



16 May 2023

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TRAI

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**Subject: Consultation on Assignment of Spectrum for Space-based Communication Services**

Ref.: Consultation Paper No. 6/2023

Dear Sir,

Inmarsat is pleased to convey in the following our responses to the questions TRAI listed in the document in reference.

Inmarsat is an active satellite operator in India providing services in L- and Ka-band, with two gateway earth stations in Ghaziabad using C- and Ka-band, operated by BSNL. It is of utmost importance that the service continuity of those satellite systems providing Safety, mission critical mobile and IFMC services in India are not adversely affected by changes in the licensing regime related to the use of spectrum allocated to space services.

Satellite spectrum-orbital resources are a globally shared public good subject to international law contained in the ITU Radio Regulations. There is no precedent of spectrum auctions for satellite use in bands that can be shared between satellite operators (e.g., L/C/Ku/Ka bands). The very few countries that have auctioned satellite assets for domestic use (e.g., their national filed orbital slots) have either abandoned the practice (e.g., US from 2004 and Brazil from 2021) or have encountered difficulties with failed auctions (e.g., Thailand, Mexico).

Other arguments against the application of market spectrum allocation as auction to satellite-based communication services on the part of an individual country can be compiled as follows:

- Satellite networks operate in an inherently international and intricate regulated environment in terms of their use of spectrum, but also in relation to their orbital positions in space and coverage areas.
- Satellite spectrum allocations and orbit use require both considerable international approvals by the International Telecommunications Union (ITU) and detailed coordination of the spectrum with adjacent satellite operators, often involving foreign satellite companies and regulators.
- Satellite operators' business models and service designs (e.g., addressing markets with large differentiation) are different from terrestrial operators (normally addressing consumer mass markets), and it is better suited to administrative licensing methods (the global practice).



- Different from terrestrial cellular systems, that need exclusive access to spectrum, satellite systems share theirs, which is a much more efficient use of spectrum resources when made available to multiple users.
- Several legal hurdles arise for applying auctions to shared-spectrum use, including constraining national competition, as well as technical and economic issues.
- Auction mechanisms for shared-spectrum use are impractical; hence such an approach has not become an international practice.
- Hundreds of satellite systems are visible from the geostationary arc (GSO), and NGSO satellite systems would add many more. All these systems belong to different administrations, and all reuse and share the same spectrum.

Finally, it is worth noting that satellite companies rely on consistent and stable spectrum policies to design and invest in space-based networks. Because the lifetime of geostationary satellites is typically 15-20 years and that of a non-geostationary satellite network even longer, the sector is particularly disadvantaged by short-term fluctuations in regulatory or spectrum policies that could disrupt the intended use of these systems.

Inmarsat is a global satellite operator with almost 50 years of experience in providing services to most countries thanks to national regulatory regimes, which reflect the rights and obligations derived from the ITU Radio Regulations applicable to space services. This has also been the case in India.

While joining the opinions expressed by the satellite industry with respect to this consultation, Inmarsat would like to address in **Annex 1** some of the questions, which have direct relevance to its current and future satellite-based activities in India.

In order to adopt a constructive approach to this consultation, Inmarsat has included in the **Annex 2** the outline of a proposed methodology that could be used for the assignment of spectrum to space-based communication service networks in India.

Please contact the undersigned if you need any clarifications.

Yours sincerely,

A handwritten signature in black ink, appearing to be "Gautam Sharma", written over a horizontal line.

**Gautam Sharma**

MD-Inmarsat India

**Annexes: 2**



## ANNEX 1

### Inmarsat Comments to some of the Consultation Questions

**Q1. For space-based communication services, what are the appropriate frequency bands for (a) gateway links and (b) user links, that should be considered under this consultation process for different types of licensed telecommunications and broadcasting services? Kindly justify your response with relevant details.**

Inmarsat considers that no satellite frequency band should be considered under the consultation by virtue of the arguments exposed before that market-based spectrum allocation mechanism as auction are not applicable to satellite spectrum.

**Q2. What quantum of spectrum for (a) gateway links and (b) user links in the appropriate frequency bands is required to meet the demand of space-based communication services?**

Satellite services must have access to the full range of frequencies allocated in the ITU Radio Regulations (Article 5 Table of Frequency Allocation) as in most cases the satellite systems operate on a global basis and in all cases they share the spectrum with other satellite networks and sometimes with terrestrial systems. To add to this complexity, satellite spectrum has to be allocated also for feeder links (via gateway earth stations) and network management and control functions (space operations), in some cases within or adjacent to spectrum used for user links.

