INDIAN SPACE ASSOCIATION
ISpA
Bhumandal Se Brahmaand Tak

November 1, 2024

To,
The Advisor (Networks, Spectrum and Licensing)
Telecom Regulatory Authority of India
Mahanagar Door Sanchar Bhawan
Jawahar Lal Nehru Marg
New Delhi - 110002

Subject: Counter Comments on TRAI Consultation Paper on "Terms and Conditions for the Assignment of Spectrum for Certain Satellite-Based Commercial Communication Services"

Dear Sir,

1. On behalf of the Indian Space Association (ISpA), we are hereby submitting our original comments as counter comments, as suggested, regarding the TRAI Consultation Paper on "Terms and Conditions for the Assignment of Spectrum for Certain Satellite-Based Commercial Communication Services."

2. We would like to inform you that additional comments from our stakeholders on request from our members,

3. We appreciate the opportunity to participate in this important consultation and remain available for any clarifications that may be required.

Best Regards,

Lt Gen AK Bhatt (Retd)
PVSM UYSM AVSM SM VSM
Director General
Indian Space Association (ISpA)

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A. Executive Summary

1. On behalf of the Indian Space Association (ISpA), we extend our sincere gratitude to the Telecom Regulatory Authority of India (TRAI) for the opportunity to respond to the consultation paper on "***Terms and Conditions for the Assignment of Spectrum for Certain Satellite-Based Commercial Communication Services***."

2. ISpA strongly advocates for the administrative allocation of spectrum for satellite services, both for NGSO-based Fixed Satellite Services (FSS) and GSO/NGSO-based Mobile Satellite Services (MSS). This approach is crucial for the following reasons:

(a) **Global Alignment:** Administrative allocation aligns with international best practices for satellite spectrum management and ITU frameworks.

(b) **Ecosystem Development:** It supports the growth of India's satellite industry ecosystem, encouraging innovation and investment.

(c) **Efficient Utilization:** Administrative allocation allows for more flexible and efficient use of spectrum, particularly important for the dynamic nature of satellite constellations.

3. **Economic Benefits:** This approach can accelerate the deployment of satellite services, bringing economic and social benefits, especially to rural and remote areas. It supports the goals of Digital India, "Broadband for All," and the vision of a 1 Trillion USD Digital Economy by 2025. Key recommendations include:

(a) **Spectrum Charging:** We recommend implementing AGR-based charging at 1% or lower of Adjusted Gross Revenue to support industry growth and investment. This approach recognizes the fundamental differences between terrestrial and satellite operations, where spectrum can be shared among multiple operators.

(b) **Flexibility in Assignment:** Support block-based assignments rather than carrier-by-carrier basis to enhance operational efficiency and reduce administrative burden.

(c) **Interference Management:** Rely on ITU frameworks for coordination, with updates to EPFD limits that reflect current technological capabilities, particularly for NGSO systems.

(d) **Roll-out Obligations:** Support TRAI's recommended obligations with deployment of at least one satellite gateway earth station within twelve months of frequency assignment.

(e) Regulatory Framework: Implement a forward-looking, technology-neutral framework that recognizes the unique characteristics of satellite services.

4. **Technical Considerations:**

(a) **Frequency Bands:** Support flexible spectrum assignments throughout Ka-band frequencies and recognize Q/V-bands as critical for NGSO system expansion.

(b) **Assignment Period**: Recommend 20-year assignment periods, co-terminus with license, to provide investment security while maintaining flexibility.

(c) **Gateway Sites:** Support collocation of NGSO and GSO earth stations through coordination rather than mandatory separation distances.

5. **Administrative Efficiency:**

(a) **Processing Timeline:** Recommend 30-day processing window from in-principle clearance for spectrum assignments.

(b) **Single Agency Contact:** Support streamlined procedures through a single government agency interface.

(c) **Simplified Licensing:** Advocate for streamlined customer terminal licensing processes.

6. ISpA believes that administrative allocation, coupled with these recommendations, will position India as a leader in the global satellite communications market, drive digital inclusion, and support the nation's broader economic and social development goals. This approach will ensure efficient spectrum utilization, foster a competitive market environment, and ultimately benefit consumers through improved connectivity and services.

7. Satellite-based communication systems can provide coverage to the remotest and most inaccessible areas of a geographically widespread country like India. At present, many sparsely populated areas, including those of strategic importance and those important from a socio- economic perspective, do not have mobile terrestrial coverage or other forms of connectivity. Communication satellites have the potential to bridge this gap by providing services to even the remotest areas. They can also cater to strategic defense requirements and improve the disaster resilience of the country.

