(Consultation Paper No. 05/2025)
ITU APT Foundation of India (IAFI)
comments on TRAI Consultation Paper regarding

Assignment of the Microwave Spectrum in
6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz Bands,
E (71-86 GHz) -Band, and V (57-71 GHz) -Band

CONTENTS

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Chapter - 1

Executive Summary of our comments:

In India, the primary frequency bands currently used for microwave backhaul include:

- **6 GHz Band (Lower)**: 5.925-6.425 GHz.
- **7 GHz Band**: 7.125-7.725 GHz.
- **13 GHz Band**: 12.75-13.25 GHz.
- **15 GHz Band**: 14.5-15.5 GHz.
- **18 GHz Band**: 17.7-19.7 GHz.
- **21 GHz Band**: 21.2-23.6 GHz.

These bands are categorized into Microwave Access (MWA) and Microwave Backbone (MWB) bands. MWA bands (13 GHz, 15 GHz, 18 GHz, and 21 GHz) are used for shorter distance traffic, while MWB bands (6 GHz and 7 GHz) are used for longer distance traffic. Our comments on these bands are summarised below:

1. Lower 6GHz, Upper 6GHz, 7 GHz and 15 GHz bands are being refarmed for meeting the last few meters connectivity by Wi-Fi and increased access requirements for 5G and 6G by the Mobile operators respectively. **Therefore we do not recommend further assignments for backhaul in these bands**
2. In the recent years, **there is a growing interest in higher frequency bands such as the V band (57-64/66 GHz) and E-band (71-76 GHz)** for high-capacity backhaul. These higher bands can support higher data rates and are suitable for short-hop, high-capacity backhauling. **These bands should be encouraged for backhaul, particularly the V band should be immediately delicensed to increase its use for FWA as well as backhaul by every user**.
3. As of October 2024, approximately 35% of mobile towers in India have been connected by optical fiber and DoT has been actively working to increase this number to facilitate the rollout of 5G technology. DoT aims to increase the fiberization of mobile towers from 35% to 70% this year. **This will help in reduction of the demand for backhaul spectrum.**
4. According to the recent NFAP revision discussions by the WPC, **the lower 6 GHz band (5925-6425 MHz) has been designated for assignment to unlicensed Wi-Fi service and should not be assigned for backhaul.**
5. **7 GHz band (7.125-7.725 GHz) and 15 GHz Band (14.5-15.5 GHz) are being considered for 6G under WRC agenda item 1.7 and should not be further assigned for backhaul.**
6. The 13 GHz band (12.75-13.25 GHz), 18 GHz Band (17.7-19.7 GHz) and 21 GHz Band: (21.2-23.6 GHz) will continue to be used for commercial backhaul services. Noting that these bands are shared with satellite services, **it is critical to ensure that the ITU-R Recommendations on sharing of these bands between the terrestrial and satellite services are fully implemented.**

All our detailed comments in chapter 4 may be seen in the light of above overarching comments

Chapter 2

Background of the TRAI consultation

The Telecom Regulatory Authority of India (TRAI) released a Consultation Paper on May 28, 2025, inviting written comments from the stakeholders on the "Assignment of the Microwave Spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz Bands, E-Band, and V-Band", by June 25, 2025. This new consultation paper follows an earlier consultation paper issued by TRAI on September 27, 2023, concerning spectrum assignment in E&V Bands and Microwave Access (MWA) and Microwave Backbone (MWB) bands. Recommendations regarding the previous paper were put on hold by TRAI due to the enactment of the new Telecommunication Act, 2023 by Indian Parliament. Consequently and TRAI referred the matter back to the DoT. On February 20, 2025, DoT again requested to TRAI, to provide recommendation on new consultation paper and especially seek recommendations on:

- Spectrum charges and related terms for assigning spectrum in the 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands for backhaul in commercial telecom services.
- A review of the 7 GHz and 15 GHz bands, considering their potential use for Access using IMT after WRC-27.
- Demand assessment and scope of service/ usage for (i) 57-64/ 66 GHz (V-band) and (ii) 71-76 GHz/ 81-86 GHz (E-band).
- The quantum and specific bands to be earmarked for last-mile connectivity in both commercial and non-commercial/captive telecom services.

In India, prior to the introduction of mobile networks, only the spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands were used for providing the microwave backhaul. These bands are often referred to as “the traditional microwave backhaul bands”. After introduction of the mobile services, DoT has classified the traditional microwave backhaul bands into two categories viz. Microwave Access (MWA) bands and Microwave Backbone (MWB) bands. A brief description of MWA bands and MWB bands is given below.

MWA Bands:

In India, 13 GHz band (12.75-13.25 GHz), 15 GHz band (14.5-15.5 GHz), 18 GHz band (17.7-19.7 GHz,) and 21 GHz band (21.2 - 23.6 GHz) are collectively referred to as “MWA bands”. The spectrum in MWA bands is used to carry traffic over relatively shorter distances.

MWB Bands:

Lower 6 GHz (5.925-6.425 GHz) and 7 GHz (7.125-7.725 GHz) bands are collectively referred to as “MWB bands”. The spectrum in MWB bands is used to carry traffic over relatively longer distances.

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 this 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 and rain attenuation, so 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.

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.

<u>DoT vide letter 20-02-2025, further intimated TRAI that :-</u>

a. Regarding 6 GHz Band- While the upper 6 GHz band (not part of this reference) i.e., 6.425-7.125 GHz has been identified for IMT in other parts of the world, the lower 6 GHz band i.e. 5.925 to 6.425 GHz continues to be used as backhaul.
b. DoT also informed that it has decided to de-license the lower 6 GHz band (5925-6425 MHz) for low power applications (Wi-Fi). Relevant rules are under consideration in the Department for notification.
c. Regarding 7/ 13/ 15/ 18/ 21 GHz Bands - The spectrum band 7.125 to 8.400 GHz (7 GHz) & 14.8-15.35 GHz (15 GHz) are being considered for IMT Access, under agenda items 1.7 of WRC-2027.
d. Requirement of captive users: Point to point connectivity requirements of certain captive users is required to be met from one or more of these bands i.e. 6/ 7/ 13/ 15/ 18/ 21 GHz bands. Such requirements are generally localised and mostly limited to few links only.
e. The V-band (57-64/ 66 GHz) is a part of the band n263 of 3GPP (57 GHz to 71 GHz), which is also referred to as 60 GHz band. That is to say that the complete 57-71 GHz band has been planned by 3GPP as IMT/ Access band. Point to point (backhaul) solutions are also available in the V band. Further, a part of this band, i.e., 66-71 GHz, has already been identified by ITU globally for IMT based Access services in WRC-19.

f. The E-Band (71-76 GHz/ 81-86 GHz) has already been assigned LSA wise for Backhaul purpose to TSPs on provisional basis, during 2022. One of the commercial telecom service providers, holding UL with Access service authorisation, has sought permission for using this band for Access Services, in addition to the Backhaul purposes. i.e. as IAB (Integrated Access & Backhaul). In addition, another service provider, holding UL with Internet service authorisation (ISP) has sought E/ V band spectrum for last mile connectivity purpose.

Key Issues and Questions explored in the Consultation Paper:

The Consultation Paper seeks stakeholders' views on 53 questions, covering a wide range of technical, regulatory, and commercial aspects related to these microwave spectrum bands. The main themes include:

(i) Demand Assessment and Scope of Service/Usage - E-Band (71-76 GHz, 81-86 GHz) and V-Band (57-64/66 GHz): TRAI is assessing the level of demand for spectrum in these high-frequency bands for various services, including backhaul, Access, providing last-mile connectivity directly to consumer devices (Fixed Wireless Access - FWA).and Integrated Access & Backhaul (IAB): Where a single radio unit serves both access and wireless backhaul functions.

(ii) Traditional Microwave Bands (6 GHz lower, 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz) - understanding the demand for these bands primarily for backhaul purposes.

(iii) Assignment Methodology – for Commercial Telecom Services (Backhaul). TRAI seeks recommendations on the specific administrative methodology for assigning spectrum in these bands for backhaul purposes for commercial Telecom Service Providers (TSPs) – whether it should be on a block-basis in Licensed Service Areas (LSAs) or a point-to-point link basis.

(iv) Fixed Wireless Access (FWA) - if the spectrum in traditional microwave bands is to be earmarked for FWA and assigned through auction, TRAI asks about the valuation methodology.

(v) Non-Commercial/Captive Use (CNPNs) - the need for earmarking spectrum in both traditional microwave bands and E/V-bands for point-to-point connectivity for Captive Non-Public Networks, and if so, the quantum and assignment methodology.

(vi) Terms and Conditions for Assignment- for Commercial Backhaul (all bands) like- Band plan, carrier size, carrier aggregation, Validity period of assignment, renewal mechanism, Spectrum surrender procedures, Criteria for assigning additional spectrum and Rollout obligations.

(vii) Spectrum charges and related factors (e.g., spectrum cap, carrier aggregation, review of existing formula for CNPN, traditional bands, and charging for E/V bands).

(viii) Coexistence and Protection of Incumbent Users.

(ix) 6 GHz (lower) Delicensing – De-license the 6 GHz (lower) band (5.925-6.425 GHz) for low-power applications (like Wi-Fi),

(x) Unlicensed Use in V-band - feasibility and technical parameters for allowing low-power indoor consumer device-to-device usages on a license-exempt basis in the V-band, in parallel to TSP's terrestrial network use. It includes questions on the specific frequency range, carrier size, definition of indoor usage, and EIRP limits.

(xi) The paper also questions whether "outdoor" usages of V-band on a license- exempt basis should be permitted

(xii) Future Considerations for 7 GHz and 15 GHz - review of usage of 7 GHz and 15 GHz bands,

There are 53 questions in the Consultation Paper, grouped in three parts.

1. Questions from 1 to 17 – are covering demand of the spectrum in the traditional microwave backhaul bands viz. 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands.
2. Questions from 18 to 34 – are covering spectrum aspects of E and V – Bands
3. Questions from 35 to 53 – are covering pricing/financial aspect of spectrum of MWA/MWB and E/V- bands

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Chapter – 3

Information about ITU-APT Foundation of India (IAFI)

ITU-APT Foundation of India (IAFI) is a non-profit, non-political, non- partisan registered foundation. IAFI is working for last 20 years with the prime objective of encouraging involvement of professionals, corporate, public/private sector industries, R&D organizations, academic institutions, and such other agencies engaged in development of ICT sector, in the activities of the International Telecommunication Union (ITU) and the Asia Pacific Telecommunity (APT). Further details regarding IAFI are available on our website https://iafi.in

The Foundation has been recognized as an International/Regional Telecommunications of the ITU, as IAFI is a sector Member of the ITU Radiocommunication Sector (ITUR), ITU Development Sector (ITU-D) and ITU Telecommunication Standardization Sector (ITU- T) and affiliate Member of Asia Pacific Telecommunity (APT) which manifests its usefulness to the Indian Telecom industry. The Foundation members are entitled to participate and contribute to the activities of ITU-R, ITU-D, ITU-T and APT. Over the last three years, IAFI has submitted more than 100 contributions for the work of all the three sectors of the union, especially in the Spectrum Area.

