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**Comments on TRAI Consultation Paper
On
Assignment of Spectrum for Space-based Communication Services**

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I. General Comments

Satellite communications play an important role in establishing the global telecommunications system and can facilitate internet connectivity where traditional telecom infrastructures are not able to provide their services. More than 2000 artificial satellites orbiting the earth relay analog and digital signals carrying voice, video, and data to and from several locations. These satellite communication systems serve a huge range of businesses, governments and individuals and bring numerous economic and social benefits by supporting several applications both directly and indirectly. These satellites link remote areas of the earth with telephone and wireless networks which will further the cause and ambition of digital inclusion.

Given the importance of this system, the assignment of spectrum assumes significant importance in the sector. This industry is still in its nascent stage and it is very important to ensure wider participation and reduce the entry barriers. There is a need for a wider and comprehensive outlook of this sector keeping in mind the global best practices. Towards this, we believe administrative assignment of the spectrum is the way forward for this industry as we discuss in this response.

As far as the auction-based method of assignment is concerned, TRAI has acknowledged in the consultation paper, the failure of the auction-based system. Only four countries (Brazil, Mexico, the United States, and Saudi Arabia) have implemented some form of competitive spectrum allocation for space communications, **but three of them (Brazil, Mexico, and the United States) discontinued the auction system due to impracticality.** These countries reverted to administrative assignment as a more viable approach. The non-exclusive spectrum allocation allows for more efficient utilisation of limited spectrum resources. Multiple satellites can utilise the same spectrum to serve different areas on Earth. This results in cost savings and improved service quality for consumers.¹

The 1995 ruling by the Supreme Court declared that airwaves are considered public assets, and their usage should be regulated in the public's best interest. In the 2G case in 2012, the Supreme Court made it clear that auctioning is not the only constitutional requirement for allocating natural resources, and alternative approaches can be utilised. **The methodology for assigning spectrum should be determined by considering technical factors, the imbalance between resource supply and demand, previous examples, and international practices.** Although auctions may

¹ CT Bureau. (2023 May 16th) *IAFI seeks assignment of satellite spectrum on non-exclusive basis*, Communications Today. Retrieved from: [iafi-seeks-assignment-of-satellite-spectrum-on-non-exclusive-basis](#).

generate higher revenue, they may not always be the most suitable method for serving the public's welfare.

Even SIA-India has asked the government to not go ahead with the auction method of assignment. Their response to the Draft Indian Telecommunications Bill notes that auctioning satellite spectrum goes against internationally recognised standards.² It can cause disruptions to current services while discouraging future investments in the telecommunications network. It will increase the cost and technical complexity of providing internet services through satellite, thereby impeding the progress of rural connectivity development in India.

² SatCom Industry Association (2022) *SatCom Industry Association (SIA-India) Response to the Draft Indian Telecommunications Bill.*, Retrieved from: [SIA-Response-to-Draft-Telecommunications-Bill-2022.pdf](#).

II. Question wise Response

Q15. What should be the methodology for the 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?**

Please provide your response with a detailed justification.

We believe that administrative assignment of the spectrum in the case of satellite communication services is the way to move forward in this nascent industry. When deciding upon the model of assignment, it is imperative to assess the contexts and implications of all allocation models. In administrative allocation, the state allocates spectrum to qualified communications companies, whereas, under an auction model, companies may bid for spectrum above the reserve price set by the state allocating such spectrum. The major reason why auction models are preferred is due to their price discovery functions, i.e. they enable the industry to partake in assigning the price of any band of spectrum basis their analysis of infrastructural capabilities at hand and their assessment of consumer demand for such spectrum. While the auction model has gained precedence globally in telecommunication spectrum allocation, states have yet to implement the same model in the spectrum allocation for space-based communications and retain them besides Saudi Arabia (Brazil and the USA both reverted to administrative allocation).

