



ITU APT Foundation of India (IAFI)

comments on

TRAI Consultation Paper regarding

**Auction of Frequency Spectrum in 37.0-37.5 GHz, 37.5-40.0 GHz,
and 42.5-43.5 GHz bands identified for IMT**

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Chapter 1

Introduction ITU-APT Foundation of India (IAFI)

The ITU-APT Foundation of India (IAFI) is a registered non-profit and non-political foundation registered under the Cooperative Societies Act of India. IAFI has been recognized by the International Telecommunication Union (ITU) as an international/ regional Telecommunications organization and has been granted the sector Membership of the ITU Radio Communications Bureau (ITU-R), ITU Development Bureau (ITU-D) and ITU Telecommunication Standardization Bureau (ITU-T). IAFI is also an affiliate member of the APT. IAFI has been working for the last 21 years to encourage the involvement of professionals, corporate, public/private sector industries, R&D organizations, academic institutions, and other agencies in the activities of the ITU and APT.

For more details regarding IAFI, please visit <https://www.iafi.in/>

Chapter 2

Executive Summary of views of IAFI

The Department of Telecommunications (DoT) vide dated 02.08.2023 requested the Telecom Regulatory Authority of India (TRAI) to provide recommendations for the auction of spectrum in the following frequency bands identified for IMT (5G).

S. No.	Frequency range	Quantum of spectrum available in each LSA (in MHz)
1.	37.0 - 37.5 GHz	500
2.	37.5 - 40.0 GHz	2,500
3.	42.5 - 43.5 GHz	1,000
4.	Total	4,000

The Hon'ble PM's 'Digital India' vision to transform the country into a digitally empowered society and knowledge economy requires enabling regulatory and business environment specifically on extensive usage of IMT bands. access to sufficient spectrum should be ensured with right regulatory conditions specifically with 37-37.5 GHz, 37.5-40 GHz and 42.5-43.5 GHz bands to be reserved for IMT usage since these can be used for proliferation of IMT-based broadband services.

These bands are capable of delivering extremely high data rates due to their wide bandwidth. It may be noted that these new bands are also classified as mm-Wave spectrum, like 26 GHz band and together these will enable further expansion of 5G/FWA services in the country. Since Telcos acquired the 26 GHz band across all LSAs in the 2022 Spectrum Auction and are now at various stages of deployment.

It is also pertinent to mention that these spectrum bands (37-37.5 GHz, 37.5- 40 GHz, and 42.5-43.5 GHz) can also be primarily deployed as mmWave spectrum for meeting back haul requirement for all licensed service providers due to the fact that these bands have- very high capacity and ultra-low latency requirement- to deliver higher bandwidths and therefore can be deployed for last mile connectivity and backhaul applications, high-capacity P2P links and Private Networks. Moreover, the deployment of mm Wave spectrum for IMT is not likely to be ubiquitous as it is likely to be used for creation of hot spots primarily. There are TSPs/ ISPs concentrates on specifically the Enterprise segment and requires allocation of backhaul mmWave spectrum to support Enterprise use cases, in order to make Indian enterprises competitive on global scale through adoption of Industry 4.0 solutions. In order to meet the Enterprise customer requirements, there is a need to create a new network to meet last mile access / connectivity requirement. Hence, it is important that these bands be assigned as soon as possible for all licensed service providers. Additionally, there are provisions in the Telecommunication Act, 2023 (notified on 24-12-2023) which provides for administrative allocation of spectrum in case of 19 exceptions. Notably, Radio backhaul for telecommunication services is one of the exceptions listed in the 'The First Schedule' to The

Telecommunications Act, 2023. With the above provisions, the Government could allocate the spectrum administratively for backhaul in parts of these bands

Furthermore, The 37.5-40 GHz, 40-42.5 GHz, and 42.5-43.5 GHz Frequency Bands are also experiencing growing demand for Space-based Communications. Therefore dynamic demands of space-based communications will be adequately met if various kinds of satellite applications are also permitted in the frequency bands 37.5-40 GHz, 40.0-42.5 GHz and 42.5-43.5 GHz through sharing methodologies thus enabling advanced satellite systems to undertake resource allocation in real time between gateway and customer stations to access to such large contiguous frequencies. This would enhance customer experience, thereby advancing customer welfare. High Altitude Platform Stations (HAPS) deployments should also be considered in the frequency band 38.0 to 39.5 GHz band to all TSPs, along with other entities. Such use of the fixed-service allocation by HAPS shall be in accordance with the provisions of Resolution 168 (Rev.WRC-23).

Therefore, before putting these bands to auction, it needs to be ensured that spectrum bands are clean, interference free and free of exclusion zones (if any) or limited exclusion zones. Specifically, the 37-38 GHz range is utilised for Space Research Services (SRS), the range 37.5-40 GHz facilitates hub operations (satellite to earth) and the range from 42.5-43.5 GHz is used for hub operations (earth to satellite) as well as Radio Astronomy Services (RAS). Therefore only portions of the bands that are clear and sharable should be put to auction.

In terms of spectrum valuation, the Authority's spectrum pricing exercise must emerge from the industry's incremental/aggregate RoCE (return on capital employed) and incremental/marginal revenue generation ability in the spectrum band(s) being valued. Each band should be valued based on its economic value and business case using the marginal revenue approach. Alternatively, since these spectrum bands will be auctioned for the first time in India, the valuation of these bands can be estimated by considering the combined weightage of the market value of 26GHz used in the most recent auction and its contribution to the revenue generation. This value should be further discounted to adjust for the comparative efficiency and propagation loss of these bands compared to the 26 GHz band. The reserve price should be taken as 50% of the valuation of the spectrum.