IAFI has acquired credibility and reputation as a specialized stakeholder group in "spectrum innovation" in the country and also in the region. It is a key driving force in spectrum discussions in the country especially on spectrum as a key resource for digital transformation through IMT, Wi-Fi, Satellite services.

IAFI also carries out capacity building activities in the region. Our key participants include government and industry. It is critical to note that different government agencies have competing demands in spectrum viz. defence, broadcasting, public, space services. These stakeholders are essential for any fruitful discussions on spectrum enablement. The Government has come out with an innovative policy on spectrum regulatory sandboxes. IAFI could play an important role in building awareness, capacities in SMEs and Start-ups in exploiting the government initiatives and spreading these best practices in the other countries in the region.

IAFI key roles and activities include:

1. **Promotion of ICT Development:** The foundation actively promotes the development and deployment of ICT infrastructure and services across India. By collaborating with various stakeholders, including government bodies, industry leaders, and academic institutions, it strives to create an enabling environment for the growth of the ICT sector.
2. **Standards Development and Implementation:** IAFI actively contributes to the development and implementation of international standards in telecommunications. It plays a key role in representing our interests in global forums, such ITU, APT, UNO,

WTO, etc and ensures that our perspective is effectively incorporated into the standards-setting process.

3. **Research and Development:** The foundation fosters research and development activities in the field of telecommunications. By supporting innovative research projects, it aims to address emerging challenges, explore new technologies, and promote cutting edge solutions that can benefit both the industry and society at large.
4. **Capacity Building and Training:** Recognizing the importance of human capital in driving the growth of the telecommunications sector, the foundation organizes capacity building programs and training workshops. These initiatives aim to enhance the skills and knowledge of professionals working in the field, enabling them to stay abreast of the latest advancements and best practices.
5. **Policy Advocacy:** IAFI actively engages in policy advocacy to influence decision-making processes related to ICT. It works closely with regulatory bodies and government agencies to provide inputs on policy formulation, regulatory frameworks, and spectrum management, ensuring that they align with the evolving needs of the industry and society.
6. **Industry Collaboration:** The foundation facilitates collaboration and networking among industry players, academia, and research organizations. It organizes conferences, seminars, and industry forums where stakeholders can exchange ideas, share experiences, and explore opportunities for partnership and cooperation.
7. **Digital Inclusion and Empowerment:** With a focus on promoting digital inclusion, the foundation works towards bridging the digital divide and ensuring that the benefits of ICT reach all sections of society. It supports initiatives that empower marginalized communities, promote digital literacy, and leverage technology for social and economic development.

Through its diverse range of activities, IAFI remains committed to driving the growth and development of the telecommunications sector in India. By fostering collaboration, advocating for sound policies, and promoting innovation, the foundation is playing a pivotal role in shaping India's digital future and contributing to the country's socio-economic progress.

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Chapter -4

IAFI response to the questioners

TRAI Consultation Paper regarding the *Assignment of the Microwave Spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz Bands, E-Band, and V-Band* was thoroughly examined and IAFI para-wise comments are as follows.

Q-1. What is the level of demand of the spectrum in the traditional microwave backhaul bands [viz. 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands] for radio backhaul purposes? Kindly provide a detailed response with justifications.

IAFI Response:

In India, the primary frequency bands currently used for microwave backhaul include:

- **6 GHz Band (Lower)**: 5.925-6.425 GHz.
- **7 GHz Band**: 7.125-7.725 GHz.
- **13 GHz Band**: 12.75-13.25 GHz.
- **15 GHz Band**: 14.5-15.5 GHz.
- **18 GHz Band**: 17.7-19.7 GHz.
- **21 GHz Band**: 21.2-23.6 GHz.

These bands are categorized into Microwave Access (MWA) and Microwave Backbone (MWB) bands. MWA bands (13 GHz, 15 GHz, 18 GHz, and 21 GHz) are used for shorter distance traffic, while MWB bands (6 GHz and 7 GHz) are used for longer distance traffic. There are a number technological developments that are impacting the demand of spectrum in these bands:

1. **Higher Frequency Bands**: There is a growing interest in higher frequency bands such as the E-band (71-76 GHz) and V-band (57-64 GHz) for high-capacity backhaul. These bands can support higher data rates and are suitable for short-hop, high-capacity backhauling.
2. **Increased demand of Mid band spectrum for Access Services**: 6GHz and 7 Ghiz bands are currently being refarmed for meeting the increased access requirements for 5G and 6G by the Mobile operators as well as last few meters connectivity by Wi-Fi.
3. **Increased rollout of optical fiber** : As of October 2024, approximately 35% of mobile towers in India have been connected by optical fiber. DOT has been actively working to increase this number to support the growing demand for high-speed data

services and to facilitate the rollout of 5G technology. DOT aims to increase the fiberization of mobile towers from 35% to 70% by 2025. This initiative is part of the National Broadband Mission, which seeks to strengthen telecommunication infrastructure across the country. The Bharat Net project, a key initiative under the National Broadband Mission, aims to connect over 250,000 gram panchayats (village councils) with high-speed broadband internet. As of May 2024, 686,963 km of optical fiber cable has been laid, and 212,778 gram panchayats have been connected. The rapid rollout of 5G services in India requires a robust fiber-optic network to support the high data throughput and low latency demands of 5G technology. The government's push to increase fiber connectivity to mobile towers is crucial for the successful implementation of 5G services.

4. **Increased Channel Sizes**: With the introduction of 5G, there is a need for larger channel sizes to support higher data throughputs. The typical channel size in traditional microwave backhaul bands has evolved from 28 MHz to 56 MHz and even 112 MHz in some cases. High bandwidth is available in higher bands.
5. **5G and Beyond**: The introduction of 5G has necessitated an upgrade in wireless backhaul links. The higher throughput of 5G base stations requires more robust backhaul solutions, with fiber-optic cable (OFC) being a preferred choice despite its higher cost and installation challenges.
6. **E-band and V-band Adoption**: The E-band is being adopted at a fast pace for high-capacity backhaul, while the V-band does not yet show significant deployment for radio backhaul purposes. The TRAI had recommended exploring the usage of these bands with light-touch regulation and allotment on a link-to-link basis.

Q-2. For which commercial telecommunication services should the spectrum in traditional microwave backhaul bands be assigned for radio backhaul purposes? Kindly provide a detailed response with justifications.

IAFI Response:

According to the recent NFAP revision discussions by the WPC, the plan for these bands is as summarised below:

i. **The 6 GHz band (5925-6425 MHz)** has been designated for assignment to unlicensed Wi-Fi services.
ii. The **7 GHz band (7.125-7.725 GHz)** is being considered for 6G under WRC agenda item 1.7

iii. The 13 GHz band (12.75-13.25 GHz), 15 GHz Band (14.5-15.5 GHz), 18 GHz Band (17.7-19.7 GHz) and 21 GHz Band: (21.2-23.6 GHz) will continue to be used for commercial backhaul services

Q-3. Which of the following methods should be used for the assignment of the spectrum in traditional microwave backhaul bands for radio backhaul purposes for various commercial telecommunication services:

(a) Block-basis in LSA,

(b) Point-to-point link-basis, or

(c) Any other?

Please provide a detailed response with justifications in respect of the relevant commercial telecommunication services.

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.

Therefore, IAFI recommends the following:

(i) The spectrum in 13 GHz band (12.75-13.25 GHz), 15 GHz Band (14.5-15.5 GHz), 18 GHz Band (17.7-19.7 GHz) and 21 GHz Band: (21.2-23.6 GHz) should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis.

(ii) For TSPs holding other than Access Service Authorisation and non-TSPs, carriers should continue to be assigned on a P2P link basis, in line with the extant policy.

(iii) We do not recommend any further spectrum assignments in 6 and 7 GHz bands as these bands have to be refarmed for access services.

Q-4. In case it is decided to use different methods (block-based, link based, or any other) for the assignment of the spectrum in traditional microwave backhaul bands for radio backhaul purposes for different types of commercial telecommunication services, what quantum of spectrum, and in which of 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands should be earmarked for point- to-point link-based assignments? Kindly provide a detailed response with justifications.

IAFI Response:

Please see the detailed reply of the question in the reply furnished for the Q-3 and Q6

- We are not in favour of any restrictions on the quantum of spectrum to be assigned to any TSP in 13 GHz band (12.75-13.25 GHz), 15 GHz Band (14.5-15.5 GHz), 18 GHz Band (17.7-19.7 GHz) and 21 GHz Band: (21.2-23.6 GHz).

(iv) We do not recommend any further spectrum assignments in 6 and 7 GHz bands as these bands have to be refarmed for access services. .

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Q-5. What should be the terms and conditions for the assignment of spectrum in traditional microwave backhaul bands for radio backhaul purposes of various commercial telecommunication services, such as –
(a) Carrier size;
(b) Carrier aggregation;
(c) Validity period of the assignment;
(d) Renewal mechanism;
(e) Roll-out obligations; and

(f) Surrender of spectrum etc.? Kindly provide a detailed response with justifications. along with the international scenario on the matter.

IAFI Response:

The assignment of spectrum in traditional microwave backhaul bands for radio backhaul purposes of various commercial telecommunication services, especially given its point-to-point (PTP) link-basis nature, requires specific terms and conditions to ensure efficient use, fair access, and support for network expansion.
Here's a detailed breakdown with justifications and the international scenario:

Key Terms and Conditions for Spectrum Assignment (Point-to-Point Link-Basis):
(a) Carrier Size (Channel Bandwidth):

a. A range of standard carrier sizes (e.g., 7 MHz, 14 MHz, 28 MHz, 56 MHz, 112 MHz) should be available, with the actual assigned carrier size determined by the operator's specific capacity requirements for each PTP link. The regulator should specify the maximum permissible bandwidth per channel in each band.
b. Flexibility and Efficiency - Different backhaul links have varying capacity needs depending on the number of base stations they serve, the traffic density, and the technologies (2G/3G/4G/5G) they backhaul. Allowing a range of carrier sizes enables operators to optimize spectrum use for each link, preventing over-assignment for low-capacity links and ensuring sufficient capacity for high-demand links.

International Scenario: ITU-R recommendations and common industry practices define standard channel plans and bandwidths for microwave backhaul bands, ensuring interoperability and economies of scale for equipment. Most countries offer a variety of channel sizes.

(a) Carrier Aggregation (CA) - Service Providers should be permitted to aggregate multiple carriers (channels) within the same band (intra-band contiguous/non-contiguous) or across different traditional microwave backhaul bands (inter-band) for a single backhaul link, provided it's technically feasible with the equipment and doesn't cause harmful interference. Aggregating existing carriers can be more cost-effective than deploying new fiber or moving to higher frequency (E-band) links, especially for medium-range distances. CA allows operators to make the most of their existing assigned channels, maximizing spectral efficiency.

