IAFI comments on Telecom Regulatory Authority of India Consultation Paper on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)

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Chapter 1

Introduction ITU-APT Foundation of India (IAFI)

We, the ITU-APT Foundation of India (IAFI), are a registered non-profit and non-political industry association registered under the Cooperative Societies Act of India. IAFI has been recognized by the International Telecommunication Union (ITU), the UN Organization for ICT issues, as an international/ regional Telecommunications organization and has been granted the sector Membership of the ITU Radio Communications Bureau (ITU-R), ITU Development Bureau (ITU-D) and ITU Telecommunication Standardization Bureau (ITU-T). IAFI is also an affiliate member of the APT. IAFI has been working for the last 20 years to encourage the involvement of professionals, corporate, public/private sector industries, R&D organizations, academic institutions, and other agencies in the activities of the ITU and APT.
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Chapter - 2

IAFI Comments on TRAI Consultation Paper on Consultation Paper on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)

Executive Summary

Background:

TRAI through this consultation paper solicited comments of stakeholders on the issues related to the Assignment of Spectrum in E-band, V-band, and Microwave Access (MWA)/ Microwave Backbone (MWB) Spectrum in Existing Frequency Bands.

Brief description of MWA/MWB/E/V-Band:

Microwave carriers are classified into two types - Microwave Access (MWA) Carriers and Microwave Backbone (MWB) Carriers.

MWA Carriers:

MWA carriers are generally in frequency bands of 10 GHz and beyond. These are assigned for short-haul systems, especially connecting Controller to BTS and used to carry traffic through relatively shorter distances. In India, currently, 13 GHz (12.75-13.25 GHz), 15 GHz (14.5-15.5 GHz), 18 GHz (17.7-19.7 GHz,) and 21 GHz (21.2-23.6 GHz) bands are used for the assignment of frequencies for MWA carriers.

Regarding existence of MWA carriers in the various frequency bands:- In 13 GHz band – 8 carriers of 28 MHz , in 15 GHz band – 10 carriers of 28 MHz, in 18 GHz band – 32 carriers of 27.5 MHz and in 21 GHz band – 40 carriers of 28 MHz are available.

As per the present assignment of spectrum, most of the MWA carriers of the 15 GHz band are used. On average, 50% of carriers in the 13 GHz band have been assigned to the Access Service Providers and 18 GHz and 21 GHz bands are largely unutilized.

Earlier TSPs were allotted to acquire maximum of 4 MWA carriers for Metro & Category-A Service Area and 3 MWA carriers for Category B and Category C Service Area. Considering the increased requirements of backhaul on account of 5G, through amendment dated 25.07.2022, DoT increased the limit to 8 carriers for Metro & Category A Service Area and 6 carriers for Category B and Category C Service Areas

MWB Carriers:

MWB carriers are assigned for relatively longer links, mainly from Core to Controller. In India, currently, 6 GHz and 7 GHz bands are used for the assignment of frequencies for MWB P2P links. 6 GHz means band 5925-6425 MHz (Tx/Rx separation – 252.04 MHz) and 7 GHz - 7125-7425 MHz (Tx/Rx separation – 161 MHz) and 7425-7725 MHz (Tx/Rx separation – 154 MHz) and both bands having 5 carriers each.

In MWB - in 6 GHz band – 8 carriers of 29.65 MHz and in 7 GHz band – 10 carriers of 28 MHz are available.

Microwave Backbone (MWB) carrier(s) are allotted on link-to-link basis subject to availability. Since MWB carriers are assigned on P2P basis, multiple links at different locations (latitude-longitude combinations) can be created, so no limitation on the number of carriers that can be assigned to a TSP on P2P basis.

DoT assigned only few carriers in MWB band. In 6 GHz band, out of 8 carriers, only spectrum assigned for 3 carriers and in 7 GHz (7125-7425 MHz), only one carrier only in 12 LSA has been assigned to Access Service Providers and in 7425-7725 MHz, 50% carriers are un-utilized.

V-Band (57-64 GHz):

The V-band (57-64 GHz) is also used for high-capacity terrestrial millimeter wave communications systems.