The international spectrum prices of other countries should not be used to serve as a basis for the valuation of these bands due to the level of maturity of the network and the social and economic parameters of India when compared with the referred international countries.

The allocation of spectrum bands should be consistent with the present licensing regime of Licensed Service Area (LSA) based allocation as the telecom networks have developed and designed basis LSA based regime. However, there is a case for licensing of these bands in small areas such as industry, campus, mines, factories, studios etc to promote industrial development of the country. Therefore some spectrum should be set aside for such local area networks.

Licensees that have met the rollout obligations once in 26 GHz band, should not have the obligations again in these bands. For new entrants, since the device and equipment eco-

system in these spectrum bands is yet to be developed to an extent to recommend rollout obligations and thus rollout obligations should not be levied.

Since the spectrum also has a coexistence requirement with the satellite services, an appropriate **protection/keep-off distance** may be prescribed between IMT stations and Satellite Earth Station Gateways. Also, prior to the auctions, the list of present/planned locations of satellite earth stations should be made available. Post auctions, a new hub station should be allowed to be established only in isolated areas with no existing or planned IMT base station.

For sharing with satellite services, ITU has published Recommendation ITU-R M.2161(<https://www.itu.int/rec/R-REC-M.2161/en>) This Recommendation contains guidelines to assist administrations to mitigate in-band interference from fixed satellite service earth stations operating in the frequency bands 24.65 25.25 GHz, 27-27.5 GHz, 42.5 43.5 GHz and 47.2 48.2 GHz into IMT stations. This should be implemented.

The **eligibility conditions for participation in the auction** should be in line with those prescribed for existing spectrum bands in the NIA 2024. The payment terms and conditions should ensure orderly and sustainable growth of the industry.

The frequency band of 37- 37.5 GHz band, 37.5- 40 GHz band and 42.5 – 43.5 GHz band is comparable to mmWave band (24.25- 27.5 GHz band), and hence the block size can be continued as 50 MHz and the minimum bidding quantity should be 400 MHz for new entrants who do not hold any spectrum in any mm-Wave band and 100 MHz for existing operators who already hold spectrum in any of the mm-Wave spectrum bands.

Regarding validity of spectrum assigned in these bands, since the technologically advanced countries like South Korea, USA and UK have also allocated the spectrum in these bands for shorter duration of 10 or 15 years and therefore, the same may be also be considered in India for these frequency bands.

Chapter 3

IAFI Response to TRAI Questions

TRAI consultation paper was examined in details and comments of IAFI are as follows.

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| <p>Q1. Whether the entire available spectrum in each of the frequency ranges (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz, should be put to auction for IMT? If no, please specify the quantum of spectrum in each frequency range to be put to auction. Kindly justify your response.</p> <p>Q2. In case you are of the opinion that any of the frequency ranges viz. 37-37.5 GHz, 37.5-40 GHz, and 42.5-43.5 GHz should be put to auction at a later date, what should be the timelines for auctioning of such frequency bands for IMT? Kindly justify your response.</p> |
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IAFI response:

Yes, all available spectrum in each of the frequency ranges (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz should be put to auction for IMT at the earliest. However at least a paired 250 MHz spectrum (FDD 250MHz x2) in the 37.5-40 GHz and 42.5-43.5 GHz bands should be kept reserved specifically for Microwave Point-to-Point (PTP) applications as a backhaul spectrum as it has the ability to deliver higher bandwidths to all the Licensed Operators. This reserved spectrum allocation should be done administratively on Point-to-point basis and all licensed operators should be eligible to obtain including TSPs with other than Access Service License/ Authorization along with other service entities.

The availability of these three new frequency ranges, in addition to the 26 GHz band, will enable the further expansion of 5G/FWA services in the country and will also be instrumental in deployment of Enterprise use cases. These bands have already been identified as the IMT bands and hence their increased usability for all licensed operators will only help accelerate the ecosystem development.

It is highlighted at the outset that as early as in 2022, the Authority, in its Recommendations¹ related to the 2022 Auctions (for IMT/5G bands), had itself observed that the frequency ranges 37-40 GHz bands have already been identified for IMT services by ITU, and thus these bands should made available for IMT services in India at the earliest.

However, some of the frequencies within these bands may also be used for other purposes, specifically Fixed Satellite Services (FSS), Space Research Services (SRS) or for Industrial purposes (CNPN networks) etc.

IAFI suggest the following:

- (i) The entire available spectrum, after setting aside the spectrum needed for other uses/services in each of the frequency ranges (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz, should be put to auction for IMT.
- (ii) Availability of clean spectrum is crucial. Hence, only parts of bands which are not planned to be used for widescale deployment by other users/services should be put to auction.
- (iii) For parts of the band where sharing is proposed/foreseen with satellite services, adequate information and necessary data regarding present/planned locations of SRS/satellite hub stations should be made available to TSPs. For sharing with satellite services, ITU has published Recommendation ITU-R M.2161(<https://www.itu.int/rec/R-REC-M.2161/en>). This Recommendation contains guidelines to assist administrations to mitigate in-band interference from fixed satellite service earth stations operating in the frequency bands 24.65 25.25 GHz, 27-27.5 GHz, 42.5 43.5 GHz and 47.2 48.2 GHz into IMT stations. This should be implemented.
- (iv) It is also recommended that the Spectrum for High Altitude Platform Stations (HAPS) deployments should be allocated administratively in the 38 to 39.5 GHz band to TSPs with other than Access Service License/ Authorization, along with other entities. Such use of the fixed-service allocation by HAPS shall be in accordance with the provisions of Resolution 168 (Rev.WRC-23).