(b) Validity Period of the Assignment - The validity period for microwave backhaul spectrum assignments should be reasonably long, ideally 10 to 15 years, aligned with the typical investment cycles for network infrastructure. A longer validity period provides operators with the necessary regulatory certainty to make significant investments in microwave equipment.

(c) Distinction from Access Spectrum: Unlike mobile access spectrum, which is often auctioned for longer terms (e.g., 20 years) due to its revenue-generating nature and broader

market implications, backhaul spectrum, while critical, serves as a utility. Its validity period should reflect its enabling role.

International Scenario: Validity periods vary globally, but a trend towards longer terms (e.g., 10-15 years) for fixed links is common to support network stability and investment. Some countries might have shorter initial terms with clear renewal clauses.

(d) Renewal Mechanism - A clear, transparent, and predictable renewal mechanism should be in place. Renewal should generally be granted provided the licensee has complied with the original terms and conditions, is operating within the technical parameters, and the spectrum is still required for the same backhaul purpose. The renewal process should ideally be administrative with reasonable fees, avoiding re-auctioning.

- International Scenario: Administrative renewal for microwave backhaul is a widely accepted best practice globally, recognizing its non-competitive nature in the access market and its utility role. Conditions often include compliance and payment of fees.

(d) Roll-out Obligations - Roll-out obligations for microwave backhaul spectrum should be carefully considered and, if imposed, should be general and flexible rather than stringent or specific to individual links.

(e) Focus should be on the overall deployment of services that *rely* on backhaul. For instance, instead of mandating X number of microwave links, the obligation could be tied to the rollout of mobile base stations or FWA coverage in underserved areas.

- International Scenario: Specific roll-out obligations for individual microwave backhaul links are rare. Regulators typically focus on the overall service rollout (e.g., mobile coverage) which implicitly drives backhaul deployment.

(f) Surrender of Spectrum - A clear and streamlined process for voluntary surrender of spectrum assignments for individual backhaul links should be established. Operators should be allowed to surrender links when they are no longer needed (e.g., due to fiber deployment, network optimization, or technology upgrade). This process should ideally involve no penalty for surrender, beyond cessation of future fees for that specific link.

International Scenario Overview:

The international scenario largely aligns with the justifications provided above, emphasizing:

- Administrative Assignment (or light-touch licensing): The vast majority of countries assign traditional microwave backhaul spectrum administratively, rather than through auctions. This recognizes its utility nature, its role in supporting access networks, and the technical complexities of PTP coordination.
- Point-to-Point Coordination: Regulators worldwide use sophisticated frequency coordination tools to manage interference between individual PTP links.
- Flexibility in Channel Bandwidths: Regulators typically offer a range of standard channel bandwidths to cater to different capacity needs.
- Growing Importance of Carrier Aggregation: As 5G demands higher capacities, multi-carrier solutions (including carrier aggregation within microwave bands and multi-band solutions combining microwave with E-band) are increasingly common and supported by regulatory frameworks.

- Reasonable Validity Periods: Licenses for microwave backhaul tend to have longer validity periods (e.g., 5-15 years) compared to short-term experimental licenses, to provide investment certainty.
- Predictable Renewal: Renewal processes are generally administrative and based on compliance, aiming for continuity of service.
- Minimal Roll-out Obligations: Direct roll-out obligations for backhaul links are rare; the focus is on the service (e.g., mobile broadband) that the backhaul supports.
- Facilitating Surrender: Clear processes for spectrum surrender are in place to ensure efficient re-use.

Q-6. Is there a need to prescribe ceilings on the number of carriers that can be assigned to a commercial telecommunication service provider in each frequency band [6 GHz (lower)/ 7 GHz/ 13 GHz/ 15 GHz/ 18 GHz/ 21 GHz] or in a group of frequency bands for radio backhaul purposes? Kindly provide a detailed response with justifications.

IAFI Response:

i. We are not in favour of any restrictions on the number of carriers to be assigned to any TSP in 13/15/18/21 GHz
ii. We are not in favour of any new spectrum assignments for service providers in 6 and 7 GHz. as these bands have to be re-farmed for access services.
iii. We further 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.

Q-7. In case it is decided to prescribe ceilings on the number of carriers that can be assigned to a commercial telecommunication service provider (TSP) for each frequency band or each group of frequency bands, -

(a) Should there be any criterion for the ceiling on the number of carriers that may be assigned to a TSP? If yes, what should be the criteria?

(b) In case of group of frequency bands, how should the bands be grouped?

(c) What should be the respective ceilings for each frequency band, or each group of frequency band(s)?

(d) Should there be any provision for assignment of spectrum above the ceiling limit on a case-by-case basis? If yes, what criterion should be prescribed, based on which, additional spectrum above the ceiling limit may be assigned to a telecom service provider?

Kindly provide a detailed response with justifications.

IAFI Response:

Reply of the Q-6 may kindly be seen, there is no need to change the existing policy.

However, IAFI is of the view that:-

1. The spectrum should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis.

2. 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.

Q-8. In the new policy regime for the assignment of spectrum, whether there is a need to grant an option to telecom service providers already holding carriers in traditional microwave backhaul bands to retain the existing carriers with them? Kindly provide a detailed response with justifications.

IAFI Response:

IAFI is of the clear opinion that there is a strong need to grant an option to telecom service providers (TSPs) already holding carriers in traditional microwave backhaul bands to retain their existing carriers in a new policy regime for spectrum assignment. This is a critical issue with significant implications for the stability, efficiency, and continued development of telecommunication networks.

Here's a detailed response with justifications:

a. Microwave backhaul links are the backbone of cellular networks, connecting cell sites to the core network. Forcing TSPs to immediately relinquish existing carriers would lead to massive network disruptions, affecting services for millions of subscribers. This would require a complete overhaul of their backhaul infrastructure, a process that is time-consuming, expensive, and technically challenging.
b. TSPs have made substantial investments in deploying equipment, designing networks, and optimizing their operations based on their existing microwave backhaul assignments. Forcing them to abandon these investments without due consideration would result in significant financial losses.
c. TSPs meticulously plan their network deployments, including backhaul, to optimize coverage, capacity, and efficiency. Existing microwave links are often strategically placed to achieve optimal performance. Discarding these plans arbitrarily could lead to suboptimal spectrum utilization in the long run.
d. Existing networks are built around specific frequency assignments. Changing these without a smooth transition period would compromise the operational integrity of the entire network, potentially leading to widespread outages, degraded quality of service (QoS), and customer dissatisfaction.

Granting an option to telecom service providers to retain their existing carriers in traditional microwave backhaul bands is crucial for maintaining network stability, protecting investments,

promoting efficient spectrum use, and ensuring the continued provision of essential telecommunication services. Any new policy regime should incorporate mechanisms that facilitate a smooth transition, acknowledge the value of existing infrastructure, and avoid imposing undue burdens on TSPs, ultimately fostering a healthy and competitive telecom ecosystem.

Q-9. As the 7125-8400 MHz range in the 7 GHz band and the 14.8-15.35 GHz range in the 15 GHz band are being considered for IMT in WRC27, whether there is a need to review the usage of 7 GHz and 15 GHz microwave backhaul bands at this stage itself, or should the review be undertaken after considering the outcome of WRC-27? Kindly provide a detailed response with justifications.

IAFI Response:

As per the Resolution 256 of WRC-23, an Agenda Item 1.7 (AI-1.7) of WRC-27 has been created, to consider studies on sharing and compatibility and develop technical conditions for the use of International Mobile Telecommunications (IMT) in the frequency bands 4400 – 4800 MHz, 7125 – 8400 MHz (or parts thereof), and 14.8 – 15.35 GHz taking into account existing primary services operating in these, and adjacent, frequency bands.

In India, in case of 7 GHz band at present from 7125 to 7725 = 600 MHz is under use for Microwave backhaul and from 7725 to 8400 MHz = 675 MHz is not used, while the entire range from 7125-8400 MHz is under consideration under Agenda Item – 1.7 for the use of IMT.

In India in case of 15 GHz band – at present 14500 to 15500 = 1000 MHz entire band is used for the microwave backhaul, while band from 14800 – 15350 = 550 MHz is under consideration under Agenda Item – 1.7 for the use of IMT.

Regarding Agenda Item 1.7 for WRC-27, the 49th meeting of Working Party 5D (WP 5D), was recently held from June 24 to July 3, 2025, commenced various studies for coexistence between Fixed Services and IMT and India is also contributing to those studies. We believe there will be successful sharing criteria development by the ITU-R and that these bands will be identified for IMT.

So, IAFI is of the view that, it will be not be appropriate to allow further assignments of fixed links in these bands.

Q-10. In case it is decided to review the usage of 7 GHz and 15 GHz bands at this stage itself, what should be the policy framework for the assignment of the spectrum in 7 GHz and 15 GHz microwave backhaul bands to take care the possible outcomes of AI 1.7 of the WRC-27? Kindly provide a detailed response with justifications.

IAFI Response:

Same as reply of the Q-9.

Q-11. Whether there is a need to earmark certain quantum of spectrum in traditional microwave backhaul bands for the last-mile connectivity (Fixed Wireless Access) to the customer equipment of commercial 160 telecommunication services? Please provide a detailed response with justifications.

IAFI Response:

The Q-11 and 12 are crafted from the TRAI Consultation paper para-2.52 to 2.64, where issues are mentioned for the last mile connectivity, for enhancing broadband connectivity especially in the rural/remote area; Fixed Wireless Access technology can be used. Here IAFI submits the followings.

The low usage of broadband and internet in rural parts of India is a complex issue, a combination of interconnected factors, rather than just one primary reason. Main reasons are

1. Poor Network Quality and Infrastructure is the most fundamental challenge. Even if people can afford devices and data, they can't use the internet effectively if the network isn't available or reliable. Main reasons are – geographical barriers like difficult terrain and high cost of infrastructure etc.
2. Low Digital Literacy and Awareness as many people don't understand how to use the internet. Online content is still in English, posing a significant barrier for the vast majority of rural Indians.
3. Low Income and Affordability – especially initial cost of acquiring a smartphone or other internet-enabled device can still be a significant barrier for the poorest segments of the population.
4. Availability and Reliability of Electricity

In essence, bridging the rural digital divide in India requires a multi-pronged approach that addresses infrastructure gaps, promotes digital literacy, makes devices more affordable, ensures reliable power, and fosters the creation of locally relevant content.

5G FWA can use the lower 6 GHz band, as delicensed for low power devices, can prove as a compelling and cost-effective pathway to significantly improve broadband connectivity especially for Rural India. It can bypass the formidable challenges of fiber deployment in difficult terrains. So, the recent decision of DoT to delicense the Lower 6 GHz (5925-6425 MHz) is going to prove as a Game Changer, for broadband penetration in rural India.

We request TRAI to recommend to DoT for enhancement of power limit for Outdoor Low Power Device.

IAFI is of the view that there is no need to earmark certain quantum of spectrum in traditional microwave backhaul bands for the last-mile connectivity (Fixed Wireless Access).

