSPs with Access Service Authorisation but not holding IMT spectrum, P2P link based assignment may be done.**

**(iv) For TSPs with Access Service Authorisation holding IMT spectrum, the ceiling for E-band should be 4 carriers per LSA.**

7. **V band:** 5GHz in the upper V band (66-71Ghz) should be exclusively allocated to TSPs for backhaul purposes. This should be allocated again on a P2P link by link basis. The lower V band (57-66GHz) which has different propagation characteristics, should be delicensed for use by all stakeholders (TSPs and non-TSPs)

**Q33. Which methodology should be used for assignment of spectrum in E-band and V-band? Response may be provided in the table given below:**

User category	Assignment methodology [Auction/ Administrative/ Any other (please specify)]	Justification
(iv) TSPs with Access Service License/ authorization	(v) TSPs with other than Access Service License/authorization	(vi) Other entities (nonTSP, for noncommercial/ captive/ isolated use)

#### **RESPONSE**

1. Please refer to our response to Q23 and Q24 above. The spectrum in E band should be assigned only to TSPs with Access Service Authorisation. Further, we do not support the auction methodology for E band. **E band should be assigned on an administrative basis only.**

#### **Administrative Assignment for TSPs with Access Service Authorisation:**

2. As also submitted in the context of MWA/MWB carriers in the responses to Q6, Q10 and Q12, conducting auctions for assignment of backhaul spectrum will give rise to multiple challenges. It would lead to competition issues, as the requirements of the operators with lower fiber footprint would be more acute as compared to the TSP with a high level of fiberization. Since there is no certainty in case of auction, the former would be at a more vulnerable position, giving a competitive advantage to the latter. This vulnerability may also be leveraged and an auction may witness attempts of destructive bidding or spectrum hoarding.
3. Auctions for E band spectrum would have a fallout on the massive investments in access spectrum as well, as monetization of access spectrum is dependent on the availability of adequate and robust backhaul. As already highlighted earlier, E band are critical for serving the backhaul requirements of new age access technologies. Thus, there has to be a level of certainty in that regard.
4. Further, backhaul spectrum is only a complementary infrastructure resource to the auctioned access spectrum. The backhaul spectrum does



not generate any revenue on its own and, hence, there is no rationale for auctioning the same. It would only add to the share of spectrum costs in the overall network costs, leaving fewer resources for the deployment, maintenance and upgradation of network infrastructure.

5. Further, the success of an auction is premised on the scarcity of supply rather than demand for the resource being auctioned, and this is not the case with E band spectrum. The world over, administrative assignment is the standard practice for assigning E band, and this aspect is acknowledged even in the TRAI consultation paper. TRAI, in its 2014 recommendations, too, had recommended in favour of administrative assignment of E band. Moreover, the 2G Judgment does not mandate auctions as the only assignment methodology for spectrum.

**6. Therefore, E band spectrum should be assigned administratively, and not through auction.**

**No need of assignment of E band spectrum to TSPs with other than Access Service Authorisation and non-TSPs:**

7. There is no need to assign E band spectrum to TSPs with other than Access Service Authorisation and non-TSPs, as there is no case for its use by such entities.

**In view of the foregoing, we recommend the following:**

- (i) **Spectrum in E band should be assigned on an administrative basis, and it should be assigned only to TSPs with Access Service Authorisation.**
- (ii) **At best, the Government may alternatively consider allocating the E band spectrum bundled with the access spectrum on a prospective basis, as the latter is already auctioned. This would assure continued availability of adequate backhaul spectrum.**

**Q34. In case you are of the opinion that certain user categories should be assigned spectrum in E-band and V-band for P2P links by any methodology other than auction, should some carriers be earmarked for such users? If yes, how many carriers should be earmarked for such users? Kindly justify your response.**

**RESPONSE**

Please refer to the responses to Q23, Q24 and Q33 above. **Spectrum in E-band should be assigned administratively, for the entire LSA on an exclusive basis, and only to TSPs holding Access Service Authorisation.**

Neither DoT nor TRAI have outlined any specific use cases where TSPs with other than Access Service Authorisation and non-TSPs may require E band spectrum.