¹ "Auction of Spectrum in frequency bands identified for IMT/5G", 11 April 2022

Q3. Do you agree that TDD-based duplexing configuration should be adopted in the country for the frequency ranges under consideration viz. (a) 37 - 37.5 GHz, (b) 37.5 - 40 GHz, and (c) 42.5 - 43.5 GHz, for IMT? If yes, considering that there is an overlap of frequencies in the band plans n260 (37-40 GHz) and n259 (39.5-43.5 GHz), how should the band plan(s) along with its frequency range be adopted? Kindly justify your response.

IAFI response:

Yes, TDD-based duplexing configuration should be adopted for the frequency ranges under consideration viz. (a) 37 - 37.5 GHz, (b) 37.5 - 40 GHz, and (c) 42.5 - 43.5 GHz, for IMT. The TDD-based configuration has been globally adopted for mm-Wave band spectrum. Since the device ecosystem is developed at a global level, it is appropriate to follow international standards in this regard.

Advantages of the adoption of TDD:

- a. TDD can be more spectrum-efficient in certain deployment scenarios, particularly where traffic demands are less predictable.
- b. TDD offers the advantage of dynamically adjusting the ratio of uplink and downlink capacity based on traffic patterns, useful in scenarios where usage may be asymmetric.
- c. TDD may reduce infrastructure costs as a single frequency band can be used for both uplink and downlink.

However, a paired 250 MHz spectrum (FDD 250MHz x2) in the 37.5-40 GHz and 42.5-43.5 GHz bands should be kept reserved specifically for Microwave Point-to-Point (PTP) applications as a backhaul spectrum as these bands have ability to deliver higher bandwidths to all the Licensed Operators.

Further, considering that there is an overlap of frequencies in the band plans n260 (37-40 GHz) and n259 (39.5-43.5 GHz), the operator should be free to choose any band plan as per 3GPP, depending on the availability of device ecosystem.

IAFI suggest that:

- (i) TDD-based configurations should be adopted for all the three frequency ranges (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz, for IMT.
- (ii) The choice of band plan should be left to the operator.

Q4. Whether the spectrum in the frequency ranges under consideration viz. (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz should be assigned for a validity period of 20 years, as prevalent in the existing frequency bands, or for a shorter validity period? In case you are of the opinion that a shorter validity period should be adopted, please suggest the validity period? Kindly provide your response with detailed justifications.

IAFI response:

The spectrum in these new frequency ranges under consideration viz. (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz being identified for IMT Services are unlikely to have eco-system fully developed from beginning of the allocation of the frequency in these bands and therefore , should be assigned for a for a period not less than 10-15 years or for 20 years.

1. Telecom is capital intensive sector with huge payback periods. Shorter validity periods may not provide sufficient time for TSPs to recoup their investments. 15-20-year validity period is a must for ensuring investment stability in the sector for such new frequency bands.
2. Further, the 15-20-year validity period has been working well for the past 30 years. 26 GHz band is also a mm-Wave band like these frequency ranges; and even that has been auctioned for 20 years as it has now evolved device and equipment ecosystem. Thus, there is no justification for changing the validity period for these specific bands.
3. Furthermore, longer validity periods have enabled technological development, with the same band being used for different technologies - 2100 MHz band was earlier deployed for 3G, but is now also used for 4G and can even be used for 5G; 900/1800 MHz bands were earlier used only for GSM, but are now used for LTE/5G. Shorter validity periods would discourage such innovation and evolution, due to lack of certainty on recovery of investments.

In view of the above, IAFI suggest that the spectrum in the frequency ranges (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz, should be assigned for a validity period of 15-20 years, consistent with the present approach (including in the 26 GHz band). However, since the technologically advanced countries like South Korea, USA and UK have also allocated the spectrum in these bands for shorter duration of 10 or 15 years and therefore, the same may be also be considered in India for these frequency bands.

In this context, it is also recommended that the Government should enable legal and policy framework allowing ISPs and Long-Distance service providers also to acquire spectrum in these bands through a spectrum auction at a very low reserve price with no rollout obligation for a period of minimum 10 years as these bands would not be having device and equipment ecosystem readily available in next 5-10 years. Therefore, we believe that those entities who would be opting for allocation of spectrum in these bands should be encouraged as they are taking risk by investing in these bands.

Q5. Whether the spectrum in (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz frequency ranges should be assigned for the existing licensed service areas (LSAs) for Access Service (i.e. Telecom Circles/Metros), or it should be assigned for smaller service areas? In case you are of the opinion that the spectrum in these bands should be assigned for smaller service areas, please suggest the criteria for defining such service areas? Kindly provide your response with detailed justifications.

IAFI response:

IAFI is of the view that the bulk of spectrum in the frequency ranges (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz, should be assigned LSA-wise, consistent with the approach followed in the case of the existing frequency bands (including 26 GHz band).

Further, it is recommended that a some spectrum in the 37.5-40 GHz and 42.5-43.5 GHz bands should also be kept shared with Microwave Point-to-Point (PTP) applications as a backhaul spectrum as these bands have ability to deliver higher bandwidths to all the Licensed Operators.