Q-12. In case it is decided to earmark certain quantum of spectrum in traditional microwave backhaul bands for the last-mile connectivity (Fixed Wireless Access) to the customer equipment of commercial telecommunication services, -

(a) What quantum of spectrum, and in which of 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands should be earmarked for such purposes?

(b) What should be the eligibility conditions to obtain the spectrum in traditional microwave backhaul bands for such purposes?

(c) What should be the terms and conditions for the assignment of spectrum in traditional microwave backhaul bands for such purposes through auction such as-

(i) Block size;

(ii) Minimum quantity for bidding;

(iii) Spectrum cap;

(iv) Validity period of the assignment;

(v) Roll-out obligations;

(vi) Surrender of spectrum etc.?

(d) Whether flexible use i.e., both backhaul connectivity, and last mile connectivity (fixed wireless access) to the customer equipment should be permitted in the frequency ranges earmarked for such purposes?

If yes, should the terms and conditions of the auction of spectrum be the same as those applicable for the "access spectrum"? Kindly provide a detailed response with justification and international practice.

IAFI Response:

Same as Q-11

Q-13. Should a certain quantum of the spectrum in traditional microwave backhaul bands be earmarked for fulfilling point-to-point connectivity requirements of captive (non-commercial/ non-TSP) users? If yes –

(a) What quantum of spectrum, and in which of 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands should be earmarked for such purposes?

(b) What should be the terms and conditions for the assignment of spectrum for such purposes, such as-

(i) Carrier size;

(ii) Carrier aggregation;

(iii) Ceiling on the number of carriers;

(iv) Validity period of the assignment;

(v) Renewal mechanism;

(vi) Criteria for the assignment of additional spectrum above the ceiling limit;

(vii) Roll out obligations; and

(viii) Surrender of the spectrum, etc.? Kindly provide a detailed response with justifications.

IAFI Response:

IAFI is of the view that a certain quantum of the spectrum in traditional microwave backhaul bands be earmarked for fulfilling point-to-point connectivity requirements of captive (non-commercial/non-TSP) users. Details are as follows.

The new Telecommunications Act, 2023 acknowledge the need for CNPNs to foster Industry 4.0, IoT, and enterprise digital transformation. Point-to-point microwave links are crucial for these networks to connect various sites within a campus, industrial complex, or specific geographical area where laying fiber is impractical or too costly.

There must be balanced against the efficient use of a scarce national resource (spectrum) and potential for interference with existing TSP networks. Hence, a certain quantum should be earmarked, but with strict conditions.

(a) What quantum of spectrum, and in which of 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands should be earmarked for such purposes?

The approach should be pragmatic, considering existing usage and the technical characteristics of each band. A small, specific quantum should be earmarked across a *few* suitable bands, rather than a large chunk from any single band. This ensures that the primary use of these bands for TSP backhaul is not significantly impacted. Frequency bands - 18 GHz and 21 GHz - higher microwave bands have shorter propagation distances and higher capacities, making them ideal for intra-campus or short-to-medium distance point-to-point links. They are also less congested for long-haul backhaul compared to lower bands. Potentially 1 pair of 28 MHz carrier in each of these bands, to be assigned on a per-link basis. This provides sufficient capacity for most enterprise backhaul needs without excessive earmarking.

Regarding Frequency bands 13 GHz and 15 GHz bands - These bands offer a good balance of capacity and propagation characteristics. They could be considered for slightly longer links within a campus or connecting nearby facilities. A very limited amount, perhaps 1 paired 28 MHz carrier in each, as a secondary option if 18/21 GHz are insufficient or technically unsuitable for a specific link.

Regarding Frequency bands -6 GHz (lower) and 7 GHz bands- These lower bands are being re-farmed for access services and therefore should not be considered for backhaul.

(b) What should be the terms and conditions for the assignment of spectrum for such purposes?

The terms and conditions must ensure efficient spectrum utilization, prevent speculative hoarding, provide operational flexibility for enterprises, and ensure a level playing field without unduly disadvantaging TSPs.

(i) Carrier Size: Primarily standard carrier sizes used in the respective bands for point-to-point microwave, e.g., 28 MHz, 56 MHz (paired). This ensures compatibility with existing equipment and technical standards, leading to a mature ecosystem and lower equipment costs. It also optimizes spectrum utilization for microwave links.

(ii) Carrier Aggregation: Carrier aggregation allows for higher capacities to meet demanding CNPN applications, not useful for CNPN.

(iii) Ceiling on the number of carriers: A strict ceiling based on the band and the nature of the CNPN- A ceiling of 1 paired carrier per link/site. For 13/15 GHz: A ceiling of 1 paired carrier (e.g., 1 x 28 MHz) per link/site.

(iv) Validity period of the assignment: A 10-year period provides sufficient stability for enterprises to plan and amortize their network investments. It also allows for periodic review of spectrum usage and technological advancements by the regulator, without being excessively long like TSP licenses (20-30 years).

(v) Renewal mechanism: Administrative renewal based on satisfactory performance and continued need. Renewal should be contingent on an audit demonstrating efficient and active utilization of the assigned spectrum throughout the previous term. To ensure efficient use of a scarce resource, renewal should not be automatic. It should be a formal process to re-evaluate the necessity.

(vi) Criteria for the assignment of additional spectrum above the ceiling limit: It should be in exceptional cases only, with rigorous justification. The applicant must provide a comprehensive analysis demonstrating that the current assigned spectrum is insufficient to meet *actual, proven* traffic demands. Any additional spectrum assigned must be subject to even more frequent and stringent reviews to ensure continued necessity.

(vii) Roll-out obligations: The assigned link(s) must be activated within a specified timeframe (e.g., 6-12 months) from the date of assignment. The enterprise should be required to submit proof of installation and operationalization of the links. Non-compliance with rollout obligations should lead to forfeiture of the assigned spectrum and potential penalties

(viii) Surrender of the spectrum- Enterprises should be allowed to voluntarily surrender assigned spectrum at any time without penalty if their needs change, encouraging efficient return of unused resources to the pool, if the spectrum remains unutilized for a continuous period (e.g., 12-18 months) after initial activation or if its utilization falls below a predefined threshold without valid technical justification.

Implementing such a framework for CNPNs in traditional microwave backhaul bands would provide critical support for India's industrial digitization drive.

Q-14. In case your response to Q13 is 'no', in what manner should the point-to-point connectivity requirements of captive (non-commercial/ non-TSP) users be fulfilled? Kindly provide a detailed response with justifications.

IAFI Response:

Reply of the Q-13 may be seen.

Q-15. In case it is decided to assign the spectrum in traditional microwave backhaul bands on a point-to-point link basis to cater to point-to-point connectivity requirements of commercial telecommunication service providers as well as captive (non-commercial/ Non-TSP) users, whether there is a need to prescribe minimum link lengths (path lengths) in these bands? If yes, what should be the minimum 162 link length for each of the traditional microwave backhaul bands? Kindly provide a detailed response with justifications.

IAFI Response:

IAFI is of the view that there is a strong need to prescribe minimum link lengths. The minimum link lengths should be based on a balance of technical feasibility, international best practices (where applicable), and efficient spectrum use within the Indian context, considering both TSP and CNPN needs. IAFI suggest the following

1. For 13 GHz and 15 GHz Bands - Minimum link length should be 3 km. As these bands are generally considered Microwave Access (MWA) bands, suitable for short to medium-haul links, allowing these bands to be used for enterprise campus-type backhaul.
2. 18 GHz and 21 GHz Bands - Minimum link length of 1 km. These are higher MWA bands, with increased sensitivity to rain fade and higher free-space path loss compared to lower bands. They are ideal for short-haul, high-capacity links, typically within dense urban areas or large industrial campuses.

The minimum link lengths should be reviewed periodically (e.g., every 3-5 years) as radio technology advances, allowing for more efficient use of spectrum at shorter distances, or as new high-frequency bands.

Q-16. Considering that the Government has decided to delicense the 6 GHz (lower) band (5.925-6.425 GHz) for low power applications, whether there is any need to prescribe certain measures to provide necessary protection to incumbent users such as Fixed Microwave (backhaul) Services, Fixed Satellite Service (FSS) etc. operating in the 6 GHz (lower) band? If yes, which specific measures should be prescribed for this purpose? Kindly provide a detailed response with justifications.

IAFI Response:

There is a critical need to prescribe specific measures to provide necessary protection to incumbent users such as Fixed Microwave (backhaul) Services and Fixed Satellite Service (FSS) operating in the 6 GHz (lower) band (5.925-6.425 GHz), even when delicensing it for

low-power applications like Wi-Fi. As DoT has delicensed like other countries that have delicensed portions of 6 GHz (e.g., USA, UK, South Korea, EU members), must adopt a robust coexistence framework.

The recent draft rules on delicensing the lower 6 GHz band for low-power indoor and very low-power outdoor use also acknowledge this by specifying restrictions and technical parameters. Considering the international best practices, technical studies, and the nature of the delicensed usage (low-power, indoor/very low-power outdoor), to protect the existing services, following measures are adopted.

a. Strict Power Limits (EIRP and PSD):
    - Low Power Indoor (LPI) Devices: This is the primary use case. Power limits must be kept very low, as proposed by DoT in the draft rules (e.g., 30 dBm EIRP max, or even lower PSD like 5 dBm/MHz EIRP). This significantly limits the range and outdoor penetration of signals, protecting licensed services.
    - Very Low Power (VLP) Outdoor Devices: These devices would have even stricter power limits (e.g., 14 dBm EIRP max) and potentially other restrictions to ensure they don't cause widespread interference.
    - Low Power Indoor (LPI) devices are only for the indoor use and in no case, it should be used outside the building. .
b. Prohibition on Certain Uses and Locations – DoT draft rules include -
    - Prohibition on oil platforms.
    - Prohibition on land vehicles (cars, trains), boats, and aircraft (except above 10,000 feet).
    - Prohibition on communication with and control of drones and Unmanned Aerial Systems (UAS).
c. Strict Out-of-Band Emission Limits (Emission Mask)- DoT recommended that :
    - Devices must adhere to stringent out-of-band emission (OOBE) limits. This means that the power emitted by the unlicensed device outside its intended channel bandwidth must be rapidly attenuated to very low levels.
d. Information and Awareness Campaigns:
    - The regulator (DoT/TRAI) should conduct extensive public awareness campaigns to educate users and manufacturers about the "non-interference, non-protection" principle, the strict power limits, and the indoor-only/VLP outdoor restrictions.
e. Enforcement and Interference Resolution Mechanism:
    - IAFI suggest establishing a clear and efficient process for reporting, investigating, and resolving interference cases caused by unlicensed devices. It may include :
        - A dedicated contact point for incumbent operators to report interference.
        - Rapid investigation by regulatory authorities.
        - Powers to enforce immediate cessation of operation for non-compliant or interfering unlicensed devices.