Thus, there is no need to assign E band spectrum to TSPs with other than Access Service Authorisation and non-TSPs. Consequently, there is no need to earmark E band carriers for them.

Additionally, any kind of earmarking of E band carriers for TSPs with other than Access Service Authorisation and non-TSPs will lead to the creation of artificial scarcity and subsequently lead to the under-utilisation of spectrum.

**Therefore, we recommend that no E band carriers need to be earmarked for TSPs with other than Access Service Authorisation and non-TSPs.**

**Q35. In case it is decided to assign spectrum in E & V bands to the TSPs with Access Service License/ Authorization through auction and adopt P2P links assignment for TSPs other than Access Service License/ Authorization, who may be requiring to establish only a few links, what threshold limit in terms of number of links, may be prescribed, beyond which, the TSPs with other than Access Service License/ Authorization should be required to acquire spectrum in Eband and V-band bands through auction? Kindly justify your response.**

#### **RESPONSE**

We don't agree with this approach and do not recommend assigning spectrum through auction. Our detailed response with justification as regards assignment of spectrum in these bands has been provided in Q23 above.

Please refer to the responses to Q23, Q24 and Q33 above. E band spectrum should be assigned administratively, on an exclusive basis for the entire LSA; and it should be assigned only to TSPs holding Access Service Authorisation.

We re-iterate that there is no need to assign E band spectrum to TSPs with other than Access Service Authorisation and non-TSPs, as there is no case for its use by such entities.

**Therefore, we recommend that E band spectrum should be assigned only to TSPs with Access Service License/Authorisation; and it should be assigned administratively – on an exclusive basis for the entire LSA.**

**Q36. In case it is decided to assign spectrum in E & V bands to all the TSPs through auction, should such TSPs be permitted to lease their spectrum acquired through auction, on P2P link basis, to the TSPs and other entities for non-commercial/ captive/ isolated use, who may be requiring to establish only a few links? What could be the regulatory issues and potential misuse of such a regime? What measures could be put in place to mitigate the concerns? Kindly justify your response.**

#### **RESPONSE**

We don't agree with this approach. Our detailed response with justification as regards assignment of spectrum in these bands has been provided in Q23 above.

Please refer to the response to Q33 above. We recommend that **E band spectrum should be assigned on an administrative basis.**

**Q37. In case it is decided to assign spectrum in E-band (71-76/ 81-86 GHz) and V-band (57-64 GHz) on an exclusive basis, should the spectrum be assigned on an LSA basis, or Pan-India basis or for any other geographic area should be defined? Kindly justify your response.**

**RESPONSE**

For E-band, please refer to our response to Q24.

Spectrum in lower V band should be delicensed and the upper V band maybe exclusively assigned to TSPs on a link-by-link or on LSA basis.

**Q38. What should be the scope of services/ usages for spectrum in E-band (71-76/ 81-86 GHz) and V-band (57-64 GHz) assigned through auction or any other assignment methodology? Kindly justify your response.**

**RESPONSE**

1. Please refer to the response to Q33 above. **E band spectrum should be assigned on an administrative basis.**
2. The scope of services/usages for spectrum in E-band (71-76/81-86 GHz) should be restricted to **backhaul only.**

**Critical role of E-band in 5G rollout:**

3. India has witnessed one of the fastest 5G rollouts in the world mainly because of the seminal Cabinet reforms, path-breaking TRAI recommendations and, most critically, the decision of the DoT about the assignment of E-band spectrum for backhaul. It is a known fact that the rollout of 5G services is intrinsically linked to availability of robust backhaul through fiber and, in the absence of the same, the availability of E-band is essential. By making E-band available to operators, the DoT ensured the rapid rollout of 5G services.