**Q10. In the frequency range 27.5-28.5 GHz, whether the spectrum assignee should be permitted to utilize the frequency spectrum for IMT services as well as space-based communication services, in a flexible manner? Do you foresee any challenges arising out of such flexible use? If yes, in what manner can the challenges be overcome? Kindly elaborate the challenges and the ways to overcome them.**

**Q11. In case it is decided to permit flexible use in the frequency range of 27.5 - 28.5 GHz for space-based communication services and IMT services, what should be the associated terms and conditions including eligibility conditions for such assignment of spectrum? Kindly justify your response.**

**Q12. Whether there is a requirement for permitting flexible use between CNPN and space-based communication services in the frequency range 28.5-29.5 GHz? Kindly justify your response.**

**Q13. Do you foresee any challenges in case the spectrum assignee is permitted to utilize the frequency spectrum in the range 28.5-29.5 GHz for cellular based CNPN as well as space-based communication services, in a**



**flexible manner? What could be the measures to mitigate such challenges? Suggestions may kindly be made with justification.**

The 28 GHz band (27.5-30 GHz) is a key spectrum resource for satellite communications and has long been chosen by Inmarsat to deploy its Global Xpress (GX) on a global basis, including in India to provide, i.a., IFMC services. The use of the 28 GHz band by earth stations in motion (ESIMs) is regulated by ITU Resolutions 156 (WRC-15) and 169 (WRC-19) to foster the deployment of broadband mobile-satellite communications using spectrum allocated to the fixed-satellite service. For that reason, ITU has decided not to identify the 28 GHz band for IMT use given that the sharing of that spectrum would not be feasible as it was recognised by ITU that “there is no specific regulatory procedure for the coordination of the earth stations in motion with regard to terrestrial services”.

For the above reasons, Inmarsat would not recommend that the 27.5-28.5 GHz continues to be identified in the NFAP 2022 to IMT use or CNPN in the band 28.5-29.5 GHz on a shared basis with ESIMs. In addition, this shared use results in potential compatibility issues around the existing and licensed Inmarsat gateway earth station, where IMT receiving base stations could be subject to harmful interference.

**Q15. What should be the methodology for assignment of spectrum for user links for space-based communication services in L-band and S-band, such as-**  
**(a) Auction-based**  
**(b) Administrative**  
**(c) Any other?**

Inmarsat operates L-band mobile-satellite service (MSS) systems on a global basis, which includes the GSPS services in India provided by our local partner BSNL, which operates the GSPS gateway earth station in Ghaziabad.

The use of the MSS L-band is regulated by international law contained in Articles 9 and 11 of the Radio Regulations as well as Resolution 222 (REV.WRC-12), which establishes special procedures including holding bilateral and multilateral planning meetings. These particular procedures add to the complexity of the use of the L-band, such that auction-based methodology for spectrum allocation cannot be applied.

**Q16. What should be the methodology for assignment of spectrum for user links for space-based communication services in higher spectrum bands like C-band, Ku-band and Ka-band, such as**  
**(a) Auction-based**  
**(b) Administrative**  
**(c) Any other?**

The C-band is used in India to provide feeder links (6/4 GHz bands) for Inmarsat GSPS, which provides critical phone services to Governmental agencies. The Ka-band is currently used in India to provide IFMC services using Inmarsat GX network. Therefore, in order to ensure continuity of these service, administrative spectrum assignment methodology should be used.

**Q19. What should be the methodology for assignment of spectrum for gateway links for space-based communication services, such as**



- (a) Auction-based**
- (b) Administrative**
- (c) Any other?**

**Q33. What could be the likely issues, that may arise, if Option # 1: (Area specific assignment of gateway spectrum on administrative basis) is implemented for assignment of spectrum for gateway links? What changes could be made in the proposed option to mitigate any possible issues?**

**Q34. What could be the likely issues, that may arise, if Option # 2: Assignment of gateway spectrum through auction for identified areas/ regions/ districts is implemented for assignment of spectrum for gateway links? What changes could be made in the proposed option to mitigate any possible issues? In what manner, areas/ regions/ districts should be identified?**

**Q35. In your view, which spectrum assignment option for gateway links should be implemented?**

BSNL operates two gateway earth stations to provide Inmarsat services in India, which were granted spectrum rights administratively. Given that gateways normally share spectrum with other satellite networks as a result of coordination processes, the only methodology for assigning of spectrum for gateway links for space-based communication services is administrative.



## Annex 2

### Outline of the Proposed Methodology for Satellite Spectrum Assignment

The request for the authorization to use spectrum (in the frequency bands -TO BE DETERMINED) and orbit (geostationary or non-geostationary) to provide satellite services in India must contain an indication of the ITU filings of the satellite networks and the name of the satellite or the indication of the system to be associated with the authorization, as well as the orbital position/constellation data, frequency bands, geographic coverage area, the period requested for the right of exploitation, and the agreements of necessary coordination with other satellite networks.

For satellite networks to be authorized to operate in India, coordination is required with previously authorized satellite networks having ITU coordination priority, which operate in the same frequency bands.

In frequency bands subject to the provision of ITU Radio Regulations No. 22.2, non-geostationary satellite systems must not cause unacceptable interference or claim protection from geostationary satellite networks. Hence, the need to present a coordination agreement does not apply between non-geostationary and geostationary systems, in these frequency bands.

In the event of coordination between non-geostationary satellite systems or between non-geostationary and geostationary satellite networks or between geostationary satellite networks, if one or more coordination agreements are not presented, the responsible satellite operator may request the authorization to use spectrum and orbit to provide satellite services in India without the right to protection against harmful interference and provided that its operation does not cause harmful interference in relation to those systems whose agreement was not obtained, without prejudice to the obtaining of coordination agreements after the acquisition of the authorisation.

Public consultations may be carried out on the intention to grant the authorizations, requesting comments on possible technical incompatibilities or any other point considered relevant.