To ensure shared use of the high-frequency bands with satellite gateway stations that could enable cooperation between IMT and satellite gateway earth stations, TRAI may consider smaller license areas appropriately in specific locations where are special requirements, such as university campuses or industries to effectively utilize such large bandwidths in the areas of satellite earth stations. These should only be considered in areas where LSA wide allocation would not be possible due to existence of satellite earth stations.

Q6. What should be the block size, and the minimum quantity for bidding in (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz frequency ranges? Kindly justify your response.

IAFI response:

The block size in (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz frequency ranges should be a minimum of 50 MHz as it would not only provide flexibility to Telecom service providers to opt for quantum of spectrum required by them and it will also be in line with the earlier followed practice in the allocation of mm Wave band (24.25- 27.5 GHz band) having the block size of 50 MHz.

The minimum quantity for bidding should be 400 MHz for new entrants (who do not hold any spectrum in any mm-Wave band) and 100 MHz for existing operators (who already hold spectrum in any of the mm-Wave spectrum bands).

Q7. What provisions with respect to the spectrum cap per service provider in a licensed service area (LSA) should be made applicable for the frequency ranges under consideration viz. (i) 37-37.5 GHz, (ii) 37.5-40 GHz, and (iii) 42.5-43.5 GHz for IMT? Specifically, –

(a) Whether there is a case for a combined spectrum cap for 26 GHz band (24.25-27.5 GHz) and the frequency ranges under consideration? If yes, what should be the spectrum cap? Kindly justify your response.

(b) In case your response to (a) above is in the negative, whether spectrum cap should be prescribed separately for each frequency range viz. (i) 37-37.5 GHz, (ii) 37.5-40 GHz, and (iii) 42.5-43.5 GHz, or these frequency ranges should be combined for applicability of spectrum cap? What should be the spectrum cap(s)? Kindly justify your response.

IAFI response:

We support Option (a), i.e. Combined spectrum cap for 26 GHz band and the frequency ranges under consideration. This is being suggested since the propagation characteristics of mm Wave spectrum band is same for both of these frequency bands. Further, in case we go with the logic that band wise cap needs to be levied, then, in that case, it would require revision in application of spectrum cap in Sub GHz and 1800/ 2100/ 2300/ 2500 MHz band as well.

Q8. What should be the roll-out obligations for the assignment of spectrum in (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz frequency bands for IMT? Kindly justify your response.

IAFI response:

These frequency bands (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz represent a new frontier for mobile communications, with their potential for high-capacity mm-Wave 5G and beyond due to larger block sizes, a longer timeframe allows service providers to explore and develop innovative use cases specific to the Indian market, maximizing the potential of these higher frequency bands.

There should be no separate roll-out obligations in respect of the these frequency ranges, for such licensees who have already fulfilled roll-out obligations in the 26 GHz band, as the new bands would be utilized only to build additional capacity over and above the network coverage already deployed using 26 GHz band for 5G/FWA services.

. For new entrants, since the device and equipment eco-system in these spectrum bands is yet to be developed to an extent to recommend rollout obligations and thus rollout obligations should not be levied on account of following reasons:

- Deployment of mm Wave spectrum for IMT is not likely to be ubiquitous as it is likely to be used for creation of hot spots and provision of fixed wireless services specifically for Microwave Point-to-Point (PTP) applications and also High-Altitude Platform Stations (HAPS) deployments.
- The mm Wave spectrum band (26 GHz band) are similar to spectrum bands under discussion. The mm Wave spectrum was put to auction in July- August 2022 with rollout obligations. However, on account of lack of ecosystem, the spectrum remained unutilised by some of the TSPs, as a result, the Government is considering the waiving off the penalty amount. The matter is being consulted with TEC as well.
- When the ecosystem against the more popular spectrum band of 26 GHz is itself not developed so far, there would be no rationale in prescribing rollout obligations for the spectrum bands of higher frequency ranges.

Q9. Whether the eligibility conditions and associated eligibility conditions for participation in the auction for 37-37.5 GHz, 37.5-40 GHz, and 42.5-43.5 GHz should be kept analogous to the eligibility conditions and associated eligibility conditions for participation in the auction for spectrum for IMT, as defined in NIA 2024? In case your response is in the negative, suggestions may kindly be made with detailed justification.

IAFI response:

Yes, the eligibility conditions and associated eligibility conditions for participation in the auction for the 37-37.5 GHz, 37.5-40 GHz, and 42.5-43.5 GHz bands should be kept analogous to the eligibility conditions and associated eligibility conditions for participation in the auction for spectrum for IMT, as defined in NIA 2024.

Since the frequency ranges under consideration in the instant CP will also be used for 5G services like many existing spectrum bands, the inclusion of new bands in auctions cannot be allowed to become a trigger for changing eligibility conditions. Therefore, it is suggested that DoT should maintain a consistent approach in this regard.

Moreover, eligibility conditions specified in the NIA 2024 are quite flexible as they allow even non-licensees to bid for the spectrum, so long as they give an undertaking that they will procure the necessary license, i.e., UL (Access Service). Even for the 26 GHz band, which is a mm-Wave band spectrum like these new frequency ranges, the same eligibility conditions have been defined.

Therefore, the eligibility conditions for participation in the auction for the frequency ranges (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz should be in line with those prescribed for the existing spectrum bands in NIA 2024.