**Competitive issues likely to arise if scope of E band usage is expanded beyond backhaul:**

4. The level of fiberisation in the country is very limited currently, and the situation is not about to change materially in the near future. Most TSPs are largely dependent on backhaul spectrum as they expand their fiber networks. In such a scenario, **any proposal to expand the usage of E band and to use them for IMT access services would disrupt the**

**telecom ecosystem and establish a near monopoly in the 5G space of the only TSP with a vast fiber footprint.** Had the Government considered such a view, India would not have witnessed one of the fastest rollouts of 5G services in the world.

### **Growing backhaul requirement cannot be met by traditional microwave backhaul alone:**

5. Over the last decade, the overall mobile data consumption and, consequently, the backhaul requirement per site, has grown manifold. The conventional microwave spectrum can barely keep up with the current bandwidth requirements for 4G, let alone 5G. Simply put, the amount of traffic surge that the access network is expected to witness will necessitate a multifold capacity augmentation at the backhaul level.
6. Therefore, although all TSPs are making every effort to fiberise their networks as rapidly as possible, using E band for backhaul remains the only practical choice for TSPs given the fast pace of network rollout.
7. Having said that, it is also true that the clubbing of E band for backhaul with access will deny backhaul rollout, creating a monopoly in 5G – the very reason that E-band was given. **Even internationally, as many as 86 countries have identified E-band for providing only backhaul services to cater to the increase in data demands for 5G.**

### **International developments – support backhaul only usage:**

8. The use of E band for access services along with backhaul is not even supported internationally:
  - E-band has been defined by 3GPP neither for access services nor for integrated access and backhaul (IAB). Consequently, the ecosystem for E-band-compatible radios/handsets/FWA, based on 3GPP technologies, does not even exist currently. In such a scenario, access connectivity to customers through E-band is completely out of the question.
  - The ultra-high frequency bands are unsuitable for access use cases due to multipath propagation's high losses. Due to Line-of-Sight propagation requirements, these frequency channels are more suitable for backhaul. Consequently, 3GPP has not specified a band plan for E-band. Allowing access to these bands will result in the waste of scarce resources that are crucially required for constructing the high capacity backhaul for 5G and mitigating the challenges associated with fiber deployment.
  - Also, in the previous WRC-19 cycle, spectrum access requirements from 2020 to 2027 were analysed, as were subranges spanning 24 GHz to 95 GHz. E band were excluded from identification for IMT. Even in the National Frequency Allocation Plan (NFAP) 2022, E band have not been defined for IMT in line with WRC resolutions.

### **Adequate mmWave spectrum already available:**

9. Moreover, there is sufficient spectrum already available in the mmWave spectrum bands, which have been auctioned for IMT thus far. Out of 62,700 MHz of spectrum which was put to auction, about 17,350 MHz of spectrum remains unsold. Also, DoT has identified additional mmWave bands in 37-43 GHz, i.e., about 4,000 MHz of spectrum per circle.
10. Currently, there is hardly any usage of mmWave bands, and TSPs have only deployed a handful of sites to comply with MRO requirements. In this context, there is no compelling reason to expand the scope of E band beyond backhaul. Other mmWave bands, which are already assigned, can very well be used for providing the same service.

**Therefore, we recommend the following:**

- (i) **E band should be used only for backhaul purposes. Deploying these critical bands for any other usage will destabilise the existing networks of TSPs, in addition to impacting the new rollouts.**
- (ii) **There is currently no case for use of E band for purposes other than backhaul, and we do not foresee such usage in the near future as well.**

**Q39. In case spectrum in E-band and V-band is decided to be assigned through auction, (a) Should the auction be conducted based on Simultaneous Multiple Rounds Ascending Auction (SMRA) method as adopted for IMT spectrum auction? Any other auction method may be suggested with detailed justification. (b) What quantum of spectrum in each band should be put to auction? Kindly justify your response.**

**RESPONSE**

We do not support the assignment of E band spectrum through auction for the reasons elaborated in the response to Q33 above. **E band spectrum should be assigned on an administrative basis.**

We do not agree with this approach of auctioning spectrum in either of these bands. Detailed justification for the same has been provided in response to Q23 and other Questions above.