Availability of large 7 GHz bandwidth in 60 GHz band, also known as V-Band, makes it suitable for very high capacity (e.g., 100Mbps ~ 1Gbps Ethernet systems) and short hop (1–2 Kms) fixed wireless systems. The 60 GHz band has unique propagation characteristics with high oxygen gas absorption of 15dB/km – i.e., the radiation from a particular radio transmitter is quickly reduced. Though this limits the distances that 60 GHz links can cover, it makes these links highly immune to interference from other 60 GHz radios. There are 140 slots of 50 MHz in V-Band and two slots are reserved, so 138 slots are available for use. No spectrum has been assigned to any TSP in V-Band so far. This band needs to be delicensed for various low power applications.

E-Band (71-76 / 81-86 GHz):

E-band frequencies are point-to-point, line of sight, radio waves in the frequency range of 71-76 GHz paired with 81-86 GHz. The unique transmission properties of very high frequency millimeter-waves enable much simpler frequency coordination, interference mitigation and path planning compared to lower frequency bands. The antennas used in E-band frequencies are highly directional. There are 19 carriers of 250 MHz each in

E-Band. Both FDD and TDD configuration arrangements are possible in E-Band.

Only 2 TSPs have taken 500 MHz of spectrum (two carriers of 250 MHz paired) as an interim measure for backhaul use on a provisional basis.

IAFI Views:

There are 61 questions in the Consultation Paper, grouped in three parts.

(a) Questions from 1 to 22 – are covering spectrum aspects of MWA/MWB.
(b) Questions from 23 to 48 – are covering spectrum aspects of E and V – Bands
(c) Questions from 49 to 61 – are covering pricing financial aspect of spectrum of MWA/MWB and E/V- bands

Consultation paper was examined in detail and the IAFI views/comments on the various issues are as follows.

Chapter - 3

IAFI Comments on TRAI Consultation Paper on Consultation Paper on Assignment of Spectrum in E&V Bands, and Spectrum for Microwave Access (MWA) & Microwave Backbone (MWB)

Q-1. 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 demandand likely demand after five years may kindly be provided as per the proforma given below with detailed justification:

- **Present demand**

Band	Quantum of spectrum required (per entity per LSA)		
	TSPs with AccessService 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)			

- **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)			

IAFI 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[1] to ~42 EB during QE Mar 23[2]**. It is estimated to grow to 58 EB per month by 2028[3]. 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[4], 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.

[1] PIReport27062018_0.pdf (trai.gov.in)
[2] QPIR_21082023_0.pdf (trai.gov.in)
[3] Ericsson Mobility Report June 2023
[4] Initial MoT Eng AR 22-23.pmd (dot.gov.in)

In summary, we recommend that the following ceiling should be considered:

Microwave carriers	Present demand
MWA (13/15/18/21 GHz)	**8 MWA** carriers in each of Metros & Category A LSAs **6 MWA** carriers in each of the Category B & C LSAs
MWB (6/7 GHz)	**2 MWB** carriers per each LSA

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:

(i) 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.

(ii) 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.

(iii) 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.

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.

Q-2. 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 (non- TSP, 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)			

IAFI 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.

Therefore, we recommend the following:

(i) <u>The spectrum for MWA and MWB should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis.</u

(ii) <u>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.</u

Q-3. Keeping in view the provisions of ITU's Radio Regulations on co-existence 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.

IAFI response:
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.**

To mitigate interference, ITU prescribes varying measures in ITU-Radio Regulations and related reports and recommendations, which have been duly captured in the said Consultation Paper dated 06.04.2023 as well.

In view of the above, there are sufficient mechanisms and processes that exist under the ITU framework[5] and global best practices that should be leveraged. We do not foresee any concerns at this stage that may warrant any ex-ante measures.

Q-4. 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

[5] https://www.itu.int/en/ITU-R/terrestrial/fmd/Pages/coordination.aspx.

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 (non-TSP, for non-commercial/ captive/ isolated use)**
MWB (6/7 GHz)			
MWA (13/15/18/21 GHz)			

IAFI response:

IAFI is of the view that existing carrier size should continue, as all the operators and currently deployed radios equipment are already compatible with it. There is also a possibility of some operators adopting advance technologies such as IMT (FWA) or IEEE or other technologies and their requirement may change to a carrier size as defined in the relevant SDO.