8. Although traditional markets (rural, remote, hitherto unconnected & Government strategic locations/areas, specific applications/locations of Enterprises, in-flight & maritime) are primary targets for SatCom to serve conventional use cases in the non-retail segment (e.g., SatCom connectivity-based solutions for Defense, public sector undertakings, government agencies, enterprises, In-flight and Maritime communication (IFMC), cellular backhaul, disaster response, etc.), there are some NGSO satellite operators who are creating massive capacity and may offer predatory pricing to consumer (B2C) segment in urban markets, which might have negative impact on existing Satcom Eco-system.

9. Therefore, in order to ensure overall growth of SatCom ecosystem and investments, it is crucial that such issues are adequately addressed while framing the policy and regulatory framework of spectrum pricing for SatCom. The Authority must keep vigil on large-capacity SatCom operators from resorting to predatory pricing.

10. TRAI and the Government should price the satellite spectrum in a manner that addresses the concerns related to fair pricing. Additionally, the traditional use cases of satellite services for the traditional market i.e. in rural and remote areas and for Government agencies, including Defense, disaster recovery, enterprises, IFMC, cellular backhaul in rural and remote areas, etc., can be priced differently (say, no spectrum charge).

11. Our question-wise response below should be read in light of the submissions made above. We thank TRAI for its consideration and look forward to further engagement on this critical issue for India's digital future.

B. ISpA Response to Issues for Consultation

Q1. Which frequency band(s)/ range(s) should be considered for the assignment to NGSO based Fixed Satellite Services for providing data communication and Internet service? Please provide a detailed response separately for the user link and feeder link.

Response:

The assignment of frequency bands for NGSO-based Fixed Satellite Services (FSS) should align with international standards and practices, established by the International Telecommunication Union (ITU) in Article 5 of the ITU Radio Regulations (ITU-RR). The frequency bands for space-based communications services should continue to be governed based on ITU Radio Regulations (ITU RR), which also form the basis of India's National Frequency Allocation Plan (NFAP). Based on current global trends and technological advancements .

Additionally, as other frequency bands become congested, the spectrum in the Q/V-bands represent a critical opportunity for the expansion of NGSO systems. Satellite operators already use the Q/V-bands for FSS today, and those bands will continue to be important for NGSO systems.

Q2. Which frequency band(s)/ range(s) should be considered for the assignment to GSO/ NGSO based Mobile Satellite Services for providing voice, text, data, and Internet service. Please provide a detailed response separately for the user link and feeder link.

Response:

No comments.

Q3. What should be the maximum period of assignment of spectrum for -

(a) NGSO based Fixed Satellite Services for providing data communication and Internet services, and

(b) GSO/ NGSO based Mobile Satellite Services for providing voice, text, data, and Internet services?

Please provide a detailed response along with international practice in this regard.

Response:

Given that the Indian government has recently opened the space communication segment for private participation, a 20 -year period provides a good balance between investment security and regulatory flexibility and Spectrum assignment be co-terminus with the license. We recommend the following maximum periods for spectrum assignment:

(a) For NGSO-based FSS: 20 years

(b) For GSO/NGSO-based MSS: 20 years

A spectrum assignment period of twenty (20) years would account for the investment required to provide satellite services and the time to implement and deploy a satellite network.

Justification:

1. Investment Recovery: Satellite systems require significant upfront capital investment. A 20-year period allows operators sufficient time to recover their investments and achieve profitability. This is particularly important for the nascent space industry in India.

2. Technological Lifecycle: This timeframe aligns with the typical operational lifespan of satellite constellations, particularly for NGSO systems. It also provides a balance between long-term certainty and the flexibility to adapt to technological advancements.

3. Market Stability: A 20-year assignment provides long-term certainty for operators, encouraging investment in infrastructure and service development.

4. Flexibility for Evolution: While providing stability, this period also allows for periodic reassessment of spectrum usage and incorporation of technological advancements.

5. Administrative Efficiency:

- Co-terminus with license period
- Simplified regulatory oversight
- Reduced administrative burden

However, it is critical that all necessary regulatory requirements are clarified by the regulator/licensor at the earliest. Considering the nascent nature of this industry and the need for urgent utilisation of already available satellite resources, the Authority can also consider a lesser validity period, say 10-15 years, to enable an early launch of services.

Q4. For assigning spectrum for NGSO-based communication services, whether every ITU filing should be treated as a separate satellite system? Please provide a detailed response along with international practice in this regard.