We also believe that under a license-exempt regulatory framework; the scope of services/usages should be left to the discretion of the operator / user.

The entire lower V-band on a license- exempt basis should be available for all users.

**Q40. In case it is decided to assign spectrum in E & V bands through auction, (a) What should be the validity period? (b) Whether there is a need to create a provision for surrender of E & V band? If yes, what should be the lock-in period and other terms and conditions? Response may be given for each user category viz. (i) TSPs with Access Service License/**

**authorization, (ii) TSPs with other than Access Service License/ authorization, and (iii) Other entities (nonTSP, for non-commercial/ captive/ isolated use) with detailed justification.**

### **RESPONSE**

We do not agree with this approach of auctioning spectrum in either of these bands. Detailed justification for the same has been provided in response to Q23 and other questions as above.

For E-band, please refer to our response to Q36.

**Q41. In case it is decided to assign spectrum in E-band and V-band through any methodology other than auction, what should be the validity period, process for augmentation/ surrender of carriers, and other terms and conditions? Suggestions may be made with detailed justification.**

### **RESPONSE**

Please refer to the response to Q33 above. E band spectrum should be assigned on an administrative basis.

For this purpose, **the validity period, process for augmentation/surrender of carriers, and other terms and conditions, should be the same as those currently prescribed in the case of MWA carriers** (as also submitted in the context of MWA/MWB carriers in the response to Q18 above).

**Q42. What should be the eligibility conditions and associated conditions for assignment of spectrum in E-band (71-76/81-86 GHz) and V-band (57-64 GHz)? Response may be given for each user category viz. (i) TSPs with Access Service License/ authorization, (ii) TSPs with other than Access Service License/ authorization, and (iii) Other entities (non-TSP, for non-commercial/ captive/ isolated use) with detailed justification.**

### **RESPONSE**

Please refer to the response to Q23 and Q24, Q37 above. **E band spectrum should be assigned administratively; and it should be assigned only to TSPs having Access Service Authorisation**, as there is no case for use of E band by TSPs with other than Access Service Authorisation and non-TSPs.

Accordingly, **the eligibility condition for assignment of spectrum in E-band (71-76/81-86 GHz) should be that the assignee must hold a valid Access Service License or UL with Access Service Authorisation issued by DoT.**

Since we advocate no auction of spectrum in either of these bands, hence the bands should be available for assignment to all categories of service providers including those setting up Captive Networks (CNPNS) and Private Networks.

All users- OEMs, Start-ups should have access to the de-licensed V band to bring innovative technologies and solutions to the market.

**Q43. Whether there is a need to prescribe any roll out obligations for spectrum in E-band and V-band? Should the roll out obligations be linked to the number of carriers assigned to a TSP? Kindly justify your response.**

**RESPONSE**

**No**, there is **no need to prescribe any roll out obligations for spectrum in E-band** or V-band.

As also submitted in the context of MWA/MWB carriers in the response to Q20 above, TSPs holding access spectrum are already subject to rollout obligations specific to access services, which are designed to ensure that services reach end-users within defined timelines.

**Backhaul spectrum, on the other hand, is not directly linked to providing coverage at the site level.** It only plays a supporting role by facilitating high-capacity data links between various network elements. Hence, there is no logical reason for having separate roll out obligations for the E band spectrum.

**Therefore, we recommend that there should not be any (separate) roll out obligations in case of assignment of E band spectrum.**

**Q44. In case it is decided to prescribe roll out conditions, what should be the roll-out obligations associated with the assignment of spectrum in E-band and V-band? What provisions should be prescribed for nonfulfillment of the prescribed roll-out obligations? Response may kindly be given for each user category viz. (i) TSPs with Access Service License/ Authorization, (ii) TSPs with other than Access Service License/ Authorization, and (iii) Other entities (non-TSP, for noncommercial/ captive/ isolated use) with detailed justification.**

**RESPONSE**

Please refer to our response to Q43

**Q45. Whether it is feasible to allow low powered indoor consumer device to-consumer device usages on license-exempt basis in V-band (57-64 GHz), in parallel to use of the auction acquired spectrum by telecom service providers for establishment of terrestrial and/ or satellite based telecom networks? If yes, whether it should be permitted? Kindly justify your response.**

**RESPONSE**

As mentioned in response to Q23 above, due to specific characteristics of the lower V band (57-66GHz) on account of oxygen absorption, the signal only travels for very short distances (less than 100 mtrs or so). Hence it is not useful for point to point backhaul links for the TSPs. However, this part of the band is very useful for use for large Public Wi-fi networks and Short Range Consumer devices (also known as SRDs).

