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Consultation Paper on 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

Introduction:

The Global Satellite Operators Association (GSOA) welcomes the opportunity to respond to TRAI's Consultation on the assignment of microwave spectrum across several critical bands. As the global voice of satellite operators, GSOA supports policy frameworks that enable robust telecommunications development while safeguarding the continued operation of Fixed Satellite Services (FSS), which play a vital role in broadband connectivity, disaster response, broadcasting, and universal service delivery, especially in hard-to-reach areas.

Several of the bands under consultation, including 12.75–13.25 GHz, 14.5–15.35 GHz, and 17.7–21.2 GHz are used or shared with FSS, particularly those used for uplink operations. Any increase in terrestrial use, especially for backhaul or fixed wireless access, must be approached with care. Expanded use without proper coordination or interference management risks degrading satellite performance and service availability across India and globally.

In addition, GSOA notes broader policy trends around adjacent bands such as the de-licensing of 5925–6425 MHz and the ongoing interest in E-band and V-band for both access and backhaul. While these bands are not currently core to satellite services in India, they represent a growing area of interest for global satellite systems and may require future coexistence frameworks.

Throughout the response to the questions below we urge TRAI to prioritize coexistence studies, restrict the use of shared bands to point-to-point applications only, and uphold protections for FSS as a co-primary service under the ITU Radio Regulations. GSOA remains committed to constructive engagement and offers this submission to help ensure a balanced, forward-looking approach to spectrum management that serves both national development and global connectivity.



Response to questions:

Q1. 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.

The traditional microwave backhaul bands are critical to supporting mobile and fixed wireless infrastructure, particularly in regions where fiber deployment is not feasible. However, increased use of these bands must not come at the expense of satellite services that share co-primary status, particularly in the 13 GHz and 15 GHz bands. Demand exists, but a balance must be struck to ensure continued reliable operation of FSS, especially in frequency ranges that support essential services like disaster recovery, remote education, and broadband access in underserved regions.

Q2. 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.

Spectrum in these bands should primarily be assigned for point-to-point terrestrial backhaul services supporting mobile network operations. However, it is important that such use does not include point-to-multipoint (PTMP) or IMT-like services under the guise of backhaul. Such usage could introduce widespread interference risks, particularly in co-primary bands like 12.75–13.25 GHz, adversely impacting FSS operations.

Q3. 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.

A point-to-point link-based assignment is preferable in bands shared with FSS, such as 13 GHz, 15 GHz and 17GHz, to ensure granular control over interference and coexistence. In bands with minimal satellite presence, a hybrid model could be considered. A block assignment model is not suitable for shared bands, as it risks uncontrolled deployment of high-density terrestrial systems that may exceed acceptable interference thresholds for satellite services.

Q4. 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 158 to-point link-based assignments? Kindly provide a detailed response with justifications.

A shared basis, with strong coordination and interference mitigation protocols, is necessary in bands co-allocated to FSS (e.g. 13 GHz and 15 GHz). Exclusive use may be considered only in bands not used by satellite operators. The hybrid model could be applicable where national-level needs vary but should never compromise FSS protections.

Q5. 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.

Spectrum should be assigned for a definite period, aligned with international norms (e.g. 10–15 years), with periodic reviews to assess spectrum utilization, coexistence outcomes, and evolving technology landscapes. However, such assignments must always be conditional on non-interference with co-primary FSS services, which must retain protection under ITU Radio Regulations.

Q6. 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.

At a minimum it should be proportional to actual network needs and band-specific technical constraints, with safeguards to prevent spectrum hoarding. In co-primary FSS bands, spectrum should only be assigned on a per-link basis, with coordination required to ensure compatibility with satellite uplinks and downlinks.

Q7. 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.

Yes, ceilings should be maintained to prevent anti-competitive behavior and to ensure equitable access. More importantly, in shared bands (13 GHz, 15 GHz), any increase in carrier count must undergo coordination and sharing studies with satellite operators to avoid harmful interference.

Q8. 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.

Yes, spectrum caps should be imposed, particularly in bands co-allocated to FSS. Over-concentration increases the risk of aggregate interference and diminishes the ability of FSS operators to plan and expand services. GSOA is available to provide more technical studies to verify such interference

Q9. 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 WRC-27, 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.

GSOA strongly recommends that no changes be made to the regulatory framework or usage policies for the 7 GHz and 15 GHz bands prior to the conclusion of WRC-27. These bands are currently subject to ongoing technical studies under Agenda Item 1.7, and any premature reassignment or policy shift would be both procedurally unsound and potentially disruptive to co-primary FSS operations.

