BROADBAND INDIA FORUM
"Think Tank for Digital Transformation"

BIF RESPONSE TO TRAI CP ON TERMS AND CONDITIONS FOR ASSIGNMENT OF SPECTRUM FOR CERTAIN SATELLITE BASED COMMERCIAL COMMUNICATION SERVICES

PREAMBLE

At the outset we wish to laud the Authority for coming out with a Consultation Paper that would take a balanced view on this very important subject matter which is likely to have a significant impact on the pace of acceleration of achieving the potential of the satellite sector to help fulfil India's digital ambitions and achieving Hon'ble PM's vision of an Atmanirbhar Digital India , achieve the mission of ' Broadband for All' and hasten the process of reaching a 1Tn USD Digital Economy by 2025-26, all of which need Broadband through Commercial Satellites to reach and connect every nook and corner of the country (including rural & remote areas) in the fastest and most affordable manner.

Satellite Communications is not only increasingly being used for connecting the unconnected and the under connected, but is increasingly being used for IoT communications in the areas of agriculture, vehicular tracking, disaster management, etc.

On the issue of Level Playing Field between Satcom & Telcos as mentioned in the DoT reference to TRAI in July 2024, we wish to state that this is fundamental to all policy discussions and TRAI as always is expected to take a balanced view while making its recommendations. Hence, there is no explicit need for it to be brought out separately.

Also it maybe pertinent to point out that in the previous TRAI's consultation on Satellite Spectrum Assignment (April 2023), **one of the incumbent terrestrial operators, brought out exactly the same point of "level playing field with terrestrial access services"** in its response to that Consultation Paper. Majority of the stakeholders including BIF opposed this view. **The same was also vehemently articulated during the subsequent OHD that followed.**

The Telecom Act 2023 has already decided that Satellite Spectrum is to be administratively assigned and is not to be treated at par with spectrum for terrestrial services (the latter being done through auctions). So, it may not be correct when on one hand, we refer to Section 4 of the Telecom Act read along with Schedule 1 of the Telecom Act and then a reference is made seeking '***level playing field' with terrestrial access services.*** **Such a mention does not have any basis at all and is incorrect.**

Our comments to the questions in the Consultation Paper are in consonance with the views expressed above.

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FREQUENCY BANDS FOR SATELLITE BASED COMMUNICATION SERVICES

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.

BIF RESPONSE:

In the Article 5 of ITU-RR, there are 130 Frequency Bands allocated for space services. Out of these, the ones allocated to FSS, or parts thereof, read with NFAP-2022 subject to the conditions detailed in the INDIA footnotes and the footnotes of Art.5 of RR, can be used for providing voice, text, data, and Internet service by NGSO based FSS.

Within the umbrella of the frequency bands as listed under Article 5 of ITU-RR, it may be pertinent to point out that the relevant bands for Satellite Spectrum are S-band, L-band, C-Band, Ku-Band and Ka band. While a variety of frequency bands can be used for providing satellite communication services, the popular frequency bands used for providing satellite communication services are L-band (1-2 GHz), S-band (2- 4 GHz), C-band (4-8 GHz), Ku-band (10-15 GHz) and Ka-band (17-31 GHz).

The user links of the NGSO satellite systems are generally in Ku and Ka band, while the feeder links are predominantly in Ka-band. Further, the next-generation satellite communication systems have plans for deployment in higher bands such as the Q band (33-43 GHz) and lower part of V-band (43-52.4GHz) for user links as well as for gateway links

Present LEO satellite constellations require access to the entire range of Ku and Ka-bands for seamless services. Partial access could severely impact end-to-end connectivity, network performance and user experience. **Hence full spectrum on exclusive use (not mixed use) should be made available in these bands**. Segregating the satellite frequencies based on different services and usages is not a practical exercise and will prove to be a limiting factor in the growth of Satellite Based Communications in the country.

Different frequency bands and services have different characteristics that make them suitable for specific types of applications. For example, higher frequency bands, such as Ku-band, Ka-band and Q/V band frequencies, are ideal for broadband satellite communications because they offer high data rates, while lower frequency bands, such as L-band and S-band frequencies, are better suited for navigation and remote sensing applications because they penetrate through clouds and other objects. **Therefore, it is important to have access to a diverse set of frequency bands and services that can support these applications.**

TRAI should permit flexible spectrum assignments (i.e., for gateway stations and customer terminals) throughout the entirety of the Ka-band frequencies.