We are supportive in making the 57-66 GHz available under a licence-exempt regulatory regime without the application of light-licensing.

**V-band** is already allowed on license-exempt basis world-wide except for a few countries. If V-band continues to be restricted and licensed, innovative new technologies and products would be unable to see the light of the day and consumers in the Indian market would be deprived of the latest and innovative solutions. Additionally, the de-licensed band would make possible to replace wired cables with new technologies. Some examples are cited:

a) Contactless ports: USB3, Ethernet, DisplayPort

<https://www.molex.com/en-us/products/contactless-connectivity>

b) Radar/motion sensing: Google Soli, and in-vehicle children sensors,

c) home security

d) health care

<https://blog.research.google/2020/03/soli-radar-based-perception-and.html>

<https://www.fcc.gov/document/fcc-permits-hot-car-sensors-save-children>

<https://www.federalregister.gov/documents/2023/07/24/2023-15367/fcc-empowers-short-range-radars-in-the-60-ghz-band>

**Q46. In case it is decided to allow low powered indoor consumer device to-consumer device usages on license-exempt basis in V-band (57-64 GHz), (a) Whether it should be permitted in entire band or part of the band? Kindly provide detailed response including the frequency carriers, which should be considered for license exemption with justification. (b) Whether there is a need to define such indoor use? If yes, what should be the definition for such indoor use? (c) What technical parameters should be prescribed including EIRP limits? Suggestions may kindly be made with supporting justification and international scenario.**

### **RESPONSE**

Co-existence between unlicensed applications and licensed services in the same band is generally not possible. We therefore recommend band segmentation as mentioned in response to Q23 i.e. license exempt use cases in the lower part of the V band (57-66GHz) and licensed use cases in the upper part of the V band (66-71GHz) Since the lower part of the V band suffers from oxygen absorption characteristics, the signals travel over very short distances and hence chances of



interference are likely to be minimal. Hence there is no need to define any specific use cases-outdoor or indoor and hence no need to define any parameters like power, EIRP limits, etc.

- A) We are supportive in making the 57-66 GHz range available under a licence-exempt regulatory regime without the application of light-licensing.

The Full Lower V band (57-66GHz i.e. a total of 9 GHz) is required to support contactless ports, device to device data transfer, and motion sensing.

*Contactless ports*

The full band is required to support the very high data rates of USB3 and USB4.

*Device to device data transfer*

The full band is required to achieve very high data rates to transfer large volumes of data quickly

*Motion sensing*

Range resolution is proportional to the spectrum bandwidth; the full band is required to achieve precise sensing.

- b) We believe that there is no need to define "indoor-use" for licence-exempt deployments in the V-band. Indoor use restriction would greatly limit the types of innovative devices allowed on the market and restrict growth.

- c) 57-64GHz - ECC Recommendation 70-03, Annex 1: n1.