By implementing these comprehensive measures, our country can successfully unlock the immense potential of the lower 6 GHz band for unlicensed use (e.g., Wi-Fi 6E/7) while effectively safeguarding its existing, vital fixed microwave backhaul services and Fixed Satellite Service operations.

Q-17. Any other suggestions relevant to the assignment of spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands may kindly be provided with detailed justifications.

IAFI Response:

IAFI suggest the following points for the assignment of spectrum in the bands (6 GHz lower, 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz), with the reason

Administrative Assignment of Spectrum (Point-to-Point) for All Backhaul Spectrum - All dedicated backhaul spectrum in the bands (6 GHz lower, 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz) for both TSPs and CNPN users must be administratively allocated. This is now aligned with the Telecommunications Act, 2023. Main reason are :

1. Nature of Backhaul: Backhaul is a utility and an input cost for providing commercial telecom services. Auctioning it would directly increase the cost of providing mobile broadband and other services, ultimately passed on to consumers.
    a. No Revenue Maximization Mandate: It is clarified by the Supreme Court in the 2G judgment, revenue maximization should not be the sole objective for spectrum allocation. The primary goal for backhaul should be efficient and rapid infrastructure rollout.
    b. International Best Practice: The vast majority of countries globally assign microwave backhaul spectrum administratively, recognizing its utility nature.
    c. Promotes Densification: For 5G, network densification (more cell sites) is critical. Each new site requires backhaul. Administrative assignment streamlines this process, enabling faster and cheaper rollout of 5G, particularly in semi-urban and rural areas where fiber might not be readily available.
2. Implement a Transparent and Streamlined Online Assignment Portal – all application, approval, and management of microwave backhaul links for both TSPs and CNPN users should be through Saral Sanchar Portal. Main reason are

    - Manual processes are slow and prone to delays. An online portal would drastically reduce application processing times, enabling faster network deployments.
    - All rules, available frequencies (per location), application status, and common reasons for rejection can be published, ensuring fairness and reducing ambiguity.
    - The system can collect valuable data on spectrum usage, demand patterns, and congestion, which can inform future spectrum planning and policy decisions.

3. Different Spectrum charges Bands and Usage (TSP/ CNPN)

- The spectrum charges for these bands should be administrative charges and a clear differentiation in charging mechanisms should be adopted.
    - For TSPs (Commercial Backhaul): Current practice with a link-based administrative charge, possibly with a component linked to the capacity of the link, is consistent with current practices for microwave backhaul.

- The present TRAI consultation paper suggests reviewing the AGR-based mechanism for MWA carriers and proposes link-based charges for MWB carriers..
- For CNPN Users (Non-Commercial Backhaul): For CNPN users, a fixed, annual administrative charge per link, potentially lower than that for TSPs, reflecting their non-commercial, captive use, should be imposed. The charge should cover regulatory oversight and administrative costs.

4. Strict compliance of Roll-out obligation:

    - Even with administrative assignment, operators (both TSPs and CNPNs) might hold spectrum, not actively using, preventing others from accessing it.
    - Periodical audit (e.g., annual or bi-annual) automated or manual audits should be conducted to verify actual usage.

Q-18. What is the level of demand of the spectrum in the E-band (71-76 GHz, and 81-86 GHz) for each of the service/ usage viz. "Backhaul", "Access" and "Integrated Access & Backhaul (IAB)"? Kindly provide a detailed response in respect of each service/ usage with justification including availability of technical standards and ecosystem.

IAFI Response:

The E-band, encompassing 71-76 GHz and 81-86 GHz, is critical portion of the millimeter-wave (mm-Wave) spectrum, unlike the V-band, which has a significant oxygen absorption peak around 60 GHz, the E-band offers much lower atmospheric attenuation, allowing for longer transmission distances and even higher capacities, makes it highly valuable for specific applications in telecommunications.

Regarding Demand of E-Band in Backhaul – demand is very high, as E-band offers contiguous bandwidths of up to 5 GHz (71-76 GHz) and another 5 GHz (81-86 GHz), allowing for channel sizes of 250 MHz, 500 MHz, 750 MHz, 1000 MHz, and even larger. This enables multi-gigabit per second (Gbps) like 10 Gbps, 20 Gbps, and even 40 Gbps. E-band links can reliably cover distances up to 10 km under good conditions. This makes it suitable for a wider range of backhaul scenarios, including connecting macro sites.

Regarding Demand of E-Band in Access – demand is low, as not suitable for mobile access. E-band signals require clear line-of-sight. Any obstruction (buildings, trees, even heavy rain) can severely degrade or block the signal, making it impractical for mobile users who are constantly moving. E-band can be used for **Fixed Wireless Access (FWA)**, particularly for enterprise connectivity or high-speed residential broadband in specific scenarios.

Similarly, Demand of E-Band in Integrated Access and Backhaul (IAB) –moderate, as E-band can be very well used in an IAB context, as the wireless backhaul link between IAB-nodes and IAB-donors. This aligns perfectly with its primary strength as a high-capacity, relatively longer-range wireless backhaul solution.

Ecosystem of E-Band is still developing

Q-19. What is the level of demand of the spectrum in the V-band (57-64/ 66 GHz) for each of the service/ usage viz. Backhaul, Access and IAB? Kindly provide a detailed response in respect of each service/ usage with justification including availability of technical standards and eco-system.

IAFI Response:

The V-band (specifically 57-64 GHz/66 GHz is a very important part of the millimeter-wave (mm-Wave) spectrum with unique characteristics that make it suitable for specific applications in telecommunications. V-band spectrum is experiencing a high and increasing demand across backhaul, access, FWA, Wi-Fi and IAB use cases, for higher capacities in 5G networks, the economic and practical challenges of fiber deployment, and the emergence of new high-speed wireless applications.

Regarding Demand for V-Band in Backhaul – it is high and growing. It can meet out the massive capacity requirements for 5G, especially in in dense urban areas, with its large contiguous spectrum blocks. V-band wireless backhaul provides a rapid and cost-effective alternative for connecting small cells and macro sites where fiber is unavailable or impractical

Regarding Demand for V-Band in Access – It is moderate to High (primarily for Fixed Wireless Access - FWA and short-range Wi-Fi). V-Band is highly attractive for providing gigabit-speed last-mile connectivity to homes and businesses, especially where fiber deployment is challenging or costly. The V-band is used for Wi-Fi, as enables multi-gigabit wireless speeds over very short distances, primarily for indoor or campus environments

Similarly, Demand for V-Band in Integrated Access and Backhaul (IAB) –is high, due to reasons explained above. IAB allows small cells to connect to the network wirelessly, eliminating the need for individual fiber to each one.

V-band radio technology for point-to-point backhaul links has been available for several years; ecosystem is robust, with multiple vendors offering equipment.

Q-20. For which commercial telecommunication services should the spectrum in E-band and V-band be assigned for radio backhaul 163 purposes? Responses with detailed justifications may kindly be provided for E-band and V-band separately.

IAFI Response:

The E-band (71-76 GHz, 81-86 GHz) and V-band (57-64 GHz) are crucial for next-generation telecommunication services, primarily due to their ability to provide massive capacity.

E-Band (71-76 GHz, 81-86 GHz) for Radio Backhaul

Commercial Telecommunication Services:

The spectrum in E-band should be primarily assigned for radio backhaul purposes to support all commercial telecommunication services offered by licensed TSPs that require high-capacity connectivity between network elements. This specifically includes, but is not limited to:

1. 5G Mobile Broadband (eMBB) - 5G, particularly in dense urban and suburban areas, demands multi-gigabit per second (Gbps) backhaul capacities per cell site. E-band, with its large contiguous blocks of spectrum, can provide fiber-like wireless throughputs (10 Gbps, 20 Gbps, and even 40 Gbps+).
2. Fixed Wireless Access (FWA) - TSPs are increasingly using FWA to provide high-speed broadband services to homes and businesses, especially in areas where fiber deployment is economically unviable or takes time. E-band's high capacity allows FWA networks to deliver multi-hundred Mbps to Gbps speeds, providing a competitive alternative to fiber or DSL.
3. Enterprise and Business Connectivity - TSPs offer dedicated connectivity solutions (e.g., leased lines, VPNs) to enterprises, including those requiring very high bandwidth for data centers, cloud connectivity, or inter-office communication. E-band provides a reliable and rapidly deployable wireless alternative or complement to fiber for these high-value enterprise clients, especially for last-mile or short-to-medium distance connections to the enterprise premises.
4. Network Densification and Small Cell Backhaul The overall trend in mobile networks is towards densification, meaning deploying more cell sites closer to users. E-band is crucial for backhauling these numerous small cells efficiently, as laying fiber to every small cell is often impractical and expensive.

Q-21. Which of the following methods should be used for the assignment of the spectrum in E-band and V-band for radio backhaul purposes for various commercial telecommunication services:
(a) Block-basis in LSA;
(b) Point-to-point link-basis; or
(c) Any other?

Responses with detailed justifications may kindly be provided for E-band and V-band separately in respect of the relevant commercial telecommunication services.

IAFI Response:

IAFI is of the view that E-Band spectrum (71-76 GHz, 81-86 GHz) should be assigned on Point-to-Point Link-Basis. Main reasons are:-

1. Nature of E-band Links: E-band links are inherently highly directional, line-of-sight (LOS) point-to-point connections. They use narrow beams and are typically planned meticulously between two specific points (e.g., two cell towers, a cell tower and an aggregation point).
2. Optimized Spectrum Reuse: Considering millimeter-wave bands having high free-space path loss, even with lower atmospheric absorption than V-band, spectrum can be reused frequently in non-overlapping geographical areas. Assigning on a point-to-point basis allows for maximum spectral efficiency and frequency reuse across the country.

3. Minimizes Interference: Point-to-point assignment, coupled with a robust frequency coordination mechanism (often automated), allows the regulator to ensure that new links do not cause harmful interference to existing ones.
4. Rapid and Flexible Deployment: TSPs require the flexibility to deploy backhaul links precisely where and when needed to connect new cell sites. A point-to-point administrative assignment facilitates this rapid deployment without the need to acquire large, expensive blocks of spectrum across an entire LSA. This is crucial for meeting 5G densification targets.
5. International Precedent: Globally, E-band spectrum for backhaul is almost universally assigned on a point-to-point link basis, reflecting its technical characteristics and operational requirements.

IAFI is supportive in making the 57-64 GHz and if possible the 64-71 GHz frequency range available under a licence-exempt regulatory regime without the application of light-licensing.

Q-22. In case it is decided to use different methods (block-based, link-based, or any other) for the assignment of the spectrum in E-band and/ or V-band for radio backhaul purposes for different types of commercial telecommunication services, how much spectrum in E-band and V-band should be earmarked for the point-to-point link-based assignment for radio backhaul purposes for commercial telecommunication services?
Responses with justifications may kindly be provided for E-band and V-band separately.

IAFI Response:

We are supportive in making the 57-64 GHz and if possible the 64-71 GHz frequency range available under a licence-exempt regulatory regime without the application of light-licensing.