Additionally, we strongly recommend that the allocation of spectrum in these frequency bands can serve the purpose of provision of high-capacity point to point links for an Enterprise, and hence it is suggested that the eligibility criteria for the allocation of these bands should include TSPs other than Access Service providers including ISPs. The revision in the eligibility criteria

will certainly promote the usage /adoption of these spectrum and would give a boost to development of Enterprise based use cases.

Q10. To mitigate inter-operator interference due to TDD-based configuration, whether the approach adopted for 3300-3670 MHz and 26 GHz bands should also be made applicable for the frequency ranges under consideration viz. 37-37.5 GHz, 37.5-40 GHz, and 42.5-43.5 GHz, or some other provisions need to be created? In case you are of the opinion that some other provisions are required to be created, suggestions may be made with detailed justification.

IAFI response:

Yes. To mitigate inter-operator interference due to TDD-based configuration, the approach adopted for the 3300-3670 MHz and 26 GHz bands should also be made applicable for the frequency ranges under consideration viz. 37-37.5 GHz, 37.5-40 GHz, and 42.5-43.5 GHz.

Further, the following steps should be taken:

- (i) Implementation of dynamic TDD, wherein each cell in the network can adapt its uplink/downlink ratio depending on traffic requirement.
- (ii) Synchronize outdoor networks or adjacent frequencies of different TSPs.
- (iii) In case a TSP acquires more than one block, the entire spectrum should be assigned in a contiguous manner.
- (iv) Cross border interference issues can be avoided if a TSP is assigned same frequency spot across different LSAs.

Q11. Whether there could be any challenges in sharing of 37.5-40 GHz and 42.5-43.5 GHz spectrum frequency ranges between IMT and Satellite Gateway links? If yes, what challenges do you foresee and what measures could be adopted to mitigate such challenges? Kindly justify your response.

Q12. In case it is decided to share (i) 37.5-40 GHz, and (ii) 42.5-43.5 GHz spectrum frequency ranges between IMT and Satellite Gateway links, –

(a) Whether there is a need to prescribe a protection/keep-off distance between IMT stations and Satellite Earth Station Gateways? If yes, what should be the protection distance?

(b) What other parameters should be prescribed for the coexistence of IMT and Satellite Gateway links?

Suggestions may kindly be made with detailed justification.

IAFI response:

In case it is decided that sharing the (i) 37.5-40 GHz and (ii) 42.5-43.5 GHz spectrum frequency ranges between IMT and Satellite Gateway links would be appropriate, an appropriate protection/keep-off distance between IMT stations and Satellite Earth Station Gateways should be prescribed.

For sharing with satellite services, ITU has published Recommendation ITU-R M.2161(<https://www.itu.int/rec/R-REC-M.2161/en>) This Recommendation contains guidelines to assist administrations to mitigate in-band interference from fixed satellite service earth stations operating in the frequency bands 24.65 25.25 GHz, 27-27.5 GHz, 42.5 43.5 GHz and 47.2 48.2 GHz into IMT stations. This should be implemented.

Further, the deployment of spectrum bands (37–37.5 GHz, 37.5–40 GHz and 42.5–43.5 GHz) is not likely to be ubiquitous, rather it is more likely to be kind of hot spots or urban micro cells. Therefore, IMT stations and Satellite Earth station Gateway can co-exist in these frequency ranges. Due to significant propagation loss, achieving seamless coverage is a challenge, but at the same time, it provides an opportunity for sharing of spectrum with satellite earth stations.

Clear technical thresholds between space-based and terrestrial services ought to be defined in an event TRAI decides to share 37.5-40 GHz and 42.5-43.5 GHz spectrum frequency ranges between IMT and Satellite Gateway links. We support TRAI's recommendation² of gateway station deployments being placed outside of city limits, with IMT not using the aforementioned frequency ranges outside said limits. In such a scenario, frequency coordination among satellite and terrestrial service stations could be explored as a contingency measure in case technical thresholds are exceeded. For sharing with satellite services, we support Recommendation ITU-R M.2161(<https://www.itu.int/rec/R-REC-M.2161/en>)

However, in order to enable TSPs to take an informed decision regarding the acquisition of spectrum, the present/planned locations of satellite hub stations must be made available prior to auctions. Further, post auctions, a new hub station should be allowed to be established only in isolated areas with no existing IMT base station.

Therefore:

- (i) An appropriate protection/keep-off distance should be prescribed between IMT stations and Satellite Earth Station Gateways for the purposes of co-existence in the frequency ranges (i) 37.5-40 GHz, and (ii) 42.5-43.5 GHz.
- (ii) The Satellite Earth gateway station should be permitted to be established in the frequency bands under discussion, at uninhabited or remote locations.
- (iii) In order to enable informed decision making, the present/planned locations of satellite hub stations must be made available prior to auctions.
- (iv) Recommendation ITU-R M.2161(<https://www.itu.int/rec/R-REC-M.2161/en>) that provides guidelines to assist administrations to mitigate in-band interference from fixed satellite service earth stations operating in the frequency bands 24.65 25.25

² See section 6.7, Recommendations on Auction of Spectrum in frequency bands identified for IMT/5G (11 April 2022), available at https://www.trai.gov.in/sites/default/files/Recommendations_11042022.pdf.

GHz, 27-27.5 GHz, 42.5 43.5 GHz and 47.2 48.2 GHz into IMT stations. This should be implemented.