Response:

Assignment to NGSO-based communications systems should be done per IN-SPACe authorisation and not per ITU filing. Moreover, the spectrum assignment serves a different function than the ITU filings.

The assignment of spectrum also addresses gateway stations and customer terminals. Additionally, the assignment of spectrum must provide business certainty by means of continuous availability of spectrum and licenses, whereas the ITU filings facilitate global coordination of the satellite system.

Q5. Whether the provisions of ITU-RR are sufficient to resolve interference related challenges and coordination issues? If not, what additional conditions should be prescribed while assigning frequency spectrum for –

(a) NGSO based Fixed Satellite Services for providing data communication and Internet services; and

(b) GSO/ NGSO based Mobile Satellite Services for providing voice, text, data, and Internet services?

Please provide a detailed response alongwith international practice in this regard.

Response:

The provisions of ITU-RR are sufficient to resolve interference-related challenges and coordination issues. There is no need for prescribing any additional conditions while assigning frequency spectrum for NGSO-based Fixed Satellite Services for providing data communication and Internet

services and GSO/NGSO-based Mobile Satellite Services for providing voice, text, data and Internet services.

Q6. For satellite earth station gateways of different satellite systems operating in the same frequency range, whether there is a need to prescribe a protection distance or any other measures to avoid interference from each other–

(a) Between the gateways of GSO and NGSO systems; and

(b) Between the gateways of NGSO systems?

If yes, please provide a detailed response along with international practice in this regard.

Response:

For satellite earth station gateways of different satellite systems operating in the same frequency range, an appropriate **'coordination distance'** may be prescribed between the gateways of GSO and NGSO systems, and between the gateways of NGSO systems, to avoid interference from each other.

Generally, two gateway stations operating in the same direction of transmission and reception do not interfere with each other. However, there is a possibility of interference when gateway stations of different satellite networks operate nearby.

In order to prevent harmful interference, an appropriate 'coordination distance' may be prescribed, requiring an operator wishing to set up a new gateway station within such distance of an existing gateway station to coordinate with such existing gateway station.

Q7. In case the spectrum assigned for satellite gateway links is also assigned to terrestrial networks such as Fixed Service, IMT etc., what protection distance or criterion should be included in the terms and conditions of the assignment of spectrum for satellite gateway links to avoid any interference to/ from terrestrial networks? Please provide a detailed response along with international practice in this regard.

Response:

In case the spectrum assigned for satellite gateway links is also assigned to terrestrial networks such as Fixed Service, IMT, etc., the protection distance or criterion to be included in the terms and conditions of the assignment of spectrum for satellite gateway links to protect them from interference to/from terrestrial networks, **would depend on the technical characteristics of the satellite earth station and the co-located IMT Base Station, keeping into account the propagation models of both the system in that specific terrain** .

Any presence of IMT or other services including satellite user terminals, fixed or mobile, within the vicinity of the gateway locations could create potential interference. It is advisable that instead of a coordination threshold distance, a power flux-density (PFD) threshold or another technical threshold for such coordination be adopted.

Further, as captured in TRAI's Consultation Paper "Assignment of Spectrum for Space-based Communication Services" dated 06.04.2023, DoT has stated that, "***Coexistence of satellite networks or satellite-based communication within the country is ensured through various provisions in RR, ITU recommendations, WRC Resolutions, NFAP and License conditions for the satellite and MW services.*** *... Moreover, as per the current practice to assign spectrum administratively, all frequency assignments/operations are issued on non-interference/non-protection basis.*" We concur with DoT in this regard.

To mitigate interference, ITU prescribes varying measures in ITU-RR which have been duly captured by the Authority in the instant Consultation Paper. In view of the above, there are **sufficient mechanisms and processes that exist under the ITU framework[1] and global best practices that can and should be leveraged.**

Q8. In case the spectrum assigned to the satellite user link is also assigned to terrestrial networks such as Fixed Service, what criterion should be included in the terms and conditions of the assignment of spectrum for satellite user links to avoid any interference to/ from

[1] For detailed coordination of terrestrial stations operating in the bands shared with space service, visit https://www.itu.int/en/ITU-R/terrestrial/fmd/Pages/coordination.aspx.

terrestrial networks? Please provide a detailed response alongwith international practice in this regard.

Response:

To the extent feasible, Spectrum assigned to the satellite user link should not be assigned to terrestrial networks to avoid any kind of potential interference between two services as they will come in line of communication & interference between two services may be there. The issue may be quite less when there are limited number of point-point fixed service (MWA) but as the number of satellite user links and FS services will grow, interference issue may be there, and thus is best that spectrum for satellite user link should be kept separate from terrestrial services.