We do not support band fragmentation through different licensing mechanisms of the Mobile service, therefore for 57-71 GHz, we believe that a licence-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.

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

That said, we support licence-exempt use in the 57-64 GHz since it provides greater market certainty, because it avoids the IMT identified bands in 66-71 GHz and provides a valuable guard band.

Regarding E-Band, reply of the Q-22 may kindly be seen.

Q-23. What should be the terms and conditions for the assignment of the spectrum in the E-band for radio backhaul purposes of commercial telecom services such as-

(i) Band plan;
(ii) Carrier size;
(iii) Carrier aggregation;
(iv) Validity period of the assignment;
(v) Renewal mechanism;
(vi) Surrender of the spectrum;
(vii) Criteria for the assignment of additional spectrum above the ceiling limit; and
(viii) Roll-out obligations etc.?

Kindly provide a detailed response with justifications.

IAFI Response:

The assignment of E-band spectrum for radio backhaul purposes of commercial telecom services needs a clear, predictable, and efficient framework. Considering the recent developments in Indian telecom policy (especially the Telecommunications Act, 2023, here are the recommended terms and conditions:

Proposed Terms and Conditions for E-Band Spectrum Assignment for Commercial Telecom Services (Radio Backhaul):-

(i) Band Plan – It will be appropriate to adhere to the established international and national band plan for E-band, 71-76 GHz (Tx or Rx) paired with 81-86 GHz (Rx or Tx), allowing for 5 GHz of contiguous bandwidth in each segment. Alignment with international band plans (ITU-R recommendations) ensures that operators can leverage a global ecosystem of equipment, leading to economies of scale, lower equipment costs, and greater availability of advanced technologies

(ii) Similarly, regarding Channelization - Standardized channel bandwidths should be prescribed (e.g., 250 MHz, 500 MHz, 750 MHz, 1000 MHz).. Contiguous large bandwidths are essential for achieving the multi-gigabit capacities that E-band promises, catering to 5G and future broadband demands.

(iii) Guard Bands: Appropriate guard bands (e.g., 125 MHz at the top and bottom of each 5 GHz segment, should be maintained to minimize out-of-band emissions and interference.

(iv) Carrier Aggregation - Carrier aggregation is the primary method for E-band radios to achieve capacities beyond 10 Gbps (e.g., 20 Gbps, 40 Gbps), which is vital for handling the exploding data traffic from 5G. TSPs should be allowed to combine multiple carriers (e.g., two 500 MHz carriers to create a 1 GHz aggregate).

(v) Validity Period of the Assignment - Minimum validity period should be 10 years. For administratively assigned backhaul spectrum common validity period is i10-15 years and in case of Access spectrum, validity period is 20-years. It will provide sufficient certainty for TSPs to plan their significant investments in network infrastructure (towers, equipment, deployment).

(vi) Surrender of the Spectrum - A clear and facilitated mechanism for voluntary

surrender of assigned E-band links, under specific conditions. TSPs should be able to surrender links that are no longer required (e.g., replaced by fiber, network re-optimization) without penalty. No Financial Penalty for Voluntary Surrender (beyond administrative charges) should be applied to encourage TSPs to return unused spectrum, rather than holding onto it to avoid penalties.

(vii) Roll-out Obligations - TSPs should be obligated to activate (commission and bring into commercial use) each assigned E-band link within three years of the a from the date of assignment of spectrum.

Q-24. What frequency range (57-64 GHz, or 57-66 GHz) in the V-band should be adopted for radio backhaul purposes? In case you are of the opinion that the 57-66 GHz range should be adopted for radio backhaul purposes, considering that the 66-71 GHz range is already identified for IMT, whether there is a need for provisioning a guard band between the 57-66 GHz range (for the backhaul purposes) and the 66-71 GHz range (for IMT)? If yes, what should be the guard band?
Kindly provide a detailed response with justifications.

IAFI Response:

There is an absolute and critical need for provisioning a guard band due to the following reasons.

1. Interference Mitigation - Guard bands are essential to prevent harmful interference between different services or uses operating in adjacent frequency bands. Without a sufficient guard band, the out-of-band emissions (unwanted signals spilling out of a device's intended channel) from V-band backhaul links could interfere with IMT receivers in the 66-71 GHz band, and vice versa.
2. Protecting Critical IMT Services: The 66-71 GHz band is identified for IMT, implying its use for high-speed mobile broadband, low-latency applications, and massive IoT connectivity. Interference to these services can have widespread economic and social consequences.

IAFI recommend that a guard band of at least 1 GHz possibly extending from 64 GHz to 66 GHz should be assigned, considering the typical channel bandwidths in V-band (e.g., 500 MHz, 1 GHz) and the power levels used for backhaul, a 1 GHz guard band provides a reasonable buffer to account for out-of-band emissions and filter roll-off characteristics.

Q-25. What should be the terms and conditions for the assignment of the spectrum in the V-band for radio backhaul purposes of commercial telecom services including the following aspects:

(i) Band plan;
(ii) Carrier size;
(iii) Carrier aggregation;
(iv) Renewal mechanism;

(v) Surrender of the spectrum;
(vi) Ceiling on the number of carriers (spectrum cap);
(vii) Criteria for the assignment of additional spectrum above the ceiling limit; and
(viii) Roll-out obligations etc.?

Kindly provide a detailed response with justifications

IAFI Response:

IAFI recommends that the 57-64 GHz range should be primarily be adopted for licensed radio backhaul purposes. Reasons for the suitability of the V-Band (57-64 GHz) for backhaul use have been explained above in Q-20/21 etc.

Terms and Conditions for V-Band Spectrum Assignment for Commercial Telecom Services (Radio Backhaul)

(i) Band Plan - The primary band for licensed backhaul should be 57-64 GHz.
(ii) Channelization: Prescribe standardized channel bandwidths. Given the total 7 GHz of spectrum available (57-64 GHz), allowing for channels such as 500 MHz, 1 GHz, and 2 GHz (paired FDD or TDD, depending on specific link design and equipment capabilities) would maximize flexibility and capacity.
(iii) Carrier Size - TSPs should be allowed to utilize various carrier sizes, from 250 MHz up to 2 GHz, depending on the link distance, required capacity, and specific equipment capabilities.
(iv) Carrier Aggregation - TSPs should be permitted to combine multiple carriers to achieve extremely high throughputs for their backhaul needs.
(v) Surrender of the Spectrum –A transparent mechanism for voluntary surrender of V-band backhaul links that are no longer needed by the TSPs to return unused spectrum to the common pool without penalty, should be designed.
(vi) Roll-out obligations - TSPs should be obligated to activate (commission and bring into commercial use) each assigned V-band link within a defined, timeframe (e.g., 3 years) from the date of assignment, depending up on the availability of the ecosystem.

Q-26. In case it is decided to earmark a few carriers in E-band and/ or V-band for services/ usages as "Access" and/ or "Integrated Access & Backhaul (IAB)",

(a) What quantum of spectrum in E-band and V-band should be earmarked for such services/ usages?

(b) What should be the eligibility conditions to obtain the spectrum in E-band and V-band for such services/ usages?

(c) What should be the terms and conditions for the assignment of spectrum in E-band and V-band through auction such as-

(i) Block size;

(ii) Minimum quantity for bidding;

(iii) Spectrum cap;

(iv) Validity period of the assignment;

(v) Roll-out obligations; and

(vi) Surrender of spectrum etc.?

(d) Should flexible use [i.e., radio backhaul, and last mile connectivity (fixed wireless access) to the customer equipment] be permitted in frequency ranges earmarked in E-band and/ or V-band for such services/ usages?

If yes, should the terms and conditions of the auction of spectrum be the same as those applicable for "access spectrum"? Responses with detailed justifications and international practices may kindly be provided for E-band and V-band separately.

IAFI Response:

Information desired in the question has already been asked above in Q-18 to Q-25 and suitably replied.

Q-27. Whether there is a need for earmarking certain quantum of spectrum in E-band and V-band for point-to-point connectivity requirements of captive (non-commercial/ non-TSP) users? If yes,-

(a) What quantum of spectrum in E-band and V-band should be earmarked for such purposes?

(b) What should be the terms and conditions for the assignment of spectrum such as:

(i) Carrier size;

(ii) Carrier aggregation;

(iii) Ceiling on the number of carriers;

(iv) Validity period of the assignment;

(v) Renewal mechanism;

(vi) Criteria for the assignment of additional spectrum above the ceiling limit;

(vii) Roll out obligations; and

(ix) Surrender of the spectrum etc.?

Responses with detailed justifications may kindly be provided for E-band and V-band separately.

IAFI Response:

IAFI is of the view that there is a strong need for earmarking a certain quantum of spectrum in both E-band and V-band for point-to-point connectivity requirements of Captive Non-Public Network (CNPN) users**,** promoting Industry 4.0 and future 5.0, enterprise digitization, and specialized private networks for critical infrastructure

Regarding E-Band (71-76 GHz, 81-86 GHz) and V-Band (57-64 GHz) for CNPNs:

(i) High Capacity for Enterprise Needs - Modern industrial and enterprise applications (e.g., smart factories, logistics hubs, data centers, large educational campuses, mining operations) require multi-gigabit connectivity for real-time data transfer, IoT sensor arrays, high-resolution video surveillance, and cloud integration.

(ii) Reliability and Control - CNPN users, especially in critical sectors (e.g., power,

defense, transportation, and manufacturing), need guaranteed connectivity, low latency, and control over their network for security and operational integrity

(iii) Limited Interference Footprint - E-band's highly directional nature and shorter propagation distances (compared to lower microwave bands) mean that CNPN links, if properly managed, will have a localized impact, minimizing interference with TSPs.

Quantum of spectrum in E-band/V-Band, to be earmarked for CNPN users

(i) A quantum of **2 x 250 MHz (paired)** should be readily available for each CNPN link. A provision for **2 x 500 MHz (paired)** should be available upon demonstrated higher capacity need.

(ii) A 250 MHz paired channel can provide several Gbps, which is sufficient for most initial CNPN high-capacity backhaul needs.

(iii) CNPNs are localized; their needs are "captive" and typically limited to a specific operational area.

(iv) Validity Period of the Assignment - Sufficient long-term period (minimum 10 years) for stability to CNPN users to invest in and integrate these crucial backhaul links into their operational technology (OT) systems.

(v) Renewal Mechanism - CNPNs are not commercial entities. Renewal should be straightforward if the original purpose and efficient use persist. Regular checks ensure the spectrum isn't being used commercially or left idle.

(vi) Roll-out obligations - Each assigned E-band link must be activated and operational within three years from the assignment date, to promote timely deployment for actual operational needs.

(vii) Surrender of the spectrum- CNPNs should be allowed for voluntary surrender without penalty, to ensure that spectrum is returned to the common pool for reassignment if no longer needed.

Q-28. In case your response to Q27 is 'no', in what manner should the point-to-point connectivity requirements of captive (non-commercial/ non-TSP) users be fulfilled? Kindly provide a detailed response with justifications.