Microwave bands	Carrier size (in MHz) for -		
	TSPs with Access ServiceLicense/ Authorization	**TSPs with other than Access Service License/ Authorization**	**other users (non-TSP, for non-commercial/ captive/ isolated use)**
MWB (6/7 GHz)	The relevant ITU regulations, reports and recommendations should be strictly followed. (e.g. Rec. ITU-R F.746 which recommend for MWA/MWB – Carrier size is recommended as 28 MHz (with flexibility to use various sizes 7/14/28/56/84/112 MHz within allocated carriers)		
MWA (13/15/18/21 GHz)	The relevant ITU Radio Regulations, Recommendations and Reports should be strictly followed.		

Q-5. 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 madewith detailed justification?

IAFI 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.

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Q-6. 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 providea detailed response with justification.

IAFI 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, much better than an auction will, and thus MWA/MWB carriers should be assigned on an administrative basis only.

Our detailed submissions are as follows:

Criticality for service rollout: 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.

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: 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").

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.

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.

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.

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.

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.

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.

As per the latest TRAI data, the huge customer base of the legacy operators would be adversely affected in case of any service disruption.

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.

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.

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.

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.

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.

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.

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.

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.
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.

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.

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.

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.

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.

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...*"
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.
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.

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.

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.
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.

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.

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 foregoing, 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.

By adhering to these principles, a fair and balanced approach that benefits all stakeholders in the industry can be ensured.

Q-7. 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 canhold,

(a) Whether a separate ceiling for each band (13 GHz/ 15 GHz/ 18GHz/ 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 ServiceLicense/ Authorization?

(d) Any other relevant suggestion may be made with justification.

Kindly justify your response.

IAFI response:

No, there is **no need to review the existing ceiling on the number of MWA carriers** that can be held by a licensee.

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

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.

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?

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.

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.

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.

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?

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.

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?

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.

(i) **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**

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.**

Q-8. 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.

IAFI 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 at least 2 MWB carriers initially to meet their backhaul requirements – hence at least 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 at least2 carriers per LSA in all categories of LSAs.

Q-9. 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 28MHz per licensee in each case i.e., band-wise ceiling and over all 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.

IAFI 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.

(d) **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.

Q-10. 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
TSPs with Access Service License/ Authorization		
TSPs with other than Access Service License / authorization		
Other entities (non- TSP, for non- commercial/ captive/ isolated use)		

IAFI response:

Please refer to our response to Q6.

Q-11. 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.

IAFI response:

Please refer to the responses to Q1, Q2, Q6 and Q10. **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.

Q-12. 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 (non-TSP, for non-commercial/ captive/ isolated use)		

IAFI response:

Please refer to our response to Q6.

Q-13. In case you are of the opinion that certain user categories should be assigned MWB carrier by any methodology other than auction, shouldsome MWB carriers be earmarked for such users? If yes, how many carriers should be earmarked for such users? Kindly justify your response.

IAFI response:

Please refer to our response to Q11.

Q-14. 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 TSPsother 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 berequired to acquire MWA/ MWB carriers through auction? Kindly justify your response.

IAFI response:

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.

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.

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:

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:

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.

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.

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.

Therefore, we recommend that MWA/MWB carriers must be assigned to all user categories through a uniform methodology ,i.e., administrative assignment.

Q-15. 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.

IAFI response:
We does 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**.

Q-16. In case MWA/MWB carriers are decided to be assigned throughauction,

(a) Should the auction be conducted based on Simultaneous Multiple Rounds Ascending Auction (SMRA) method as adoptedfor 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.

IAFI response:
Please refer to our response to Q15.

Q-17. 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 (non- TSP, for non-commercial/ captive/ isolated use) with detailed justification.

IAFI response:
Please refer to our response to Q15.

Q-18. 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.

IAFI 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.

Q-19. 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 (non- TSP, for non-commercial/ captive/ isolated use) with detailed justification.

IAFI response:

Please refer to our response to Q2.

Q-20. 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.

IAFI 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 recommends that there should not be any (separate) roll out obligations towards MWA/MWB carrier assignment for TSPs holding access spectrum.

Q-21. 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 (non- TSP, for non-commercial/ captive/ isolated use) with detailed justification.

IAFI response:
Please refer to our response to Q 20.

Q-22. 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.

IAFI response:
Please refer to our response to Q 20

Q-23. What quantum of spectrum in E-band (71-76 / 81-86 GHz) and V- band (57-64 GHz) is required to meet the demand of TSPs with Access Service License/ Authorization? Whether spectrum in E-band and V- band 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 non-commercial/ 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 non-commercial/ captive/ isolated use)**
E-band (71-76/81-86 GHz)			
V-band (57-64 GHz)			

IAFI response:

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.