For the case of ESIM, sharing conditions could be adopted from relevant resolutions from the outcomes of previous WRCs such as Res **123 (WRC-23)** and Res **169 (WRC-19)** for protection of terrestrial services in the Ka-band.

In case the spectrum assigned to the satellite user link is also assigned to terrestrial networks such as Fixed Microwave Service, the criterion to be included in the terms and conditions so as to be protected from interference to/from terrestrial networks,

- **For <u>UTs on moving platform</u>, PFD limits may be prescribed**, in case the same spectrum is assigned to terrestrial networks, such as Fixed Service, as well.

  For instance, the European (licensing) Decision ECC (18)05 for the Ku-band FSS allocation to NGSO systems provides for a Max EIRP of the satellite terminal of 54.5 dBW. Further, its Annex 1 provides for PFD limits for all earth stations on moving platforms (land, aero and maritime). Such PFD limits protect the terrestrial microwave links from co-frequency and co-located operations.

Q9. Whether there is a need to prescribe any conditions to mitigate the risk of scarcity of satellite gateway sites? If yes, please provide a detailed response alongwith international practice in this regard.

Response:

There is no need to prescribe any conditions to mitigate the risk of scarcity of satellite gateway sites.

Considering that SatCom services are still at a nascent stage, the number of gateway locations required by operators would be limited. Consequently, scarcity of such locations may not be a relevant concern at this stage. DoT should rather focus on measures for enabling the advancement of SatCom services in the country – in line with the Government's vision as encapsulated in the Indian Space Policy, 2023. However, based on the entry of satellite operators and the number of satellite gateways being established, a suitable policy can be framed post consultation at the appropriate time.

Therefore, we recommend that there is presently no need to prescribe any conditions to mitigate the risk of scarcity of satellite gateway sites.

Q10. In addition to the roll-out conditions recommended by TRAI for satellite-based Telecommunication Service Authorisation through its recommendations on the Framework for Service Authorisations to be Granted Under the Telecommunications Act, 2023 dated 18.09.2024, whether there is a need to impose certain additional roll-out obligations for the assignment of frequency spectrum for –

(a) NGSO based Fixed Satellite Services for providing data communication and Internet services;

(b) GSO/ NGSO based Mobile Satellite Services for providing voice, text, data, and Internet services?

Please provide a detailed response alongwith international practice in this regard.

Response:

We support TRAI's recommendation on rollout obligations, and suggest that the definition of rollout of "network" in Clauses 5 and 6 should be defined as deployment of at least one (1) satellite gateway earth station and that the twelve (12) month rollout window should run from the date of the frequency assignment.

Further, the very nature of satellite services implies that the services would be available ubiquitously across the globe, and hence, the requirement of coverage-related rollout would always be possible to be met by NGSO & GSO satellites.

Q11. Whether there is a need to introduce a provision for surrender of frequency spectrum prior to the expiry of the period of validity of spectrum assigned for -

(a) NGSO based Fixed Satellite Services for providing data communication and Internet services;

(b) GSO/ NGSO based Mobile Satellite Services for providing voice, text, data, and Internet services?

If yes, what should be the process, and associated terms and conditions such as minimum period of spectrum holding, notice period, surrender fee, etc.? Please provide a detailed response with justifications.

Response:

Licensees should be able to surrender the spectrum prior to the expiry of the validity period of the assignment, if they so wish.

Q12. Whether there is a need to prescribe timelines for processing the applications for the assignment of frequency spectrum for- (a) NGSO based Fixed Satellite Services for providing data communication and Internet services; (b) GSO/ NGSO based Mobile Satellite Services for providing voice, text, data, and Internet services? Please provide a detailed response with justifications.

Response:

There is a need to prescribe processing timelines for spectrum assignments related to satellite services. Mechanisms that streamline the administrative process, such as establishing set procedural timelines, identifying a single government agency that serves as the point of contact, and allowing a simplified form of licensing of customer terminals to ensure that the spectrum assignment framework can run efficiently and affordably for both the government and applicants. We suggest that the spectrum assignment application be processed within 30 days from the issuance of the in-principle clearance of network by the Department of Telecommunications (DoT).

Q13. Whether there are any other suggestions related to assignment of spectrum for- (a) NGSO based Fixed Satellite Services for providing data communication and Internet services; (b) GSO/ NGSO based Mobile

Satellite Services for providing voice, text, data, and Internet services? Please provide a detailed response with justifications.