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.

Additionally, the demand for spectrum will only increase with the growing use of satellite-based services, so the availability of maximum possible spectrum can help meet this demand and ensure efficient use of limited resources while avoiding interference.

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.

BIF RESPONSE:

In the Article 5 of ITU-RR, there are 130 Frequency Bands allocated for space services. Out of these, the ones allocated to MSS, or parts thereof, read with NFAP-2022 subject to the conditions detailed in the INDIA footnotes and the footnotes of Art.5 of RR, can be used for providing voice, text, data, and Internet service by GSO/ NGSO based MSS.

The same spectrum bands identified for NGSO based FSS in Q1 above should be considered for assignment for GSO/NGSO based MSS services. This is because Satellite Spectrum bands are shareable amongst different service providers and amongst different services.

The relevant bands are S-band, L-band, C-Band, Ku-Band and Ka band. While a variety of frequency bands can be used for providing satellite communication services, the popular frequency bands used for providing satellite communication services are L-band (1-2 GHz), S-band (2- 4 GHz), C-band (4-8 GHz), Ku-band (10-15 GHz) and Ka-band (17-31 GHz) as well as Q/V bands.

VALIDITY OF SPECTRUM ASSIGNMENT

Q3. What should be the maximum period of assignment of spectrum for - (c) NGSO based Fixed Satellite Services for providing data communication and Internet services, and (d) 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.

BIF RESPONSE:

The validity of the service authorization or the period of validity (A2b - shown in the ITU publication for the satellite network) of the satellite frequency assignment can be taken as the maximum period of assignment of spectrum for - NGSO based FSS for providing data communication and Internet services or GSO/ NGSO based MSS for providing voice, text, data, and Internet services. 20 years' validity for service authorisation, with possibility of extension/ renewal (or till validity of frequency assignments in ITU Register, whichever is earlier), in line with other telecom services, can be a reasonable period for SatCom service provider.

Accordingly, the period of validity of spectrum assignment for NGSO based FSS and GSO/ NGSO based MSS should be 20 years in line with the period of validity of the service authorisation, so that it provides sufficient certainty to service providers for recovery of their capital investments. Another reason for a longer period of validity would be since Satellite-based broadband services are, at present, in a nascent stage of development, and their business potential would emerge after some years of operations; the policy and regulatory environment should be stable and certain, to give investors sufficient confidence to plan and monetise their investments.

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 alongwith international practice in this regard.

BIF RESPONSE:

Every ITU filing is NOT a separate satellite system. ITU filings fall in 3 categories MOD, ADD or SUP to the original filing and may apply to the same satellite network.

However, a service provider may provide services utilizing multiple satellite systems, as filed with ITU, especially in the case of the use of a combination of satellite orbits. This is aligned to global best practices.

In the case of GSO satellite systems, frequency spectrum is assigned separately for each satellite. It may be possible that a service provider may provide services utilizing multiple satellite systems, as filed with ITU, especially in the case of the use of a combination of satellite orbits. This is aligned to global best practices

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.

INTERFERENCE RELATED CHALLENGES & COORDINATION ISSUES

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 –

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

(d) 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.

BIF RESPONSE:

ITU's Radio Regulations have over the years provided interference free space operations. According to the declaration made by Director of the ITU's Radiocommunication Bureau during the `Space Sustainability Forum (Geneva, 10-11 September 2024)', 99.94% of satellite operations were free of interference during 2023.

All information is well documented in ITU-RR so painstakingly after years of efforts, and can provide valuable guidance to all stakeholders.

The ITU-RR are sufficient to resolve interference and coordination related issues. Radio Regulations (RR), which is an international treaty binding to all ITU Member States including India, have the following objectives:

a) to facilitate equitable access to and rational use of the natural resources of the radio-frequency spectrum and the geostationary-satellite orbit;
b) to ensure the availability and protection from harmful interference of the frequencies provided for distress and safety purposes;
c) to assist in the prevention and resolution of cases of harmful interference between the radio services of different administrations;
d) to facilitate the efficient and effective operation of all radiocommunication services; and
e) to provide for and, where necessary, regulate new applications of radiocommunication technology.