This is due to the context in which space-based communications operate. Space-based communications function in similar scarcity contexts as the land-based spectrum allocation.³ It has already been accepted by the Supreme Court of India that land-based spectrum is a finite resource and must be used in light of the same, sparingly and with maximum utility.⁴ In furtherance of this, we have observed the re-farming of the spectrum being included in the Draft Indian Telecommunication Bill 2022.⁵ Another distinction that needs to be considered with the spectrum allocation is the problem they will solve. Studies have shown that fiber-based connections are the best method to connect people on the Internet as they are cost-effective and can be upgraded at a fraction of the cost relative to a space-based

³ ITU News (2023 January 2) *WRS-22: Regulation of satellites in Earth's orbit*, International Telecommunications Union. Retrieved from <https://www.itu.int/hub/2023/01/satellite-regulation-leo-geo-wrs/>

⁴ *Ministry of Information and Broadcasting v Cricket Association of Bengal and Ors* (1995) Retrieved on October 12, 2022, from <https://indiankanoon.org/doc/539407/>, *Centre for Public Interest Litigation and Ors. v Union of India* (2012). Retrieved on October 12, 2022, from <https://indiankanoon.org/doc/70191862/> and *Bharti Airtel v Union of India* (2015). Retrieved on October 12, 2022, from <https://indiankanoon.org/doc/36704852/>

⁵ Section 5(6) of the Draft Indian Telecommunications Bill 2022

communication network. With such context, it is established that satellite-based communications are effective in connecting remote areas where fibre cannot reach and that space-based communications are intended to complement and not supplant fibre-based networks.⁶

In addition to these challenges, critics of the auction model have also asserted the following arguments:-

1. ***Auctions for Space Communications will not result in price discovery:*** Auctions generally result in price discovery when the demand is more than the supply of the commodity being auctioned. Since the demand for space communications stands moot and cannot be determined in advance, the auction model is likely to result in the sale of the spectrum at the reserve price, which can later create competition issues in the market as front runners of the auction may create artificial barriers for new entrants. In light of the same, an administrative assignment is optimal relative to auctioning and is likely to enable the optimal use of the assigned spectrum. Additionally, regulators may also look at creating timelines for phasing out first-mover advantages⁷ at a later stage once the industry has matured enough to warrant such regulatory intervention as has been proposed by the Federal Communications Commission in the USA.⁸
2. ***Exclusive assignment of spectrum creates exclusive rights:*** It is argued that exclusive assignment of spectrum through an auction model is likely to result in exclusive access to spectrum as is commonly observed when terrestrial spectrum is being auctioned for International Mobile Telecommunications (“IMT”). In such a scenario, a company bidding for spectrum upon assignment will not only limit others from accessing their spectrum but will also not be able to use the assigned spectrum effectively. This is due to the nature of the satellite spectrum being different from the terrestrial spectrum. **While in the latter, splitting of spectrum within a band reduces the quality of the spectrum, the same is not the case**

⁶Garrity, J. & Husar, A.(2021 April) *Digital Connectivity and Low Earth Orbit Satellite Constellations-Opportunities for Asia and the Pacific*, ADB Sustainable Development Working Paper Series No.76, Asian Development Bank. Retrieved from

<https://www.adb.org/sites/default/files/publication/696521/sdwp-076-digital-connectivity-low-earth-orbit-satellite.pdf>

⁷The FCC proposes to phase out protections for first movers to be phased out 10 years after the first NGSO FSS system receives a licence in a subsequent processing round. Currently, market entrants are required to submit an interference analysis based on a degraded throughput methodology to demonstrate that they will protect earlier-round systems in the event that an earlier- and a later-round system do not reach a coordination agreement. In order to increase competition, this requirement is being phased out after the stipulated time period is completed.

⁸ Federal Communications Commission (2023 March 30) *Report, Order and Further Notice of Proposed Rulemaking : Revising Spectrum Sharing Rules for Non-Geostationary Orbit, Fixed-Satellite Service Systems*, FCC. Retrieved from <https://docs.fcc.gov/public/attachments/DOC-392201A1.pdf>

for satellite spectrum as they are non-rivalrous by nature, and multiple users can share a band of the spectrum without material reductions in quality.⁹

At the outset, the assignment of the spectrum itself should be non-exclusive, i.e., it should be assigned to multiple players. This will ensure efficiency through competition.¹⁰ The methodology for assignment should be transparent and based on a detailed plan to ensure that the allocation treats all the market players equally. This can be realised through an administrative allocation, albeit with a standard framework and policy for allocation. This will ensure a low operation cost and therefore decreased price and increased penetration, which is the primary objective of the satellites.¹¹ Administrative allocation will also lead to lower prices for consumers and increased innovation in the market.¹²

Traditional auctioning of the spectrum is a redundant practice that can potentially stop the flow of investments in the sector.¹³ Many better practices have evolved around the globe, for example, the spectrum assignment plan in South Africa or the framework based on ITU regulations in the United States, which are more efficient and market-friendly.¹⁴