Response:

The process for assignment of spectrum should be simplified to enhance ease of doing business. Currently, the spectrum is assigned on a carrier-by-carrier basis. Any changes in the size of the carrier or increase/decrease in the number of carriers may necessitate changes to the assignment, which is time consuming and results in additional cost and administrative burden. Spectrum should be assigned as a block, rather than on a carrier-by-carrier basis.

Q14. Should spectrum charges for NGSO-based FSS providing data communication and Internet services, be levied:

i. On a per MHz basis,

ii. On a percentage of Adjusted Gross Revenue (AGR) basis, or

iii. Through some other methodology?

Please provide a detailed justification for your answer.

Response:

The spectrum charges for NGSO-based FSS systems should be levied on a percentage (%) of AGR, for simplification and as part of ease of doing business. We recommend that TRAI should determine the amount of the charge using an administrative cost-based charging approach. Overall spectrum charges do not need to be any higher than the administrative costs required to cover the allocation of spectrum. It will also facilitate investment and innovation in the burgeoning satellite communication industry by ensuring cost predictability.

This approach is consistent with the TRAI's own recommendations. The TRAI has previously recommended that spectrum charges for commercial VSAT CUG and GMPCS be 1% of AGR.

Q15. In case it is decided that spectrum charges for NGSO-based FSS providing data communication and Internet services should be levied on a per MHz basis, should these charges be calculated based on:

i. The Department of Telecommunications (DoT) order dated December 11, 2023, or

ii. An alternative approach (please specify)?

Please provide a detailed justification to support your answer.

Response:

The calculation of spectrum charges for NGSO-based satellite communication services/systems should be levied on a percentage of AGR basis, and should not be levied on a per MHz basis.

Q16. If it is decided that spectrum charges for NGSO-based FSS providing data communication and Internet services should be levied on a percentage of AGR basis:

i. What should be the appropriate percentage of AGR?

ii. Should a minimum spectrum charge be specified to address the issue of inefficient utilization of spectrum? If yes, what methodology may be used to determine the amount of the minimum spectrum charge?

iii. Is there an alternative approach that could be followed to address the issue of inefficient spectrum utilization?

Please provide a detailed justification for your answers.

Response:

There is no need to specify a minimum spectrum charge to address the issue of inefficient utilization of spectrum. There is no reason to expect that NGSO operators will not be effectively utilize spectrum or keep spectrum idle., promoting both industry growth and optimal use of this valuable resource.

Q17. Considering the Adjusted Gross Revenue (AGR) based charging methodology currently followed for Commercial VSAT and in view of the enhanced scope of the Satellite service authorisation, what should be the spectrum charge, as a percentage of AGR, that should be levied on GSO-based FSS?

Or,

Should some alternative spectrum charging methodology be used for determining spectrum charges for GSO-based FSS?

Please provide a detailed justification for your answer.

AND

Q18. Should spectrum charges for GSO and NGSO-based MSS that provide voice, text, data, and Internet services be levied:

i. On a per MHz basis,

ii. On a percentage of AGR basis, or

iii. Through some other methodology?

Please provide a detailed justification for your answer.

AND

Q19. If it is determined that spectrum charges for GSO/NGSO-based MSS providing voice, text, data, and Internet services should be levied on a per MHz basis, should these charges be calculated based on:

i. The Department of Telecommunications (DoT) order dated December 11, 2023, or

ii. An alternative approach (please specify)?

Please provide a detailed justification to support your answer.

AND

Q20. If it is decided that spectrum charges for GSO/NGSO-based MSS providing voice, text, data, and Internet services should be levied on a percentage of AGR basis: (i.) What should be the appropriate percentage? (ii.) Should a minimum spectrum charge be specified to address the issue

of inefficient utilization of spectrum? If yes, what methodology may be used to determine the amount of the minimum spectrum charge? (iii.) Is there an alternative approach that could be followed to address the issue of inefficient spectrum utilization? Please provide a detailed justification for your answers.

Response:

The charging mechanism needs to be unified across the satellite-based service authorisations under the UL. This will allow for an efficient sharing of spectrum across these service authorisations under the UL.

Q21. Whether there are any other issues/suggestions relevant to the spectrum charging for: (i.) NGSO/GSO based FSS providing data communication and Internet services. (ii.) NGSO/GSO based MSS providing voice, text, data, and Internet services. The response may be submitted with proper explanation and justification.

Response:

No further issues/suggestions relevant to spectrum charging.

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