IAFI Response:

No comments with regards to reply of Q-27.

Q-29. Whether it is feasible to allow low power indoor consumer device-to-consumer device usages on a license-exempt basis in the V-band in parallel to the use of the spectrum by telecom service providers for the establishment of terrestrial networks in a part or full V-band?

Kindly provide a detailed response with justification and international scenario.

IAFI Response:

IAFI strongly recommend for assigning a portion of the V-band, for the low-power indoor consumer device usage on a license-exempt basis, in addition to the use of the spectrum by telecom service providers for terrestrial backhaul networks. Main reasons are:

(i) High Atmospheric Absorption - Unique propagation characteristics of the V-band, particularly the strong oxygen absorption, peak around 60 GHz (within the 57-64 GHz range) is proving very useful for the low-power indoor consumer device. It causes very rapid signal attenuation over short distances (typically, signals drop off significantly after a few tens of meters to a hundred meters for low-power devices.
(ii) Benefit for Consumer Devices - This short range is ideal for indoor, high-speed, device-to-device like 8K video, wireless docking, VR/AR headsets, fast file transfers, because it allows for high spatial reuse. Devices in one room or adjacent apartments can use the same frequencies without interfering with each other.
(iii) Non-Interference, Non-Protection (NINP) Basis - License-exempt devices operate on a NINP basis. This means they must not cause harmful interference to authorized (licensed) services and cannot claim protection from harmful interference caused by authorized services. This regulatory principle forms the backbone of successful shared spectrum models.
(iv) Wide-spread Adoption: The V-band, particularly the 57-64 GHz range, is widely opened for license-exempt (unlicensed) use for consumer devices in numerous countries globally. The international experience demonstrates that coexistence between licensed backhaul links and low-power indoor consumer devices in the V-band is technically feasible and has been successfully implemented for years.
(v) Enhanced Consumer Experience – V-Band may enables ultra-fast wireless connectivity for indoor applications, greatly improving user experience for bandwidth-intensive activities like wireless VR, 4K/8K video streaming, and rapid data transfers between devices.

It is further suggested that to ensure successful coexistence, even with the inherent isolation, certain technical and operational parameters must be prescribed for the license-exempt devices:

(i) Strict Power Limits - Stringent maximum Equivalent Isotropically Radiated Power (EIRP) limits for consumer devices (e.g., around 10-20 dBm EIRP max, or even lower Power Spectral Density - PSD limits) can be defined, to keep interference footprint very small.
(ii) Indoor-Only Operation for LPI (Low Power Indoor) Devices -The primary mode for most consumer device-to-device use should be restricted to indoor environments. Building attenuation provides significant natural shielding.

Q-30. In case it is decided to allow low power indoor consumer device-to-device usages on a license-exempt basis in the V-band (57-64/66 GHz), -

(a) Should it be permitted in the entire V-band or only in a portion of the V-band? If it should be permitted only in a portion of the V-band, please specify the frequency range.

(b) In case it is decided to permit low power indoor consumer device-to-device usages on a license-exempt basis in the entire V-band, whether the 57-64 GHz range, or the 57-66 GHz range should be considered for such usages?

(c) What should be the carrier size/ channel bandwidth?

(d) What should be the definition of indoor usages?

(e) What technical parameters should be prescribed, including EIRP limits for low power indoor consumer device-to-device usages?

Kindly provide a detailed response with justifications and international scenario.

IAFI Response:

IAFI recommend that it should be permitted primarily in the 57-64 GHz portion of the V-band. Main reasons are:

(i) International Harmonization and Ecosystem - The 57-64 GHz range (often referred to as the 60 GHz band) is the most globally harmonized and widely used segment for license-exempt, short-range, high-speed consumer applications., so a mature ecosystem of chipsets, modules, and end-user devices (laptops, smartphones, VR headsets, wireless docking stations, smart TVs) already exists, leading to cost-effectiveness and ready availability.

(ii) The 57-64 GHz range falls within the peak of atmospheric oxygen absorption, limits outdoor range for backhaul, it's a significant advantage for indoor consumer use.

(iii) Clear Separation from IMT - The 66-71 GHz portion of the V-band has been identified for IMT (5G mobile access) globally. Maintaining a clear separation, with a guard band

Therefore, the specified frequency range for low-power indoor consumer device-to-device usages should be 57-64 GHz.

(iv) Regarding Bandwidth – it should be align with IEEE 802.11ad/ay standards, which define channel bandwidths suitable for multi-gigabit operation in the 60 GHz band. These typically include - 2.16 GHz (for 802.11ad) as a base channel and channel bonding in multiple 2.16 GHz channels (e.g., two, four, or eight channels) to achieve wider bandwidths (e.g., 4.32 GHz, 8.64 GHz) for 802.11ay.

(v) Maximum EIRP (Effective Isotropically Radiated Power) - Maximum EIRP for low-power indoor devices should be limited to around 10-15 dBm (10 mW to 30 mW), very low power level ensures that signals attenuate quickly and are contained within the indoor environment, minimizing the risk of harmful interference to outdoor licensed services.

(vi) Maximum Power Spectral Density (PSD) -A maximum PSD limit (e.g., EIRP per MHz or kHz) should also be prescribed (e.g., 5-10 dBm/MHz EIRP).

(vii) Similarly, stringent OOBE limits to be implemented to ensure that energy radiated outside the operating channel falls off very rapidly.

Q-31. Whether there is a need for permitting "outdoor" usages of V-band on a license-exempt basis? Kindly provide a detailed response with justification and international scenario.

IAFI Response:

IAFI is of the view that V-Band should not be permitted on a license-exempt basis for the outdoor usage due to the potential for interference to licensed services,

Q-32. If the response to the Q31 is in the affirmative, whether it is feasible to allow outdoor usages on a license-exempt basis in the V-band in parallel to the use of the spectrum by telecom service providers for the establishment of terrestrial networks in a part or full V-band? Kindly provide a detailed response with justification and international scenario.

IAFI Response:

No comments in view of reply of Q-31.

Q-33. In case it is decided to allow outdoor usages on a license-exempt basis in the V-band (57-64/ 66 GHz), -
(a) Should it be permitted in the entire V-band or only in a portion of the V-band? If it should be permitted only in a portion of the V-band, please specify the frequency range.
(b) In case it is decided to permit outdoor usages on a license-exempt basis in the entire V-band, whether the 57-64 GHz range, or the 57-66 GHz range should be considered for such usages?
(c) What should be the carrier size/ channel bandwidth?
(d) What technical parameters should be prescribed, including EIRP limits for low power indoor consumer device-to-device usages?

Kindly provide a detailed response with justifications and international scenario.

IAFI Response:

No comments in view of reply of Q-31

Q-34. Any other suggestions relevant to the assignment of the spectrum in E-band (71-76/ 81-86 GHz) and V-band (57-64/ 66 GHz) may kindly be made with detailed justifications.

IAFI Response:

General Suggestions

(i) Prioritize Licensed Telecom Service Provider (TSP) Backhaul and CNPN Needs Administratively - The Telecommunications Act, 2023, has correctly categorized backhaul spectrum for administrative assignment. E-band and V-band are vital for 5G and future network densification, FWA, and critical CNPNs. Prioritizing their administrative assignment ensures rapid, cost-effective deployment of the digital infrastructure necessary for India's economic growth and digital inclusion.
(ii) Technology Neutrality within Backhaul – It should be ensure the assignment framework for E-band and V-band is technology-neutral, allowing TSPs to deploy any technology

(e.g., FDD, TDD, advanced modulation schemes) that complies with the prescribed emission limits and technical parameters.

(iii) Periodic Review of Technical Parameters and Band Plans - Regular review (e.g., after 5 years) of the band plans, carrier sizes, power limits, and other technical parameters for both bands. This review should consider new ITU-R recommendations, global best practices, and the evolution of technology and market needs.

(iv) Clear Channelization within the 5 GHz Blocks - TRAI should publish a clear, preferred channelization plan (e.g., preferred center frequencies and bandwidths like 250 MHz, 500 MHz, 750 MHz, 1000 MHz channels) within the 71-76 GHz and 81-86 GHz segments.

Q-35. In case the 6 (lower)/7/13/15/18/21 GHz bands for radio backhaul of various commercial telecom services are assigned on a Point-to-Point (P2P) Link basis, should the spectrum charges be levied:

i. As a percentage of Adjusted Gross Revenue (AGR), or

ii. On a per carrier/link basis, or

iii. Through any alternative mechanism (please specify)? Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per link/per carrier charge.

IAFI Response:

<u>IAFI recommend the following:</u>

(i) MWA/MWB carriers 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.

(ii) 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.

(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.

Q-36. In case the 6 (lower)/7/13/15/18/21 GHz bands for radio backhaul of various commercial telecom services are assigned on a block basis for the entire Licensed Service Area (LSA), should the spectrum charges be levied:

i. As a percentage of Adjusted Gross Revenue (AGR), or

ii. On a per MHz or per carrier basis, or

iii. Through any alternative mechanism (please specify)?

Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per carrier/ MHz charge.

IAFI Response:

The pricing of backhaul spectrum in India are 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 rationalized.
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.

IAFI proposes that

(i) **MWA/MWB carriers 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.**

(ii) **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.**

Q-37. In case it is decided to assign some frequency spectrum in 6 (lower)/7/13/15/18/21 GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services through auction, then:

i. Should the auction determined price of other bands by using spectral efficiency factor serve as a basis of valuation for the above bands? If yes, which spectrum bands be related, what efficiency factor or formula should be used and what is the basis for the same? Please justify your suggestions.

ii. If response to question (i) above is no, what other methodology may be used. Please justify your suggestions.

IAFI Response:

This is a critical policy issue - whether to auction spectrum in traditional microwave backhaul bands (6 lower, 7, 13, 15, 18, 21 GHz) for last-mile connectivity (Fixed Wireless Access - FWA), and if so, how to price it.

Traditional microwave bands (6-21 GHz) have historically been used primarily for point-to-point backhaul (connecting cell towers to the core network), which is now subject to administrative assignment under the Telecommunications Act, 2023.

Fixed Wireless Access (FWA) is a last-mile broadband service to homes/businesses, often delivered using IMT (4G/5G) bands like 3.3 GHz/ 26 GHz.

The question hypothesizes a scenario where these traditional backhaul bands are used for FWA and auctioned. This is a significant policy shift, so requires a separate consultation process.

Q-38. In case it is decided to assign some frequency spectrum in 6 (lower)/7/13/15/18/21 GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services through auction, then:

i. **Should the auction determined price of other countries in 6/7/13/15/18/21 GHz spectrum bands for last mile connectivity and/or IMT services serve as a basis of valuation of microwave bands for last mile connectivity? What methodology should be followed for using this auction determined price as a basis for valuation? Support your suggestions with justifications and country-wise auction data.**

ii. **If the above approach is considered appropriate, should the international auction-determined prices be normalized to account for cross-country differences such as population, GDP, purchasing power parity (PPP), subscriber base, and other relevant factors? If so, should normalization be carried out by using the ratio of auction prices of spectrum bands within the same country to neutralize the impact of cross country differences? Alternatively, please suggest any other suitable normalization methodology that may be adopted in this context.**

iii. **Apart from the approaches highlighted above which other valuation approaches may be adopted for the valuation of 6(lower)/7//13/15/18/21 GHz spectrum bands? Please provide detailed information.**

IAFI Response:

Same as Q-37 above.