ETSI EN 305 550, 20 dBm avg EIRP and 13 dBm/MHz EIRP PSD

and 57-71GHz - ECC Recommendation 70-03 Annex 3: c1

**Q47. Any other suggestions relevant to assignment of spectrum in E-band (71-76/81-86 GHz) and V-band (57-64 GHz) may kindly be made with detailed justification.**

**RESPONSE**

A study conducted in 2021 by Prof. Rekha Jain, formerly of IIMA and TCOE and visiting faculty, ICRIER estimated the **Economic Value of Delicensed Spectrum in India as 12.7 Lakh Crores by 2025. This presumed that the 6GHz band and the lower V band would be delicensed in 2023.** This study report emphasises the importance of delicensing of the lower V band for socio-economic good and growth of GDP of the country. (Copy of the Report is available at <https://broadbandindiaforum.in/wp-content/uploads/2022/01/Rekha-Jain-PresentationWi-Fi-annual-Summit-Jan-20-2022- V1.pdf>)

DoT has through its reference letter to TRAI L-14035/10/2022-BWA has acknowledged that the device/chip ecosystem for supporting various technologies for data transfer between consumer devices in the V band has developed and license exempt basis would serve greater public interest and realizing significant socio-economic gains.

**Q48. In case it is decided for assignment of spectrum on administrative basis, what should be the spectrum charging mechanism for assignment of spectrum for i) E band ii) V band iii) MWA carriers and iv) MWB carriers separately for each of the following three categories: - a) TSPs with Access Service Authorization b) TSPs with other than Access Service Authorization c) Other entities (non-TSP, for non-commercial/ captive/ isolated use)**

### **RESPONSE**

1. Please refer to the responses to Q1, Q2, Q6, Q10, Q12, Q23, Q24, Q37 and Q33. The spectrum in E band should be assigned administratively, for the entire LSA on an exclusive basis; and it should be assigned only to TSPs with Access Service Authorisation. Further, MWA/MWB carriers should also be assigned administratively. For TSPs with Access Service Authorisation, MWA/MWB carriers should be assigned on an exclusive basis for the entire LSA; and for TSPs with other than Access Service Authorisation and non-TSPs, they should be assigned on P2P link basis.
2. **For TSPs with Access Service Authorisation**, the spectrum charging mechanism for assignment of spectrum for E band, MWA carriers and MWB carriers should be based on a **percentage of AGR, but with the current rates significantly rationalised**.

### **Exorbitant rates under the current regime:**

3. At present, for TSPs with Access Service Authorisation, MWA/MWB carriers and E-band are charged based on a percentage of AGR. However, the rates prescribed currently are quite high.
4. In fact, the data relating to SUC payouts reveals that only 25% of the total SUC payout of the industry relates to access spectrum. The remaining 75%, i.e., the lion's share, relates to SUC for the backhaul spectrum. This is an alarming pattern, considering that backhaul spectrum does not generate any revenue on its own and is merely a complementary resource for access spectrum.

### **Need for rationalising the current rates:**

5. Backhaul spectrum is only a supporting infrastructure for the access network and a tool to facilitate the TSPs to use the radio access network and spectrum efficiently. It facilitates the spread of mobile services in a more cost-effective manner. In addition, with the more efficient use of access spectrum, the TSPs' revenue – and consequently, the LF & SUC payout to the Government – automatically increase.
6. Hence, **it is in the interests of the Digital India mission as well as the Government exchequer that backhaul spectrum is made available as cheaply as possible**. By using this approach, a conducive environment to rapid network expansion, improved service quality, and cost-effective

utilisation of available resources can be created. This will benefit not only TSPs but also end-users, ultimately fostering the orderly growth of the telecommunications sector in India.

7. The benefits of rationalization of levies have already been recognised by both the Government and TRAI. As part of the SATCOM reforms, DoT removed multiple regulatory charges/ fees – NOCC charges for usage of Space Segment, MPVT Charge, and Annual Licence Fee for M2M/IoT devices for Captive VSAT Licences. Further, TRAI has recommended that fixed line broadband services should be exempted from LF, for at least a period of 5 years. All these efforts are aimed towards proliferating telecom services in the country; and rationalization of backhaul spectrum charges will only further that objective.
8. With ample backhaul spectrum being available, there is no reason why it cannot be offered at reasonable rates to TSPs, especially when it is in the larger public interest to do so as highlighted above.