At the global level, ITU is responsible for management of the radio-frequency spectrum and satellite orbit resources to ensure interference free operation of space-based communication services. A key component of international frequency management is the ITU Radio Regulations (ITU-RR), which is an international treaty that governs the use of the radio-frequency spectrum and the geostationary satellite orbits and non-geostationary satellite orbits under the aegis of ITU. The ITU-RR determines how the radio frequency spectrum is shared among different services, including space services.

ITU-RR has a defined frequency coordination process. The aim of frequency coordination is for developing new orbit-spectrum assets and protecting the rights to use such resources. It is a technical and regulatory process by which radio-frequency interference between different radio systems that use the same frequency is removed or mitigated and trouble-free service to users is ensured.

However, it is felt that the current ITU-RR provisions under Article 22 establishing equivalent power flux-density (**EPFD**) limits to avoid interference between GSO networks and NGSO systems, which were developed twenty-five (25) years ago are based on outdated technical assumptions about NGSO systems and end up significantly over-protecting GSO networks. This over-protection unjustifiably constrains the performance and efficiency of LEO systems and, as a result, restrict the ability of systems to provide the most efficient and affordable broadband service to unserved and underserved communities. These existing provisions may be improved by revisiting the EPFD limits, and TRAI may wish to consider an approach that ensures that a fair balance be found between flexibility, including efficient service delivery, and the protection of other services. Updating these

limits to take account of major developments in this sector over the past 25 years will enable LEO systems to manifest their full potential for communities around the world in the form of improved throughput and capacity.

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– (c) Between the gateways of GSO and NGSO systems; and (d) Between the gateways of NGSO systems? If yes, please provide a detailed response alongwith international practice in this regard.

BIF RESPONSE:

Yes-suitable protection distance for gateways to provide for protection from harmful interference must be decided. This may be decided based on existing interference studies carried out in different bands. If not, then the same may be required to be carried out before deciding the matter.

NGSO and GSO gateway earth stations can coexist as long as mitigation measures such as avoidance angle and intelligent satellite selection are implemented, and all NGSO systems are capable of doing so. For NGSO-GSO systems, coordination procedures under Article 9 of the ITU-RR or EPFD limits under Article 22 of the ITU-RR ensure mutual compatibility between these systems. For NGSO-NGSO systems, the Article 9 coordination procedures provide a sufficient structure to facilitate the necessary dialog between operators so that they can establish the technical conditions, unique to their respective systems, to ensure mutual compatibility between the satellite systems and their associated earth stations—gateway stations and customer terminals. TRAI should rely on the ITU framework and international practice for any interference avoidance measures.

Modern NGSO systems employ frequency sharing techniques that can avoid harmful interference by using techniques such as angular avoidance and satellite selection. It is possible to co-locate both gateway stations and user terminals with other GSO/NGSO systems, by employing appropriate frequency coordination and mitigation mechanisms. No protection distances are warranted, and operators/service providers can be licensed after ensuring that such inter-system coordination has been duly notified and/or such protection mechanisms, as prescribed by Article 22 and Resolution 76, have been arrived after extensive co-existence studies.

In case of established co-existence studies between incumbent terrestrial and FSS/MSS services and new satellite services, working together maybe permitted after suitable conditions are defined for PFD limits and power emissions. To mitigate interference, ITU prescribes varying measures, which have been duly captured in the TRAI consultation as well.

The co-existence of terrestrial and space-based communication services cannot be generalised. Interference mitigation strategies have to be developed between concerned operators (both on the terrestrial wireless and space-based

communications side), taking into account the frequency overlap, the various protection criteria already stipulated in the ITU RR, and by incorporating necessary protection distances. The licensing conditions should stipulate a mutual frequency coordination between the operators, with an oversight by DOT/WPC.

Hard EPFD limits enable NGSO FSS systems to share frequencies with and protect GSO systems without requiring individual coordination with all the systems worldwide. NGSO FSS satellite systems shall comply with the EPFD limits contained in different tables of Article 22 of ITU's RR.

In conclusion, we reiterate that ITU-Article 22 and Resolution 76 recommends employing appropriate frequency coordination and interference mitigation mechanisms for earth station gateways and these are followed by modern satellite systems (GSO/NGSOs).

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 alongwith international practice in this regard.

BIF RESPONSE:

In many frequency bands, spectrum is shared between satellite-based networks and terrestrial networks such as Fixed Service (backhaul) and IMT. For instance, in 13 GHz band (12.75-13.25 GHz) and 18 GHz band (17.7-19.7 GHz), the frequency spectrum is assigned for microwave access (MWA) service for cellular backhaul. Thus, MWA coexists with FSS in these frequency bands.