The question hypothesizes a scenario where these traditional backhaul bands are used for FWA and auctioned. This is a significant policy shift, so requires a separate consultation process

Q-39. What valuation methodology should be followed if it is decided to assign frequency spectrum in traditional microwave backhaul bands for flexible use (i.e. both backhaul connectivity and last mile connectivity) of commercial telecom services through auction? Please provide detailed justification.

IAFI Response:

Same as Q-37 above.

The question hypothesizes a scenario where these traditional backhaul bands are used for FWA and auctioned. This is a significant policy shift, so requires a separate consultation

process

Q-40. Should the spectrum charges for 6 (lower)/ 7/ 13/ 15/ 18/ 21 GHz bands for non-commercial/ captive backhaul use continue to be levied as per the M x C x W formula specified in the DoT's order No. P-11014/34/2009-PP dated 11.12.2023? Is there a need to revise this formula by inclusion of additional factors, modifying slab/factor values etc.? If yes, please specify which additional factors should be included and what should be the revised slab/factor values? Please provide detail of the same alongwith justification.

IAFI Response:

The fundamental difference between commercial telecom backhaul and non-commercial/captive backhaul is the **revenue-generating nature** of the underlying service. TSPs use backhaul to provide services for which they charge end-users. CNPNs use backhaul for their internal operations, where the value is in operational efficiency, safety, automation, and data transfer for their core business (e.g., manufacturing, logistics), not in direct telecom service revenue. High charges for CNPN backhaul would be a deterrent for industries looking to adopt advanced digital technologies (IoT, automation, real-time analytics) that rely on reliable internal connectivity. Enterprises, especially SMEs, need simple, predictable cost structures. A complex formula designed for large commercial operators might be cumbersome for CNPNs. For non-commercial use, the primary objective of spectrum allocation is enabling economic activity and societal benefit, not maximizing government revenue from spectrum fees.

Therefore, the spectrum charging mechanism for CNPNs should be an administrative fee aimed at recovering the cost of spectrum management, rather than a market-driven price.

Q-41. If the answer to above question is no, whether an alternative charging mechanism should be adopted for levying spectrum charges for 6 (lower)/ 7/ 13/ 15/ 18/ 21 GHz bands for non-commercial/ captive backhaul use? Please provide detailed justification.

IAFI Response:

There may be many approaches to device new method. I will be appropriate to that TRAI should start separate consultation, depending on the gravity of the issue.

Q-42. In case the E-band (71-76/ 81-86 GHz) is assigned for Radio backhaul purpose for various commercial telecommunication services and on a Point-to-Point (P2P) link basis, should the spectrum charges be levied:

i. As a percentage of Adjusted Gross Revenue (AGR), or

ii. **On a per carrier/link basis, or**

iii. **Through any alternative mechanism (please specify)?**

Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per carrier/link charge.

IAFI Response:

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

Q-43. In case the E-band (71-76/ 81-86 GHz) is assigned for Radio backhaul purpose for various commercial telecommunication services and on a block basis for the entire Licensed Service Area (LSA), should the spectrum charges be levied:

i. **As a percentage of Adjusted Gross Revenue (AGR), or**

ii. **On a per MHz or per carrier basis, or**

iii. **Through any alternative mechanism (please specify)?**

Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per MHz/per carrier charge.

IAFI Response:

IAFI is of the view that spectrum in E-bands should be assigned on an administrative basis, and it should be assigned only to TSPs with Access Service Authorisation.

Q-44. In case the V-band (57-64/66 GHz) is assigned for Radio backhaul purpose for various commercial telecommunication services and on a Point-to-Point (P2P) link basis, should the spectrum charges be levied:

i. **As a percentage of Adjusted Gross Revenue (AGR), or**

ii. **On a per carrier/link basis, or**

iii. **Through any alternative mechanism (please specify)?**

Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per carrier/ link charge.

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. The full V-band should be on licence-exempt basis and should be made available for all users and geographic areas.

Q-45. In case the V-band (57-64/66 GHz) is assigned for Radio backhaul purpose for various commercial telecommunication services and on a block basis for the entire Licensed Service Area (LSA), should the spectrum charges be levied:

i. As a percentage of Adjusted Gross Revenue (AGR), or

ii. On a per MHz or per carrier basis, or

iii. Through any alternative mechanism (please specify)?

Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per MHz/per carrier charge.

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.

IAFI supports in making the 57-64 GHz and if possible the 64-71 GHz frequency range available under a licence-exempt regulatory regime without the application of light-licensing. We do not believe that other licensed services should have access to 57-64 GHz but if there is a desire to licence then this should be in the 64-71 GHz band.

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 assign some frequency spectrum in E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access (last mile connectivity)/ Integrated Access Backhaul (IAB) through auction, then:

(i) Should the auction determined price of other bands serve as a basis of valuation for the above bands using spectral efficiency factor? If yes, which spectrum bands be related, what efficiency factor or formula should be used and what should be the basis for the same? Please justify your suggestions

(ii) If response to question (i) above is no, what other methodology may be

used? Please justify your suggestions.

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.

We are supportive in making the 57-64 GHz and if possible the 64-71 GHz frequency range available under a licence-exempt regulatory regime without the application of light-licensing.

Full 7 GHz band is required to support contactless ports, device to device data transfer, and motion sensing

Q- 47. In case it is decided to assign some frequency spectrum in E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access (last mile connectivity)/ Integrated Access Backhaul (IAB) through auction, then:

i. **Should the auction determined price of other countries in E- band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) serve as a basis of valuation of these bands? If yes, what methodology should be followed for using this auction determined price as a basis for valuation? Support your suggestions with justifications and country-wise auction data.**

ii. **If the above approach is considered appropriate, should the international auction-determined prices be normalized to account for cross-country differences such as population, GDP, purchasing power parity (PPP), subscriber base, and other relevant factors? If so, should normalization be carried out by using the ratio of auction prices of spectrum bands within the same country to neutralize the impact of cross country differences? Alternatively, please suggest any other suitable normalization methodology that may be adopted in this context.**

iii. **Apart from the approaches highlighted above which other valuation approaches should be adopted for the valuation of E- band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz)? Please provide detailed information.**

IAFI Response:

IAFI is of the view that spectrum in E-bands should be assigned on an administrative basis, and it should be assigned only to TSPs with Access Service Authorisation.

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

Q- 48. In case it is decided to assign some frequency spectrum in E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for point-to- point connectivity requirements of captive (non-commercial/ non- TSP) users, then:

(i) Should the spectrum charges for E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for point-to-point connectivity requirements of captive (non-commercial/ non-TSP) users may be levied as per the M x C x W formula as specified in the DoT's order No. P-11014/34/2009-PP dated 11.12.2023? Is there a need to revise this formula by inclusion of additional factors, modifying slab/factor values etc.? If yes, please specify which additional factors should be included and what should be the revised slab/factor values. Please provide detail of the same along with justification.

(ii) If the answer to above question is no, whether an alternative charging mechanism such as link to link charges as recommended in 2014 for levying spectrum charges for E and V bands for non - commercial/ captive backhaul use, should be adopted? Please provide detailed justification.

IAFI Response:

IAFI is of the view that spectrum in E-bands should be assigned on an administrative basis. Similarly, IAFI supports the unlicensed use of V-Band spectrum in the frequency band of 57-64 GHz frequency range.

Q-49. In case it is decided to assign some frequency spectrum in 6 (lower)/ 7/13/15/18/21 GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services and in E- band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access (last mile connectivity)/ Integrated Access Backhaul(IAB) through auction, then: Should the value of:

(a) 6 (lower)/7/13/15/18/21 GHz bands (for last mile connectivity)

(b) E-band (71–76/81–86 GHz) and V-band (57–64/66 GHz) (for Access (last mile connectivity)/IAB)

be determined using a single valuation approach? If yes, please indicate which single valuation approach or method should be adopted in each case and provide detailed justification

IAFI Response:

The question hypothesizes a scenario where these traditional backhaul bands are used for FWA and auctioned. This is a significant policy shift, so requires a separate consultation process

Q-50. 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 the above spectrum bands, or some other approach like taking weighted mean etc. should be followed? Please support your answer with detailed justification.

IAFI Response:

The question hypothesizes a scenario where these traditional backhaul bands are used for FWA and auctioned. This is a significant policy shift, so requires a separate consultation process

Q-51. In case it is decided to assign some frequency spectrum in 6 (lower)/ 7/13/15/18/21 GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services and in E- band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access(last mile connectivity)/ Integrated Access Backhaul (IAB) through auction, then:

What ratio should be adopted between the reserve price for the auction and the valuation of the spectrum in:

- **(a) 6 (lower)/7/13/15/18/21 GHz bands (for last mile connectivity)**
- **(b) E-band (71–76/81–86 GHz) and V-band (57–64/66 GHz) (for Access (last mile connectivity)/IAB) and why? Please support your answer with detailed justification.**

IAFI Response:

The question hypothesizes a scenario where these traditional backhaul bands are used for FWA and auctioned. This is a significant policy shift, so requires a separate consultation process

Q-52. In case it is decided to assign some frequency spectrum in 6 (lower)/ /13/15/18/21

GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services and in E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access(last mile connectivity)/ Integrated Access Backhaul (IAB) through auction, then:

What should the payment terms and associated conditions for the assignment of

- **(a) 6 (lower)/7/13/15/18/21 GHz bands (for last mile connectivity)**
- **(b) E-band (71–76/81–86 GHz) and V-band (57–64/66 GHz) (for Access (last mile connectivity)/IAB) relating to:**
  - **i. Upfront payment**
  - **ii. Moratorium period**
  - **iii. Total number of instalments to recover deferred payment**
  - **iv. Applicable interest rate for protecting the NPV of bid amount**

Please support your answer with detailed justification.

IAFI Response:

The question hypothesizes a scenario where these traditional backhaul bands are used for FWA and auctioned. This is a significant policy shift, so requires a separate consultation process

Q- 53. Any other suggestions relevant to the subject may be submitted with detailed justification.

IAFI Response:

IAFI recommend the following:

1. The spectrum for MWA and MWB should be assigned to TSPs with Access Service Authorisation for the entire LSA on an exclusive basis.

2. 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.

3. The spectrum charging mechanism for CNPNs should be an administrative fee aimed at recovering the cost of spectrum management, rather than a market-driven price.

4. IAFI suggest in making the 57-64 GHz and if possible the 64-71 GHz frequency range available under a licence-exempt regulatory regime without the application of light-licensing. V-band is already allowed on license-exempt basis world-wide except for a few countries.

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