<u>Importance of E/V bands:</u>

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/V bands. 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 V - bands:

IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.
IAFI does not support band fragmentation through different licensing mechanisms of the Mobile service, therefore for 57-71 GHz, we believe that a license-exempt approach is appropriate. 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.

Quantification of demand for E - bands:

As in the case of MWA/MWB carriers, the exact quantification of demand for Ebands 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.

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.

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 at least **4 carriers per LSA**.

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:

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.

Even the extant policy for assignment of E-band is limited to TSPs with Access Service Authorization. Hence, any need to assign E band spectrum to TSPs with other than Access Service Authorization and non-TSPs should strictly be on case to case basis and only after meeting current and future needs of 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) Any assignment of E band spectrum to TSPs with other than Access Service Authorization and non-TSPs should strictly be on case to case basis and only after taking into account the current and future needs of TSPs with Access Service Authorisation.

Q-24. 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.

Microwave bands	Spectrum should be assigned for the entire LSA on exclusive basis, or on P2P link basis for -		
	TSPs with Access Service License/ Authorization	**TSPs with otherthan Access Service License/ Authorization**	**other entities (non-TSP, for non-commercial/ captive/ isolated use)**
E-band (71-76/81-86 GHz)			
V-band (57-64 GHz)			

IAFI response:

IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

Currently, E-band carriers are assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis, while there is no policy for assignment of V-band carriers. 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:

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 bands should be assigned to TSPs with Access Service Authorisation on an exclusive

basis for the entire LSA.

With regard to the assignment of spectrum in E bands to other entities/non-TSPs, please refer to the response to Q23 earlier.

Therefore, we recommend the following:

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

(ii) Any assignment of E band spectrum to TSPs with other than Access Service Authorization and non-TSPs should strictly be on case to case basis and only after taking into account the current and future needs of TSPs with Access Service Authorisation.

Q-25. 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, theconcerns and measures to overcome such concerns may kindly be suggested with relevant details.

IAFI response:

Please refer to the response to Q3 above in respect of co-existence of MWA/MWB carriers with space-based communication services.

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.**

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.

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

In view of the above, there are sufficient mechanisms and processes that exist under the ITU framework[6] and global best practices that should be leveraged. We not foresee any concerns at this stage that may warrant any ex-ante measures.

Q-26. 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.

IAFI response:

IAFI is of the view that it will be appropriate to continue E-Band configuration with FDD only, considering reduced interference, as separate uplink and downlink frequencies to minimize interference, enhancing overall system performance, full-duplex communication allowing simultaneous transmission and reception enable high-speed, low-latency applications and increased uplink capacity, as dedicated uplink frequencies guarantee a consistent and reliable uplink for critical applications. The main reasons for this assertion are elaborated below:

Current equipment ecosystem – only supports FDD based usage:

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.

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:

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.

In addition to the above, FDD is a mature and well-established technology, ensuring a wide range of compatible equipment and established best practices.

[6] 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.

Q-27. 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 configurationshould be adopted, detailed submissions may be made with band plan, ecosystem availability, and international scenario.

IAFI response:

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

IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

Q-28. 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 needto 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 detailedjustification.

IAFI response:

The carrier size for assignment of spectrum in E-band (71-76/81-86 GHz) should be 250 MHz or higher

Even under the extant regime, the carrier size for E-band is 250 MHz, as per TRAI's 2014 Recommendations.

IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

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.

As regards the V Band, IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

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

Similarly, we recommend that carrier sizes in the V-band should be dictated by the applications utilized under a license-exempt regime on a technology neutral basis and do not need to be mandated in regulation

Q-29. 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.

IAFI response:

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.

For V Band, IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

Importance of Contiguity in Carriers:

As stated in the response to Q28 above, the carrier size for E-band should be fixed at 250 MHz. 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.

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:

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.

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:

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.

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 bands 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.

(iii) For V Band, IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

Q-30. Since E-band carriers will be reassigned as per the assignment methodology that will be finalized, to avoid any disruption of servicesto 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.

IAFI response:

Please refer to our response to Q29.

Q-31. 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.
IAFI response:

Please refer to our response to Q23 above. Spectrum in E bands 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.

Regarding V-Band – IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

Therefore, we recommend the following:

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

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

(iii) For V Band, IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

Q-32. 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.