To control interference, ITU provides an elaborate framework including the following:

(a) Allocation: Frequency separation of stations of different services (Article 5)

(b) Coordination: between Administrations to ensure interference-free operations conditions (Article 9)

(c) Power Limits: (Articles 5, 21 & 22)

(i) Power Flux Density (PFD) to protect terrestrial services (ii) Equivalent isotropically radiated power (EIRP) to protect space services (iii) Equivalent Power Flux Density (EPFD) to protect GSO from NGSO (d) Regulatory Protection: Not to cause harmful interference or claim protection (Article 5 and 22)

(ii) In this regard, it is noteworthy that Article 21 of ITU-RR deals with the aspects of terrestrial and space services sharing frequency bands above 1 GHz. The Section I of Article 21 deals with the choice of sites and frequencies. It provides as below:

"21.1 Sites and frequencies for terrestrial stations and earth stations, operating in frequency bands shared with equal rights between

terrestrial radiocommunication and space radiocommunication services, shall be selected having regard to the relevant ITU-R Recommendations with respect to geographical separation between earth stations and terrestrial stations.

21.2 As far as practicable, sites for transmitting stations, in the fixed or mobile service, employing maximum values of equivalent isotropically radiated power (e.i.r.p.) exceeding the values given in Table 21-1 in the frequency bands indicated, should be selected so that the direction of maximum radiation of any antenna will be separated from the geostationary-satellite orbit by at least the angle in degrees shown in the Table, taking into account the effect of atmospheric refraction.

21.2.1 For their own protection receiving stations in the fixed or mobile service operating in frequency bands shared with space radiocommunication services (space-to-Earth) should also avoid directing their antennas towards the geostationary-satellite orbit if their sensitivity is sufficiently high that interference from space station transmissions may be significant. In particular, in the frequency bands 13.4-13.65 GHz and 21.4-22 GHz, it is recommended to maintain a minimum separation angle of 1.5 degree with respect to the direction of the geostationary-satellite orbit."

(iii) The Section II of Article 21 of ITU' RR deals with power limits for terrestrial stations. It provides, inter-alia, as below: "21.3 The maximum equivalent isotropically radiated power (e.i.r.p.) of a station in the fixed or mobile service shall not exceed +55 dBW."

(iv) Section-III of Article 21 of ITU's RR provides power limits for earth stations. Section-IV provides a minimum angle of elevation of earth stations. Section-V provides limits of power flux density from space stations.

(v) In many frequency bands, the frequency spectrum earmarked for satellite earth station gateways may also be shared between satellite earth station gateways and terrestrial services like IMT. For instance, the DoT has decided to make available the frequency ranges (a) 37.5 - 40 GHz, and (b) 42.5 - 43.5 GHz, for IMT and the same will also be shared with satellite earth station gateways with a suitable protection.

(vi) Applying the coordination provisions in the ITU-RR are sufficient for satellite gateway stations to anticipate the magnitude and behavior of interference from other systems. With predictable and transparent spectrum assignment procedures for terrestrial networks and technical conditions following international standards, the interference magnitude and likelihood can be calculated for terrestrial and satellite gateway links. This enables sharing spectrum without causing or receiving harmful interference. The 28 GHz band should be reserved for satellite gateway stations and customer terminals.

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

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

BIF RESPONSE:

Coexistence of space and terrestrial services are dealt with in Chapter VI of the ITU-RR dealing with `Provision for services and stations' where Article 21 deals with 'Terrestrial and space services sharing frequency bands above 1 GHz'. Appendix 5 of ITU-RR provides `Identification of administrations with which coordination is to be affected or agreement sought under the provisions of Article 9' and Appendix 7 deals with `Methods for the determination of the coordination area around an Earth Station in frequency bands between 100 MHz and 105 GHz.

As per footnote 5.516B in Article 5 of the ITU-RR, the operation of customer terminals –referred to as High Density Fixed Satellite Services (HDFSS) - can operate in an uncoordinated manner without causing interference to terrestrial networks and without seeking protection. In practice, the stations in the Fixed Service (**FS**) and FSS customer terminals will likely not overlap in frequency, time, and geography due to varying capacity needs, transmission times, deployment scenarios, and frequency selection options available to each station. As such, the overall likelihood of harmful interference occurring at the same time in the same frequencies will be extremely low.