#### **Significantly lower rates around the globe:**

9. TRAI has rightly captured the international examples of E-band pricing. It can be observed that among them, Saudi Arabia has the maximum pricing at about INR 7.1 lakhs per carrier per annum and Iraq holds the second position at about INR 3.2 lakhs per carrier per annum. Similar pricing structures can be observed in countries like Italy and Indonesia.
10. Meanwhile, with a rate of 0.15% of the AGR, the TSPs in India end up paying approximately INR 96 Cr. for a single E-band carrier. When compared to the prices in other jurisdictions, the prices paid by a TSP in India come out to be nearly 1400 and 3000 times of Saudi Arabia and Iraq, respectively. It is also important to highlight that the prices in India, being AGR-based, are dynamic and are bound to increase significantly as the quantum of AGR increases.
11. Thus, the pricing of backhaul spectrum in India is clearly exorbitant and does not match global trends in this regard. In order to promote enhanced connectivity and ease of doing business in the telecom sector, India must follow international best practices. Accordingly, **while the AGR-based spectrum charging mechanism may be continued with, the extant rates must be significantly rationalised.**

#### **Need to do away with the SUC escalation matrix:**

12. The current spectrum charging mechanism of MWA/MWB carriers is such that the rate escalates with the increase in number of carriers, with the rate for a single carrier being 0.15% and the cumulative rate ranging from 0.35% for 2 carriers to as high as 1.45% and 2.30% for 6 and 8 carriers, respectively. It may be appreciated that such high cumulatively incremental rates result in substantially increased costs – for a mere supporting architecture.

13. Hence, **we suggest that there should be no escalation matrix like the one prevailing currently. The rates should be kept uniform – irrespective of the number of carriers held by a TSP.**

**Backhaul spectrum & access spectrum very different – can't be compared for valuation:**

14. **The valuation of E band or MWA/MWB carriers should not be calculated based on the auction determined prices of spectrum bands for IMT/5G services or by using the spectral efficiency factor on the value of other bands.** It will be a totally flawed approach as a spectrum that is used for backhaul purposes cannot be equated with access spectrum.
15. As per Article 1.20 of the International Telecommunication Union's Radio Regulations ("**ITU-RR**"), 'fixed service' is defined as "A *radio communication service between specified fixed points*". In addition, as per Article 1.24 of the ITU-RR, 'mobile service' is defined as "A *radio communication service between mobile and land stations, or between mobile stations (CV)*".
16. E band and MWA/MWB carriers are used for backhaul/backbone applications between fixed points, which are categorised as 'fixed services' under the ITU-RR. On the other hand, access spectrum bands are used for IMT services (IMT, IMT-2000, IMT-2020, IMT-2030 – mainly services that are commonly known as 2G/3G/4G/5G/6G – as defined by 3GPP), which are categorised as 'mobile services' under the ITU-RR.
- 17. It is clear from the above that use cases and characteristics of the spectrum allocated for IMT/5G services are very different from those of the spectrum in E band or MWA/MWB. Hence, a comparison between the two would never yield any meaningful results; there is no rationale for linking them for the purposes of valuation.**

**Spectrum charging in case of P2P assignment:**

18. **Without prejudice to the above,** this AGR-based mechanism cannot be used in the cases of MWA/MWB carriers and E band that are assigned on a P2P link basis. **In the case of P2P assignment, the spectrum charging mechanism must be on a per link basis with nominal rates.**
19. Currently, MWA/MWB carriers are assigned on a P2P basis and the same carriers are utilised by various users across different locations within the same circle. This situation results in a double burden where TSPs are required to pay SUC based on a percentage of AGR for the entire circle, even when the same spectrum is being used by multiple users. In order to correct the situation, **the spectrum charging mechanism needs to be in line with the scope of assignment.** Thus, in case of P2P assignment, spectrum charges need to be levied on a per link basis, and the rates for the same must be nominal.