- 3. Economic Implications:** The satellite-based service licensees will be mostly serving the niche markets, i.e., the population who reside in unserved, underserved, and remote regions, therefore the optimal procedure for assigning spectrum for space-based communication is essential for the sector's growth where operations of satellite gateways in India would be dependent on them. While the auctioning method is used for telecommunication spectrum allocation, however, we believe the administrative process would be the best possible option to assign spectrum to space-based communication. Because the telecommunication and

⁹ Kar,P. (2023 April 8) *Satellite Spectrum Assignment — The TRAI's Dilemma*, Medium. Retrieved from <https://paragkar.medium.com/satellite-spectrum-assignment-the-trais-dilemma-eba2001a804a>

¹⁰ Prakash A. (2023 May) *Why satellite spectrum requires non-exclusive assignment approach*, TeleNet. Retrieved from: [why-satellite-spectrum-requires-non-exclusive-assignment-approach](https://www.tele.net/why-satellite-spectrum-requires-non-exclusive-assignment-approach)

¹¹ See Airtel's response to TRAI Consultation Paper on Assignment of Spectrum for Space-based Communication Services No. 6/2023; Barik S. (2023 April 5th) *Key question in space-comms race: to auction or allocate?*, Indian Express. Retrieved from: [key-question-in-space-comms-race-to-auction-or-allocate-8539192](https://www.indianexpress.com/article/technology/space-comms-race-to-auction-or-allocate-8539192).

¹² Ramachandran TV. (2022 October 27th) *Don't auction satellite spectrum*, The Hindu. Retrieved from: <https://www.thehindubusinessline.com/opinion/dont-auction-satellite-spectrum/article66062155.ece>.

¹³ SatCom Industry Association (2022) *SatCom Industry Association (SIA-India) Response to the Draft Indian Telecommunications Bill.*, Retrieved from: [SIA-Response-to-Draft-Telecommunications-Bill-2022.pdf](https://www.sia-india.org/SIA-Response-to-Draft-Telecommunications-Bill-2022.pdf).

¹⁴ See, for example, Independent Communications Authority of South Africa *Radio Frequency Spectrum Assignment Plan Rules for Services operating in the Frequency Band 3400 MHz to 3600 MHz (IMT3500)*. Retrieved from: [DrivingSpaceCommerce.pdf](https://www.ica.gov.za/DrivingSpaceCommerce.pdf); Stine J. & Portigal D. (2004 March) *Spectrum 101: An Introduction to Spectrum Management*, MITRE Corporation. Retrieved from: [04_0423.pdf](https://www.mitre.org/publications/spectrum-101-04-0423.pdf).

space-based communication services are distinct technologically and infrastructurally and follow different business models where the latter only serves unserved, underserved, and remote regions. Besides, frequency spectrum assigning process has direct implications on the business model and affordability of the services provided to the individuals in form cost implications.

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?**

Please provide your response in respect of different types of services (as mentioned in Table 1.3 of this consultation paper). Please support your response with a detailed justification.

The C-Band spectrum serves as the backbone of the entire broadcasting industry. It is shared amongst multiple stakeholders, enabling the availability of approximately 900 channels to subscribers in India through various distribution platform operators.¹⁵ Thus, auctioning of the C-Band spectrum will disrupt television services (a primary form of communication), thereby affecting a major chunk of the middle and lower-income groups.¹⁶ Additionally, the Indian Government cannot auction the C-Band spectrum since the spectrum utilised by satellites is specifically designated for orbital use and is not owned by the Indian government for auction.¹⁷ The International Telecommunication Union (ITU) coordinates frequencies for each orbital location, which are then allocated by the respective satellites. Conducting an auction for these frequency bands would breach ITU commitments, as satellite operators have been authorised to use the orbital spectrum without interference.¹⁸ Thus, the C-Band Spectrum could be assigned via administrative methods, ensuring the maximisation of its socio-economic benefits.¹⁹ Similar arguments preferring an administrative assignment method also apply to Ka-Band and Ku-band spectrums..

¹⁵ (2023 April 20th) *NBDA wary of 5G spectrum allocation, writes to I&B secy*, The Times of India. Retrieved from: [99625704.cms](https://www.bbc.com/news/india-625704).

¹⁶ Farooqui J. (2023 April 25th) *Broadcasting body seeks MIB intervention over C-band auction*, The Economic Times. Retrieved from: [99740820.cms](https://www.bbc.com/news/india-625704).

¹⁷ Farooqui (2023).

¹⁸ Farooqui (2023).

¹⁹ (2017 February) *Introducing Spectrum Management: Spectrum Primer Series*, GSMA. Retrieved from: [Introducing-Spectrum-Management.pdf](#).