SCARCITY OF SATELLITE GATEWAY SITES

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 along with international practice in this regard.

BIF RESPONSE:

There will not be geographic scarcity of gateway earth stations and, as such, there is no need for TRAI to adopt default protections in the form of separation distances.

ROLL-OUT OBLIGATIONS FOR ASSIGNED SPECTRUM

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 – (c) NGSO based Fixed Satellite Services for providing data communication and Internet services; (d) 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.

BIF RESPONSE:

Yes. There should be a condition that the satellite service provider start commercial service in the country with its satellite constellation within one-three years of the assignment of spectrum.

The aforementioned roll-out obligations are in respect of the operationalization of satellite earth station gateway i.e. feeder link frequency spectrum. In respect of the spectrum assigned for user links, no separate rollout obligations are required to be prescribed as they are demand based.

We 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.

SURRENDER OF ASSIGNED SPECTRUM

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 - (c) NGSO based Fixed Satellite Services for providing data communication and Internet services; (d) 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.

BIF RESPONSE:

It is not required to introduce such a provision. In case it is required, the same can be decided on a case by case basis

TIMELINES FOR PROCESSING APPLICATIONS FOR ASSIGNMENT OF SPECTRUM

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

BIF RESPONSE:

Yes. 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 15 days from the issuance of the in-principle clearance of network by the

Department of Telecommunications (**DoT**). TRAI recommendations on ease of doing business for Satcom issued in May 2023 may be kindly reiterated in this regard.

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.

BIF 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.

SPECTRUM CHARGING MECHANISM FOR SATELLITE BASED COMMERCIAL COMMUNICATION SERVICES

The present approach of revenue share for commercial services is appropriate for India for nascent space sector to grow.

The spectrum for user links should be assigned at the national level as the Satellite footprint is expected to be a national one as it offers several advantages that cater to the unique nature of satellite communications:

Satellite services, both FSS and MSS inherently provide extensive coverage, making them ideal for serving vast geographical areas within a country. Satellite services play a critical role in disaster recovery and emergency response efforts. National-level Service Authorisation as recommended by The Authority shall ensure that satellite user devices can be used consistently and seamlessly across the entire nation and facilitate the rapid deployment of satellite communications during emergencies, ensuring that vital services remain accessible even in remote or affected areas.

Cost of Spectrum plays an important part in the overall Cost of the network - almost to the tune of 60-70%. **To make Satcom Services affordable, therefore it is of paramount national interest that Satcom Spectrum should be made affordable. Spectrum Charging** (given in separate Annexure attached) for Satcom shows that a **0.1% of AGR** may be a justifiable figure, as it adequately covers the cost of administration and regulation of spectrum.

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.**

BIF RESPONSE:

On the issue of Level Playing Field between Satcom & Telcos as mentioned in the DoT reference to TRAI in July 2024, we wish to state that this is fundamental to all policy discussions and TRAI as always is expected to take a balanced view while making its recommendations. Hence, there is no explicit need for it to be brought out separately.

Also it maybe pertinent to point out that in the previous TRAI's consultation on Satellite Spectrum Assignment (April 2023), **one of the incumbent terrestrial operators, brought out exactly the same point of "level playing field with terrestrial access services"** in its response to that Consultation Paper. **Majority of the stakeholders including BIF opposed this view. The same was also vehemently articulated during the subsequent OHD that followed.**

The Telecom Act 2023 has already decided that Satellite Spectrum is to be administratively assigned and is **not to be treated at par** with spectrum for terrestrial services (the latter being done through auctions). So, it may not be correct when on one hand, we refer to Section 4 of the Telecom Act read along with Schedule 1 of the Telecom Act and then a reference is made seeking '***level playing field' with terrestrial access services.*** **Such a mention does not have any basis at all and is incorrect.**

- Satcom is meant to serve rural, remote, underserved and unserved areas and hence it cannot be compared to terrestrial services

- Revenues of the two sectors just cannot be compared. While Terrestrial Services fetch revenues to the tune of 3 lakh crores, Satcom sector gross revenues are of the order of ~ Rs600-800 Crores which constitutes around 0.2% of the Terrestrial Revenues

- Cost of Spectrum plays an important part in the overall Cost of the network - almost to the tune of 60-70%. **To make Satcom Services affordable, therefore it is of paramount national interest that Satcom Spectrum should be made affordable.**

- Cost of SUC Calculations (given in separate Annexure attached) for Satcom shows that a 0.1% of AGR may be a justifiable figure as it adequately covers the cost of administration and regulation of spectrum.