**Therefore, we recommend the following:**

- (i) MWA/MWB carriers and E band should be assigned administratively, for the entire LSA on an exclusive basis.**
- (ii) The spectrum charging mechanism should be based on a percentage of AGR, in line with the prevailing practice. However, the current rates must be significantly rationalised.**
- (iii) Further, the rates should be kept uniform, irrespective of the number of carriers held by a TSP. Without prejudice to the above, in the case of P2P assignment, the spectrum charging mechanism must be on a per link basis with nominal rates.**

**For V-band, please refer to our response to Q23**

**Q49. Should the auction determined prices of spectrum bands for IMT/5G services be used as the basis for valuation of: i) E band ii) V band iii) MWA carriers and iv) MWB carriers Please justify your responses.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

**Q50. Whether the value of spectrum in i) E band ii) V band iii) MWA carriers and iv) MWB carriers be derived by relating it to the value of other bands by using spectral efficiency factor? If yes, with which spectrum band, should this band be related and what efficiency factor or formula should be used? Please justify your suggestions.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

**Q51. Should the current method of levying spectrum fees/charges for E band, MWA carriers and MWB carriers on AGR basis as followed by DoT, serve as a basis for the purpose of valuation of i) E band ii) V band iii) MWA carriers and iv) MWB carriers If yes, please specify in detail what methodology is to be used in this regard.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

**Q52. Should the International administrative annual spectrum charges estimated based on specific channel case (250 MHZ/Year) of E-Band serve as a basis for the purpose of valuation of i) E band ii) V bands Please provide detailed justification. If the answer to the question is yes, should the administrative annual spectrum charges be normalized for cross**

**country differences? Please specify in detail the methodology to be used in this regard?**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

**Q53. Should international benchmarking by comparing the auction determined price in countries where auctions have been concluded in E and V bands, if any, be used for arriving at the value of i) E band ii) V band If yes, then what methodology can be followed in this regard? Please provide detailed information.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

**Q54. Whether any fixed administrative annual spectrum charges/ auction determined prices are available for other jurisdictions in case of MWA and MWB links? If yes, whether these charges/ prices can serve as a basis for the purpose of valuation of i) MWA ii) MWB carriers Please provide with detailed justification.**

**RESPONSE**

No comments

**Q55. Should the methodology, as adopted by the Authority in 2014 Recommendations for calculating spectrum charges for MWB links, be used as one of the valuation approach for MWB links? If yes, please provide detailed methodology for arriving at the valuation along with justification.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48

**Q56. Whether the valuation for spectrum in E-band (71-76/ 81-86 GHz) and V-band (57-64 GHz), MWA (13 GHz/ 15 GHz/ 18 GHz/ 21 GHz), MWB (6 GHz/ 7 GHz) be done separately for each LSA, or pan-India basis, or any other geographic area/ link basis? Kindly justify your response.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

**Q57. Apart from the approaches highlighted above which other valuation approaches should be adopted for the valuation of i) E band ii) V band iii) MWA carriers and iv) MWB carriers Please support your suggestions with detailed methodology, related assumptions and other relevant factors, etc.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

**Q58. Whether the value arrived at by using any single valuation approach for a particular spectrum band should be taken as the appropriate value of that band? If yes, please suggest which single approach/ method should be used. Please support your answer with detailed justification.**

**RESPONSE**

Our response to the method of evaluation of the said spectrum bands has been provided in our previous responses as given above.

**Q59. In case your response to the above question is negative, will it be appropriate to take the average valuation (simple mean) of the valuations obtained through the different approaches attempted for valuation of a particular spectrum band, or some other approach like taking weighted mean, median etc. should be followed? Please support your answer with detailed justification.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

**Q60. Should the reserve price be taken as 70% of the valuation of spectrum? If not, then what ratio should be adopted between the reserve price for the auction and the valuation of the spectrum in different spectrum bands and why? Please support your answer with detailed justification.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

**Q61. In case of auction-based assignment of i) E band ii) V band iii) MWA carriers and iv) MWB carriers what should the payment terms and associated conditions relating to: i. Upfront payment ii. Moratorium period iii. Total number of installments to recover deferred payments iv. Rate of interest in respect of deferred payment and prepayment Please support your answer with detailed justification.**

**RESPONSE**

For MWA, MWB and E-band, please refer to our response to Q48.

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