- (v) A software defined automated process on a portal may be created having database of coordinates of the proposed earth station in the spectrum bands under consultation. The geofencing coordinates of the proposed earth station in these spectrum bands under discussion, can provide the feasibility results through the portal for establishing earth station.
- (vi) An exclusion zone requirement can also be prescribed for coexistence of IMT and satellite earth station.

Q13. Whether the value of spectrum in 37–37.5 GHz, 37.5–40 GHz and 42.5–43.5 GHz spectrum bands be derived by relating it to the auction determined price/value of spectrum in any other band by using spectral efficiency factor? If yes, with which spectrum band, should these bands be related and what efficiency factor or formula should be used? Please justify your suggestions.

IAFI response:

These spectrum bands are being auctioned for the first time in India and there are no reference points or data related to the spectrum being auctioned, the following approach could be considered:

- The valuation of the spectrum in these bands can be estimated by considering the combined weightage of the market value of 26 GHz used in the most recent auction and its contribution to revenue generation. This value should be further reduced based on the comparative efficiency and propagation loss of these bands compared to the 26 GHz band.
- The valuation should also be further adjusted and rationalised depending upon the available quantum of the spectrum development status of the device and equipment ecosystem as well as the global adoption of that band.

Q14. Should international spectrum prices i.e. the auction determined price/reserve price of other countries in 37 – 37.5 GHz, 37.5 – 40 GHz and 42.5 – 43.5 GHz spectrum bands serve as a basis for the purpose of valuation of these bands? If yes, what methodology can be followed in this regard? Please provide detailed information.

IAFI response:

No.

The international spectrum prices of other countries in the 37-37.5 GHz, 37.5-40 GHz and 42.5-43.5 GHz spectrum bands should not serve as a basis for the valuation of these bands due to the differences in the levels of maturity of the respective network and of the social and

economic parameters of India when compared with the referred international countries. However, since there is no reference point for these bands in India, this approach could be considered an additional derivative in the process of valuation before being further normalised to adjust for the Indian telecom economics, i.e., ARPU, RoCE, rollout obligations and investment.

Q15. Apart from the approaches highlighted above which other valuation approaches should be adopted for the valuation of 37 – 37.5 GHz, 37.5 – 40 GHz and 42.5 – 43.5 GHz spectrum bands? Please support your suggestions with detailed methodology, related assumptions and other relevant factors, etc.

IAFI response:

The Authority's spectrum valuation approach must emerge from the industry's incremental/aggregate RoCE and incremental/marginal revenue generation ability in the spectrum band(s) being valued. Therefore, it should be valued based on its economic value and business case, using a marginal revenue approach.

Q16. Whether the value arrived at by using any single valuation approach for a particular spectrum band should be taken as the appropriate value of that band? If yes, please suggest which single approach/method should be used. Please support your answer with detailed justification.

Q17. In case your response to the above question is negative, will it be appropriate to take the average valuation (simple mean) of the valuations obtained through the different approaches attempted for valuation of a particular spectrum band, or some other approach like taking weighted mean etc. should be followed? Please support your answer with detailed justification

IAFI response:

The reserve price for all spectrum bands in the past has followed a combination of valuation models/approaches which have in turn led to the discovery of a price not sustainable in the long term. The success of some bands and unsuccessful auctions in other bands clearly indicates that there are factors beyond modelling (potential revenue, free cash flow and profitability) that impact the success of spectrum auctions.

So, there is a need to re-look at the approach for the valuation of spectrum such that it is able to balance the long term public good, continuous impact on the national economy and its growth due to investment in telecom infra with the one-time revenue opportunity of spectrum sale.

Therefore, the valuation of the respective spectrum bands should be based on their economic value and business case. In such cases, a marginal/incremental revenue approach should be the

preferred approach since it would be proportionate to the potential revenue generated by the additional spectrum bands acquired through auction.

Q18. What ratio should be adopted between the reserve price for the auction and the valuation of the spectrum in these spectrum bands and why? Please support your answer with detailed justification.

IAFI response:

The reserve price should not exceed 50% of the valuation of the band to ensure that the prices discovered in the auction are market driven.

Q19. What should the payment terms and associated conditions for the assignment of 37 – 37.5 GHz, 37.5 – 40 GHz and 42.5 – 43.5 GHz spectrum bands relating to:

- i. Upfront payment**
- ii. Moratorium period**
- iii. Total number of installments to recover deferred payments**
- iv. Rate of discount in respect of deferred payment and prepayment**

Please support your answer with detailed justification.

IAFI response:

The payment terms and associated conditions for the assignment of 37 – 37.5 GHz, 37.5 – 40 GHz and 42.5 – 43.5 GHz spectrum bands should be as follows:

- i. Upfront payment:** There should be no requirement of upfront payment.
- ii. Moratorium period:** At least a 6-year moratorium period should be allowed, in order for TSPs to be able to start realising revenues from the spectrum before they have to make the payments for the same.
- iii. Total number of installments to recover deferred payments:** A total of 14 annual instalments, after the 6 years moratorium period, should be fixed – with no upfront payment requirement. This will enable TSPs to invest in network rollout.
- iv. Rate of discount with respect to deferred payment and prepayment:** Huge interest on deferred spectrum payments defeats the purpose of allowing a moratorium. Therefore, no interest should be levied on deferred payments.

In case interest has to be levied, it should be at the repo rate, and not the SBI PLR/MCLR, as repo rate is adequate to protect the time value of money. SBI PLR/MCLR imposes unwarranted financial burden on TSPs.

Q20. Any other suggestion relevant to the subject, may be submitted with detailed justification.