In view of the above, BIF recommends the following:

- Level Playing Field between Satcom and Terrestrial Services simply does not arise as they are not equal in any respect.
- Level Playing Field does not apply to Satcom as it cannot be compared to Terrestrial Services
- Cost of Satellite Spectrum should be as low as possible and just sufficient to cover the cost of administrating and regulating the spectrum. Govt. should not desire to make any profit out of this.
- **Administrative and regulation costs for Satcom works out to be a fraction of a %. (Approx. 0.1%of the sector Revenues). Hence the SUC should be of that order only.**

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. For commercial VSAT CUG, this would entail reducing the charges from 4% to 1% of AGR, whereas for GMPCS services, this would entail a change in the charging mechanism itself. This was recommended on the rationale that this fee would adequately cover the administrative expenses incurred for managing the spectrum, thus emphasizing cost recovery as a basis for charging for spectrum for satellite-based services.[1] Indian customers and businesses can be offered even lower cost satellite services when the spectrum chargers are correspondingly reduced to below 1% of AGR. This would help achieve the goal to provide fast, affordable broadband to unserved and underserved communities. The TRAI has also reiterated the reduction of charges and the model on several occasions.[2]

We highlight the need to recognise the fundamental difference between operations of the terrestrial wireless and satellite communication providers/systems, and enable efficient spectrum regulation.

- Unlike spectrum for terrestrial wireless services/systems, spectrum used by satellite communications can be shared amongst multiple operators/systems. While terrestrial wireless providers/systems require exclusive access to spectrum to be able to rollout their services/systems effectively and optimize their network capacity, such exclusive rights to use the spectrum for satellite operators are not needed and would be an inefficient use of the finite spectrum resource.

- The business model of terrestrial wireless operators/systems is distinct from satellite communication providers. Terrestrial service providers (TSP) secure their spectrum through auctions and, if successful, are awarded a license for a specific geographic area with a known population. The people and businesses in their license area represent their customer opportunity base. The TSPs then build their base stations and supporting network infrastructure to deliver wireless communications to customers and businesses in their license area who subscribe to the TSPs' services. If

[1] TRAI, *Recommendations on Spectrum Usage Charges, and Presumptive Adjusted Gross Revenue for Internet Service Providers and Commercial Very Small Aperture Terminal Service Providers* (March 7, 2017), available at https://www.trai.gov.in/sites/default/files/Recommendations_07032017.pdf.

[2] TRAI, *Recommendations on Licensing Framework for Satellite-based connectivity for Low Bit Rate Applications* (August 26, 2021), available at https://www.trai.gov.in/sites/default/files/Recommendations_26082021.pdf.

demand exceeds capacity, TSPs can build more base stations and infrastructure to meet that demand. On the other hand, satellite communication providers register and coordinate their frequencies at the ITU and share these frequencies with all other satellite systems registered at the ITU. To operate in a country, satellite communication providers seek authority from the responsible national authority to offer satellite communication services in the country. If successful, satellite operators obtain approval to operate in the country, using shared spectrum resources. The satellite operator builds and launches their satellites, builds their gateway stations and customer terminals, and begins offering services around the world. Satellite systems have limited capacity relative to their field of view. If demand exceeds capacity in a geography, the satellite operator cannot scale a constellation in the same manner as terrestrial wireless operators can with their network. A satellite operator would need to launch more satellites and possibly build more gateway stations, and that requires a cost benefit analysis to determine if the cost of the additional capacity would yield positive benefits.

The present approach of revenue share (Percentage **of AGR**) for commercial services is appropriate for India for nascent space sector to grow. **Keeping in view that spectrum charges should be sufficient to cover the administrative costs of spectrum which amounts to a fraction of the revenues (0.1%%) for commercial Satcom, we recommend that the percentage be decided accordingly. This would be in consonance with the National priorities of Mainstreaming Satcom and that of Ease of Doing Business as enshrined in the core principles of the Telecommunications Act 2023.**

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.

BIF 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.