The 7.125–8.4 GHz and 14.8–15.35 GHz ranges are only under study for possible IMT identification. Until WRC-27 decisions are finalized and harmonized globally, making national policy changes would be speculative and could result in regulatory misalignment. Changing usage policies now would undermine investment certainty for existing users, particularly satellite operators who plan long-term infrastructure deployment.

Q10. 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.

GSOA strongly recommends a cautious and forward-looking policy framework for the 7 GHz and 15 GHz bands, especially in light of ongoing studies under Agenda Item 1.7 of WRC-27, which considers the possible identification of these bands - or portions thereof - for IMT (mobile broadband) use.

Specifically, the 15 GHz band (14.5–15.35 GHz) is already co-allocated on a primary basis to the Fixed-Satellite Service (Earth-to-space). Any change in usage or classification, particularly introducing wide-area IMT/mobile use would severely disrupt satellite operations and global coordination processes.

If the 7 GHz band (specifically 7.125–7.75 GHz) is considered for review, TRAI should identify sub-bands not shared with FSS as potential candidates for flexible future use, while reserving FSS-co-primary bands for fixed link and satellite coexistence only.

In summary, GSOA recommends maintaining current assignments and limiting use to point-to-point backhaul applications, with strong protection measures for FSS, while deferring any IMT-related decisions until the conclusion of WRC-27, this is because any transition of shared bands to IMT must be grounded in robust coexistence studies under ITU-R and take place only after WRC-27 concludes.

Q11. 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 telecommunication services?

Please provide a detailed response with justifications.

GSOA strongly advises against earmarking any portion of traditional microwave backhaul bands, in particular since they are shared bands such as 12.75 -13.25 GHz and 14.5 - 15.35 GHz for Fixed Wireless Access (FWA) to customer premises. These bands are primarily designated for point-to-point fixed services, and are co-allocated on a primary basis to FSS under the ITU Radio Regulations.

GSOA urges TRAI to preserve traditional microwave bands exclusively for backhaul and maintain strict point-to-point usage conditions, while encouraging last-mile FWA to be deployed in more appropriate bands designed for that purpose. This approach will protect satellite operations, ensure spectral harmony, and support both terrestrial and satellite connectivity goals.

Q12. 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.

GSOA reiterates that traditional microwave bands, particularly 12.75 -13.25 GHz and 14.5 - 15.35 GHz, which are co-primary with FSS should not be earmarked for FWA. These bands are designed for point-to-point fixed links and are critical for FSS uplink operations. Using them for FWA, which involves point-to-multipoint deployments, would create high interference risks and disrupt satellite operations.

However, if TRAI proceeds with earmarking despite these concerns:

- It should avoid FSS-shared bands (13 GHz, 15 GHz).
- Consider only bands without satellite use, subject to coexistence studies.
- Only licensed TSPs with valid use cases.
- Users must provide interference mitigation plans.

It should be noted that globally, FWA is typically deployed in higher waves bands or IMT-designated bands, not in traditional microwave backhaul or FSS-shared bands. Countries like the U.S. and UK prioritize interference-free coexistence and use spectrum coordination zones when necessary. Therefore, GSOA urges TRAI to preserve traditional microwave bands for point-to-point use only and avoid introducing FWA in bands shared with satellite services. If FWA must be introduced, strict safeguards are essential.

Q13. 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.

GSOA supports the inclusion of captive (non-commercial) users in microwave spectrum planning, provided such use remains limited to point-to-point applications and does not interfere with co-primary FSS operations. Spectrum earmarking for captive use should be carefully constrained, especially in sensitive bands like 12.75–13.25 GHz.

Q14. In case your response to Q13 is 'no', in what manner should the point-to-point connectivity requirements of captive (noncommercial/ non-TSP) users be fulfilled? Kindly provide a detailed response with justifications.

If point-to-point connectivity requirements of captive (noncommercial/non-TSP) users are not fulfilled through the conventional licensing or commercial telecommunications service provider (TSP) frameworks, an alternative approach should be considered that balances regulatory oversight with operational flexibility.

Q15. 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 link length for each of the traditional microwave backhaul bands?

Kindly provide a detailed response with justifications.

GSOA agrees, that prescribing minimum link lengths in traditional microwave backhaul bands is necessary to ensure efficient spectrum use, minimize interference, and harmonize spectrum policy for both commercial TSPs and captive users. Recommended minimum distances range from 0.3 km in very high-frequency short-range bands (V-Band) up to 5 km in lower-frequency long-range bands (e.g., 21 GHz), reflecting propagation characteristics and typical use cases.

Q16. 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.