IAFI response:

In addition to our submissions in Q1-19 above, there are certain other issues related to spectrum assignment, that need to be highlighted:

A. Spectrum Swapping:

Spectrum is a critical resource and a robust and comprehensive spectrum policy enhances and improves telecom services, which, in turn, supports the country's GDP growth. **The Hon'ble Prime Minister has set out the vision to transform the country into a digitally empowered society and knowledge economy by launching the 'Digital India' initiative. To achieve this ambitious goal, an enabling regulatory and business environment is necessary.**

Further, the Cabinet reforms of 2021 eased the regulatory framework on spectrum viz. the moratorium period for spectrum deferred payouts, option of surrender of spectrum after 10 years, zero spectrum usage charges (SUC) for future auctions, removal of additional SUC on shared spectrum, conduct of annual auctions, relaxation of terms & conditions of payouts, and so on. These measures have given the necessary impetus to industry. This is evident from the fact that India is witnessing one of the fastest 5G rollouts in the world.

In the same vein, **it is essential that the Government also consider a more flexible spectrum allocation policy by prescribing new/additional spectrum allocation methods apart from spectrum auctioning and trading.** This would improve the ease of doing business as well as ensure efficient utilisation of the spectrum.

In this regard, we suggest that **DoT allow the swapping of spectrum held by TSPs in one band with spectrum available with the Government in other bands.** Due to multiple factors, some of the existing spectrum holdings of the TSPs remain underutilised/stay idle in the spectrum pool of that TSP. In contrast, the same spectrum would be useful to other TSPs based on their business strategy. For better utilisation of the spectrum and to ensure minimal spectrum remains idle, TSPs should be allowed to exchange their existing holding of auctioned spectrum in one band with the spectrum available with the Government in another band that fits the business strategy of the TSP.

For example, one TSP may want to switch some part of its 1800 MHz spectrum holdings with 800/900 MHz of the spectrum band available with the Government based on its business requirements while being revenue neutral or positive. This can be done by paying the difference in amount, which can be calculated based on the last auction-determined price. If the auction determined prices are more than one year old, then the prevailing market rates could be determined by indexing the last auction

prices with interest as mentioned in the recent NIA for spectrum auction. By facilitating the same, better utilisation of spectrum resources can be ensured, without any loss to the exchequer. This will ensure that the TSPs have the right combination of various spectrum bands to support their business need and, more importantly, result in superior quality experience, which is the basic tenet and requirement of telecom policy.

Therefore, DoT should formulate a policy that allows TSPs to swap the existing spectrum in one band with another band that they need while being revenue neutral to positive to the exchequer.

B. Refund of Spectrum Charges on Surrender of Spectrum:

Clause 2.2(viii) of the Guidelines for surrender of Access Spectrum by Access Service Providers dated 15.06.2022 (“**Spectrum Surrender Guidelines**”), provides that “*On surrender of spectrum, no future instalments with respect to surrendered spectrum will be required to be paid after the date of surrender.*” However, clause 2.2(ix) provides that “*There shall be no refund of any payment made, either as full or partial upfront payment or instalments or pre-payments, towards the acquisition of such spectrum.*”

Thus, as per the current guidelines, if a TSP surrenders spectrum for which prepayment has been made, DoT does not refund any amount. However, if no prepayment has been made, no further instalments are required to be paid after surrender. This is not only discriminatory towards the TSPs who make part/full upfront/pre-payment of spectrum charges but it also discourages TSPs from making such upfront/pre-payments.

Further, it also deters TSPs who have made upfront/pre-payments from surrendering such spectrum, even if it is of no use to them – thus, resulting in the spectrum lying idle. This represents a loss of public good as well as a loss to the exchequer – as this spectrum, if surrendered, could have been put to auction and used for provision of services by some other TSP.

It is pertinent to mention here that the DoT itself, while seeking TRAI’s recommendations on the terms and conditions of surrender, had stated that “*the spectrum purchase dues for the remaining (post surrender) period will not be levied*” (as quoted in the 2022 Auctions Recommendations). However, the Spectrum Surrender Guidelines are not in line with the policy decision conveyed by DoT in its reference.

It is important that when a policy decision has been taken to waive future payments in case of surrender, it should be implemented both in letter and spirit. In the interests of parity and fairness, the benefit has to be provided in both situations – i.e., if no prepayment has been made, there should be no need for future payments; and if some amount has been pre-paid, the same must be refunded.

In case it is not possible to refund the spectrum charges, they should at least be adjusted with the deferred spectrum payments of the TSP, or with the charges for any spectrum acquired by the TSP in future auctions.

We recommend the following:

- (i) **The Spectrum Surrender Guidelines should be amended to provide for a refund of spectrum charges in case of surrender of spectrum.**
- (ii) **In the alternative, i.e., in case the spectrum charges cannot be refunded, they may be adjusted with the deferred spectrum payments of TSP, or with the charges for any spectrum acquired by the TSP in future auctions.**

C. No indexation of Auction-Determined Prices in case Spectrum remains Partially Unsold:

The Authority, in the 2022 Auctions Recommendations, had recommended that a fresh spectrum valuation exercise be conducted once every three years for existing bands. For auctions conducted in between such periodic valuation exercises, the last auction-determined prices should be duly indexed at MCLR for arriving at the reserve prices for the LSAs where the spectrum put to auction in the previous auctions was sold and over a year elapsed since the previous auction. Further, for the LSAs where the spectrum remained unsold in previous auctions, it was recommended to use the last reserve prices without any indexation.