IAFI response

IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

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.

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 least 4 carriers per LSA, respectively.

(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

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**.

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.

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.

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.

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**.

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

(iv) For V Band, IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

(v)

Q-33. 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
(i) TSPs with Access Service License/ authorization		
(ii) TSPs with other than Access Service License/authorization		
(iii) Other entities (non- TSP, for non- commercial/ captive/ isolated use)		

IAFI response:

Please refer to our response to Q23 and Q24 above. The spectrum in E bands should be assigned only to TSPs with Access Service Authorization through an administrative assignment basis

Further, we do not support the auction methodology for E/V bands. **E bands should be assigned on an administrative basis only**.
Regarding V-Band: IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

Administrative Assignment for TSPs with Access Service Authorisation:

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.

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 bands are critical for serving the backhaul requirements of new age access technologies. Thus, there has to be a level of certainty in that regard.

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.

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 bands, 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/ bands. Moreover, the 2G Judgment does not mandate auctions as the only assignment methodology for spectrum.

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

Any assignment of E band spectrum to TSPs with other than Access Service Authorization and non-TSPs should strictly be on case to case basis and only after taking into account the current and future needs of TSPs with Access Service Authorisation.

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:

(a) Spectrum in E bands should be assigned on an administrative basis,.

(b) Any assignment of E band spectrum to TSPs with other than Access Service Authorization and non-TSPs should strictly be on case to case basis and only after taking into account the current and future needs of TSPs with Access Service Authorisation.

(c)

(d) V-Band: IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages

the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

Q-34. 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 earmarkedfor such users? If yes, how many carriers should be earmarked for such users? Kindly justify your response.

IAFI response:

Please refer to the responses to Q23, Q24, Q37 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.

(i) Therefore, we recommend that no E band carriers need to be earmarked for TSPs with other than Access Service Authorisation and non-TSPs and any assignment of E band spectrum to TSPs with other than Access Service Authorization and non-TSPs should strictly be on case to case basis and only after taking into account the current and future needs of TSPs with Access Service Authorisation.

Regarding V-Band: IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

Q-35. 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 fewlinks, what threshold limit in terms of number of links, may beprescribed, beyond which, the TSPs with other than Access Service License/ Authorization should be required to acquire spectrum in E- band and V-band bands through auction? Kindly justify your response.

IAFI response:

Please refer to the responses to Q23, Q24 and Q33 above. E/V 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.

Regarding V-Band - IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

Q-36. 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 andother entities for non-commercial/ captive/ isolated use, who may berequiring 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.

IAFI response:

Please refer to the response to Q33 above. We recommend that **E band spectrum should be assigned on an administrative basis.**
Regarding V-Band, IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the

unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

Q-37. 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.

IAFI response:

Regarding E-Band - Please refer to our response to Q24.

Regarding V-Band spectrum: IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

Q-38. 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.

IAFI response:

Please refer to the response to Q33 above. **E band spectrum should be assigned on an administrative basis.**
Regarding V-Band spectrum: IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

The scope of services/usages for spectrum in E-band (71-76/81-86 GHz) should be restricted to **backhaul only**.

<u>Critical role of E-band in 5G rollout:</u>

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 bands usage is expanded beyond backhaul:

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 bands 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:

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.

Therefore, although all TSPs are making every effort to fiberise their networks as rapidly as possible, using E bands for backhaul remains the only practical choice for TSPs given the fast pace of network rollout.

Having said that, it is also true that the clubbing of E/V bands 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:

The use of E bands 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/V bands were excluded from identification for IMT. Even in the National Frequency Allocation Plan (NFAP) 2022, E bands have not been defined for IMT in line with WRC resolutions.

Adequate mmWave spectrum already available:

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.

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 bands 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 bands 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 bands for purposes other than backhaul, and we do not foresee such usage in the near future as well.

(iii) Regarding V-Band spectrum: IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

Q-39. 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.

IAFI 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**.

Regarding V-Band spectrum: IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

Q-40. 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 (non- TSP, for non-commercial/ captive/ isolated use) with detailed justification.

IAFI response:

Please refer to our response to Q36.

Q-41. 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.
IAFI response:

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

IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

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).

Q-42. 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.

IAFI 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 bands 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**.

Regarding V-Band: IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing

Q-43. 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 yourresponse.