If the Government decides to delicense the 6 GHz (5.925–6.425 GHz) for low-power applications, it is essential to prescribe specific measures to protect incumbent users such as FSS operators. These incumbent services are critical for reliable telecommunications and satellite operations, and without adequate safeguards, low-power devices could cause harmful interference that degrades or disrupts these essential links. To mitigate such risks, strict limits on transmit power, EIRP, and out-of-band emissions should be imposed on low-power devices. GSOA can provide more technical details in the reply stage of this consultation should TRA require it.

Additionally, geographical exclusion or protection zones around incumbent FSS earth stations should be established to prevent interference in sensitive areas. Dynamic interference avoidance techniques such as Dynamic Frequency Selection (DFS) and Automated Frequency Coordination (AFC) systems should be implemented, enabling low-power devices to detect incumbent signals and avoid occupied frequencies. A comprehensive and up-to-date registry of incumbent sites must be maintained to support coordination and enforcement efforts.

Furthermore, low-power devices must comply with internationally recognized technical standards – such as those developed by CEPT - to ensure consistent interference mitigation.

Q17. 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.

Whilst we recognize that the upper 6 GHz band (6425–7125 MHz) has been identified in many jurisdictions as suitable for licensed mobile use, which can provide ample additional bandwidth for 5G expansion. By making this upper portion available for licensed IMT services, India can ensure mobile operators have access to sufficient mid-band spectrum for network growth. This in turn reinforces the value of designating the lower 6 GHz band (5925–6425 MHz) for unlicensed use, enabling both licensed and unlicensed ecosystems to flourish in a complementary and efficient manner. Such a balanced approach supports diverse connectivity needs while avoiding undue pressure to repurpose additional lower bands for IMT.

Q18. 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.

No comment



Q19. 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.

No comment

Q20. For which commercial telecommunication services should the spectrum in E-band and V-band be assigned for radio backhaul purposes? Responses with detailed justifications may kindly be provided for E-band and V-band separately.

No comment

Q21. 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.

No comment

Q22. 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.

No comment

Q23. 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) Ceiling on the number of carriers (spectrum cap);
- (viii) Criteria for the assignment of additional spectrum above the ceiling limit; and
- (ix) Roll-out obligations etc.?

Kindly provide a detailed response with justifications.

No comment

Q24. 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.

No comment

Q25. 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) Validity period of the assignment;
- (v) Renewal mechanism;
- (vi) Surrender of the spectrum;
- (vii) Ceiling on the number of carriers (spectrum cap);
- (viii) Criteria for the assignment of additional spectrum above the ceiling limit; and
- (ix) Roll-out obligations etc.?

Kindly provide a detailed response with justifications

No comment

Q26. 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.

No comment

Q27. 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**
- (viii) Surrender of the spectrum etc.?**

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

No comment



Q28. In case your response to Q27 is 'no', in what manner should the point-to-point connectivity requirements of captive (noncommercial/ non-TSP) users be fulfilled? Kindly provide a detailed response with justifications.

No comment

Q29. 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.

No comment

Q30. 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.**

No comment

Q31. 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.

No comment

Q32. 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.

No comment

Q33. 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.

No comment

Q34. 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.

No comment

Q35. 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.

No comment

Q36. 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.

No comment



Q37. 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.

No comment

Q38. 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.**

Using international auction prices as a starting point for valuing microwave spectrum for last mile connectivity is appropriate if adjusted through normalization to reflect local market and economic conditions. In any case a transparent, data-driven, and context-sensitive methodology ensures fair spectrum pricing, incentivizes investment, and maximizes socio-economic benefits.

Q39. 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.

No comment



Q40. 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 $M \times C \times W$ 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 along with justification.

No comment

Q41. 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.

No comment

Q42. 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.

No comment

Q43. 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.

No comment

Q44. 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.

No comment

Q45. 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.

No comment

Q46. 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.

No comment

Q47. 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.

No comment

Q48. 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 $M \times C \times W$ 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.

No comment

Q49. 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

No comment



Q50. 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.

No comment

Q51. 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.**

No comment

Q52. 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 E175 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.**

No comment

Q53. Any other suggestions relevant to the subject may be submitted with detailed justification.

We recommend promoting flexible, technology-neutral licensing and encouraging spectrum sharing mechanisms to optimize efficient use of the 6/7/13/15/18/21 GHz bands. It is crucial to ensure clear regulatory certainty, especially to protect FSS operations from interference.



Particular attention must be given to preventing interference from multipoint fixed service, which pose a significant risk to FSS earth stations due to aggregate emissions. To address this, GSOA is ready to host a technical workshop presenting detailed studies on multipoint FS interference and its potential impact on FSS, helping regulators and stakeholders understand the challenges and adopt appropriate safeguards. We also urge regulatory frameworks to include effective interference management, incumbent protection, and coordination processes to balance new deployments with vital satellite and fixed link services.