We submit that **indexing the last auction-determined prices would inflate the reserve prices significantly. Everyone has witnessed how steep reserve prices have led to substantial portions of the spectrum on offer going unsold during the past few auctions.** For example:

- a) In the 2022 Auctions, more than 60% of each band put to auction (except for 5G spectrum, i.e., 3300 MHz and 26 GHz bands) remained unsold. The entire spectrum put to auction in the 2300 MHz bands was unsold. Moreover, even in the 800 and 900 MHz bands each, the spectrum sold was merely 13% and 17%, respectively.
- b) Further, 800 MHz spectrum was sold in only 4 circles out of 22 where it was put to auction. Similarly, spectrum in the 900 MHz band was sold in only 3 circles out of 21. There are multiple such instances where spectrum in crucial bands was sold but only in a measly quantity. For example:
 - i. In the 1800 MHz band,
 - In Andhra Pradesh and Himachal Pradesh LSAs, a meagre 27% of the spectrum put to auction was sold.
 - Whereas in LSAs like Mumbai and Kolkata, only 18% and 21% of spectrum was sold, respectively.
 - ii. In the 2100 MHz band in the Delhi LSA, only 33% of the spectrum was sold in the auction.

- iii. In the 2500 MHz band, 33% of the spectrum was sold in the Andhra Pradesh LSA.

The above clearly indicates that the available spectrum was not fully sold, thus representing a lack of demand at current prices. In this situation, **elevating the reserve prices (auction-determined prices indexed at MCLR) is counterproductive, since it serves the interests of neither the government nor industry.**

The spectrum left unsold and remained unused signifies a missed socio-economic opportunity for the nation. If auctioned, it could have been utilised to enhance network capacities, keeping pace with the escalating data usage, and extending services into remote rural areas to narrow the digital divide. Therefore, **any unwarranted inflation of reserve prices is unjustified and needs to be avoided at all costs.**

Further, the primary focus for the DoT should be to ensure sufficient spectrum availability at reasonable prices, regardless of the outcomes of previous auctions. In any case, there have been several instances where the valuation methodology employed by the Authority has resulted in reserve prices lower than that of the preceding auction. For example:

- a) The reserve prices for the 800 MHz band in the 2022 Auctions were lower than those in the 2021 Auctions in all LSAs except 5.
- b) Similarly, the reserve prices for the 1800 MHz band also were lower in the 2022 auctions in all LSAs except 3.

The fact that the 800 MHz and 1800 MHz spectrum bands got sold in those LSAs during the 2021 Auctions also did not prevent the Authority/DoT from recommending a lower reserve price.

Accordingly, **reserve prices should ideally be revised downwards or at least kept at the same level as the last auctions. In no case should the reserve prices be increased.** This will encourage TSPs to buy more spectrum. This spectrum, which would otherwise be lying unsold and unutilised, will actually generate revenue for the government and enable TSPs to provide better services to consumers – a win-win situation for all.

Without prejudice, in case auction-determined prices have to be indexed to arrive at reserve prices, it should be done only in cases where the entire quantum of spectrum put to auction got sold in the previous auctions, and not in cases where it remained partially unsold. Alternatively, in cases where spectrum remained partially unsold, there should be a clear-cut criterion as to when the auction-determined prices can be indexed – say, for example, when at least 75% of the spectrum on offer got sold in the previous auctions.

Therefore, we recommend the following:

- (i) Reserve prices should be revised downwards. They should not be increased in any case. Particularly for such high bands where the return on investments is quite low, the reserve price should be quite minimal.
- (ii) Without prejudice, auction-determined prices should be indexed only in cases where the entire quantum of spectrum put to auction got sold in the previous auctions, and not in cases where it remained partially unsold.
- (iii) Alternatively, in cases where spectrum remained partially unsold, there should be a clear-cut criterion as to when the auction-determined prices can be indexed – say, for example, when at least 75% of the spectrum on offer got sold in the previous auctions.

D. No indexation of Reserve Prices in case Spectrum was not put to Auction in the Previous Year:

It is evident from the 2022 Auctions Recommendations that it is only the auction-determined prices that can be indexed. **In cases where there is no auction-determined price, i.e., where the spectrum remained unsold or was not put to auction in the previous auctions, the past recommended reserve prices (without indexation) have to be used. There is no question of indexing the reserve prices.**

It has been observed that the above principle has been followed in calculating the reserve prices for the 2024 Auctions in all spectrum bands and circles, except for the 900 MHz band in the UP (East) circle, where the reserve prices have been arrived at after indexation of the past recommended reserve prices.

It is relevant to point out here that the 900 MHz band was not even offered for auction in the UP (East) circle in the 2022 Auctions and, thus, there is no auction-determined price available for the 900 MHz band. Therefore, in line with the 2022 Auctions Recommendations, the past recommended reserve prices (without indexation) must be used as the reserve prices for the purposes of the 2024 Auctions.

Therefore, we recommend that in cases where spectrum was not put to auction in the previous auctions, the past recommended reserve prices should be used without any indexation.

E. Calculation of Interest on Spectrum Installments:

As per the current practice on spectrum auctions, DoT has a 30-day window from the date of first payment to issue a frequency assignment letter. However, interest on the remaining amount becomes applicable even before the issue of the frequency assignment letter.

Therefore, we recommend that the interest on spectrum instalments should only be applicable from the date of issue of the frequency assignment letter and not earlier.

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