Spectrum charges should be sufficient to cover the administrative costs of spectrum which amounts to a fraction of the revenues (0.1%) for commercial Satcom, we recommend that the percentage be decided accordingly. This would be in consonance with the National priorities of Mainstreaming Satcom and that of Ease of Doing Business as enshrined in the core principles of the Telecommunications Act 2023.

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.

BIF RESPONSE:

BIF advocates that it should be based as a Percentage of AGR. Keeping in view that spectrum charges should be sufficient to cover the administrative costs of spectrum which amounts to a fraction of the revenues (0.1%) for commercial Satcom services. Accordingly, we recommend that the percentage be kept at 0.1%. We also wish to request that Royalty Charges for VSAT based services under erstwhile NLD authorisation which was determined using a formula based mechanism under the old WPC Order of 2012, be also merged in the new AGR methodology. This would be in consonance with the National priorities of Mainstreaming Satcom and that of Ease of Doing Business as enshrined in the core principles of the Telecommunications Act 2023.

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.

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.

BIF RESPONSE:

We recommend No Change in the proposed methodology of AGR based charging. The percentage should be 0.1% of AGR. 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.

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.

BIF RESPONSE:

It should be as a percentage of AGR basis and same as GSO/NGSO based FSS. 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.

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.

BIF RESPONSE:

Not applicable, as we are in favour of it being decided as a percentage of AGR and not on a per MHz basis 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.

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? 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.

BIF RESPONSE:

BIF advocates that it should be based as a Percentage of AGR. Keeping in view that spectrum charges should be sufficient to cover the administrative costs of spectrum which amounts to a fraction of the revenues (0.1%) for commercial Satcom services. Accordingly, we recommend that the percentage be kept at 0.1%. We also wish to request that Royalty Charges for VSAT based services under erstwhile NLD authorisation which was determined using a formula based mechanism under the old WPC Order of 2012, be also merged in the new AGR methodology. This would be in consonance with the National priorities of Mainstreaming Satcom and that of Ease of Doing Business as enshrined in the core principles of the Telecommunications Act 2023.

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.

BIF RESPONSE:

(1) The assignment of spectrum should be at a national level, and should not be location based for gateway stations. Since the 27.5-29.5 GHz band is co-primary with Fixed Services (**FS**) stations (MWA/MWB), any location-based assignment for FSS stations will make the coordination very difficult, if not impossible.

(2) In addition, for the smooth rollout of satellite services that can effectively address the connectivity needs of unserved and underserved areas in India, the TRAI should take into account the following issues:

(i) The provision of internet services to consumers in India can be effectively addressed by satellite services. However, currently, there is no prescribed charging mechanism for spectrum for the provision of satellite services under the ISP License. We urge the TRAI to address this gap by recommending a charging model for spectrum for providing satellite services under this authorization. **A recommendation for a uniform charging model for spectrum for all space-based communications is required**

(ii) WPC carries out frequency assignments through the issuance of Decision Letters. These letters assign frequencies on a carrier-by-carrier basis, which limits the operational flexibility of modern satellite systems that use dynamic frequency usage. There will be a significant administrative overhead resulting in delays of deployment of services if spectrum is to be assigned carrier-by-carrier. Instead, **spectrum should be assigned as a block, and the operator should have the flexibility to dynamically use the frequencies assigned across different user terminals, gateway stations, and satellites serving India.**

BROADBAND INDIA FORUM
"Think Tank for Digital Transformation"

Annexure: Justification for Calculation of SUC for Satcom

Year	Expenditure on WPC (INR Crores)	Expenditure on WMC (INR Crores)	Total Expense on Planning and Monitoring (INR Crores (i)	Expenses on account of Cost of Equipment, buildings and pension expenditure (INR Crores) (ii)	Total Annual Expenses of WPC+WMC (INR Crores) (A) (i+ii)	Total Sector Annual Revenues (INR Crores) (B)	A/B=
2023	20.74Cr	50.31Cr	71.05Cr	~200.00Cr	~271 Cr	~300,000Cr*	0.0009(0.1%)

Source: DoT Annual Report 2022-23
- Media Reports

- This constitutes just **0.1% of the sectoral revenues. (271Cr /300,000 Cr)**
- **Therefore, SUC should be an annual fixed fee of the order of 0.1% AGR.**
- **This provides for ample margins after covering the cost of administration and regulation of spectrum**