IAFI response:

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

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

Regarding roll-out obligation for V-Band, **Regarding V-Band: IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing**

IAFI proposed that V-Band spectrum should be license-exempt, so in such case, rollout obligations do not arise.

Q-44. 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 non-fulfilment of the prescribed roll-out obligations? Response may kindlybe 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.

IAFI response:

Please refer to our response to Q43.

Q-45. Whether it is feasible to allow low powered indoor consumer device-to-consumer device usages on license-exempt basis in V-band (57-64GHz), 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.

IAFI response:

IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need 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.

Q-46. In case it is decided to allow low powered indoor consumer device-to-consumer device usages on license-exempt basis in V-band (57-64GHz),

(a) Whether it should be permitted in entire band or part of theband? Kindly provide detailed response including the frequency carriers, which should be considered for license exemption withjustification.

(b) Whether there is a need to define such indoor use? If yes, whatshould 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.

IAFI response:

Please refer to our response to Q45.

Q-47. 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.

IAFI response:

Regarding suggestions relevant to the assignment of spectrum in E-band (71-76/81-86 GHz) and V-band (57-64 GHz), suggestions of the IAFI are as follows.

(a) Use of E-band for backhaul applications:

E-band is well-suited for backhaul applications due to its high capacity, as it may help to address the growing demand for backhaul capacity as networks evolve to 5G and beyond.

(b) Improved collaboration between industry and government:

Collaboration between industry and government would help to ensure that the spectrum in these bands is used in a way that benefits consumers and the economy.

Q-48. 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)

IAFI response:
Please refer to the responses to Q1, Q2, Q6, Q10, Q12, Q23, Q24, Q37 and Q33. The spectrum in E bands 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.

IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

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:

At present, for TSPs with Access Service Authorisation, MWA/MWB carriers and E-band are charged based on a percentage of AGR, while there is no policy for assignment of V-band. However, the rates prescribed currently are quite high.
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:

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.

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.
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.
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:

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.
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.

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:
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.

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:

The valuation of Ebands 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.

As per Article 1.20 of the International Telecommunication Union's Radio Regulations (**"ITU-RR"**), 'fixed service' is defined as "*A radiocommunication service between specified fixed points*". In addition, as per Article 1.24 of the ITU-RR, 'mobile service' is defined as "*A radiocommunication service between mobile and land stations, or between mobile stations (CV)*".

E bands 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.

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 Ebands 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.

<u>Spectrum charging in case of P2P assignment:</u>
Without prejudice to the above, this AGR-based mechanism cannot be used in the cases of MWA/MWB carriers and E bands 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.**

Currently, 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.

<u>Therefore, we recommend the following:</u>

(i) <u>MWA/MWB carriers and E bands should be assigned administratively, for the entire LSA on an exclusive basis. Thee spectrum charging mechanism should be based on a percentage of AGR, in line with the prevailing practice.</u>

(ii) <u>However, the current rates must be significantly rationalised. Further, the rates should be kept uniform, irrespective of the number of carriers held by a TSP.</u>

<u>(III) 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.</u>

(iii) IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range and also encourages the unlicensed use of the 64-71 GHz frequency range, without the need of light licensing.

Q-49. 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.

&

Q-50. 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.

&

Q-51. 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.

&

Q-52. 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 isyes, should the administrative annual spectrum charges be normalized for cross country differences? Please specify in detail the methodology to be used in this regard?

&

Q-53. Should international benchmarking by co

mparing the auction determined price in countries where auctions have been concluded inE 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.

&

Q-54. Whether any fixed administrative annual spectrum charges/ auction determined prices are available for other jurisdictions in case of MWAand MWB links? If yes, whether these charges/ prices can serve as abasis for the purpose of valuation of

- **i) MWA**
- **ii) MWB carriers**

Please provide with detailed justification.

&

Q-55. Should the methodology, as adopted by the Authority in 2014 Recommendations for calculating spectrum charges for MWB links, beused as one of the valuation approach for MWB links? If yes, please provide detailed methodology for arriving at the valuation along withjustification.
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Q-56. 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.

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Q-57. 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.

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Q-58. 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.

&

Q-59. 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 liketaking weighted mean, median etc. should be followed? Please support your answer with detailed justification.

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Q-60. 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.

&

Q-61. 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 pre-payment.Please support your answer with detailed justification.

IAFI Response:

Please refer to our response to Q48

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