Q17. Whether spectrum for user links should be assigned at the national level or telecom circle/ metro-wise? Kindly justify your response.

Answer: The allocation should be done at the telecom circle/metro-wise level. This will ensure non-exclusivity, which will, in turn, increase efficiency.²⁰ The United Kingdom and Hong Kong have localised spectrum-sharing policies, which have ensured that territorial restrictions enable the reuse of the same frequency channels in different areas around a region.²¹ Local licences have also supported wireless broadband services or local private networks in less-populated and non-penetrated areas,²² which is one of the main aims of satellite communication.

Q 38. In case it is decided for assignment of spectrum on administrative basis, what should be the spectrum charging mechanism for assignment of spectrum for space-based communications services?

Please support your answer with detailed justification.

Answer: The following points should be considered for delineating the spectrum charging mechanism:

- Spectrum should be allocated to the highest value use or uses to ensure maximum benefits to society are realised.²³ Towards this goal, ITU has been recommending national authorities to undertake periodic regulatory impact assessments to ensure that the procedures carved out in their policies facilitate optimum utilisation of the spectrum and its maximised usage for social good. In fact, ITU itself conducts such impact assessments for television spectrums and it will be helpful to take cues from the ITU's processes and delineate similar strategies in our national frameworks and policies towards periodic assessments to determine the efficacy of the said satellite spectrum charging mechanism.
- Greater access to spectrum will be facilitated when the least cost and least restrictive approach is chosen in achieving spectrum management goals and objectives.

²⁰ ITU News (2023).

²¹ Digital Regulation Platform (2020 October 6th) *Spectrum Management*, The World Bank. Retrieved from: [use-of-shared-spectrum-at-the-national-level](#).

²² Ofcom (Office of Communications) (2019) *Enabling Wireless Innovation Through Local Licensing: Shared Access to Spectrum Supporting Mobile Technology*. Retrieved from: [enabling-wireless-innovation-through-local-licensing.pdf](#).

²³ Agnoletto, F., et.al., (2022), Maximising the socio-economic value of spectrum: A best practice guide for the cost-benefit analysis of 5G spectrum assignments, GSMA, Retrieved from: <https://www.gsma.com/spectrum/wp-content/uploads/2022/01/mobile-spectrum-maximising-socio-economic-value.pdf>

- A balance should be achieved between the cost of interference and the benefits obtainable from greater spectrum utilisation.
- Fairness and objectivity require that fees are based on objective factors and all licence holders in a given frequency band should be treated on an equitable basis. This would preclude, for example, different treatment of different users in a given frequency band.
- Transparency requires that the basis on which fees are calculated should be made clear in a published document resulting from consultation with stakeholders and that all fees should be set based on a published schedule.
- Administrative costs will be lower if the fee schedule is simple to administer. The simplest fee schedule would be one involving a flat fee payment; however, this may not promote efficient spectrum use.
- Administrative simplicity needs to be balanced against the requirement to encourage efficiency of spectrum use if fees are set taking account of parameters such as bandwidth, frequency band or coverage.

In addition to these factors, the following factors should also be considered:

- Spectrum fees should be reviewed at suitable intervals in order to cater for changes in economic key performance indicators (KPIs) or advancement in technologies resulting in increased demand for a particular band.
- Mechanisms should be in place to avoid, detect and where necessary prevent spectrum hoarding, which will deter competition.
- A balance should be established between the financial approach and other key facets-regulatory (competition), and social (universal service).
- As a vital natural resource, the price of the spectrum should be sufficient to ensure that it is valued and used wisely. The use of spectrum provides considerable benefits to the economy and benefits from spectrum should be maximised.
- The costs associated with managing and regulating the frequencies (including monitoring and control) should be recovered from those who benefit from spectrum management activities.
- Important social and cultural objectives can be advanced by use of the spectrum and spectrum pricing should facilitate the achievement of social and cultural objectives.

Notwithstanding these objectives, the revenue goals and requirements of the government influence the setting of spectrum fees by the regulator. As best as possible these revenue targets should align with the objectives of (i) optimal spectrum efficiency, (ii) achieving economic and social development goals, (iii) spectrum users paying for spectrum resource usage, and (iv) recovering spectrum management costs.

Q 45. Should the international administrative spectrum charges/fees serve as a basis/technique for the purpose of valuation in the case of satellite spectrum bands?

Please give country-wise details of administrative price being charged for each spectrum band. Please specify in detail terms and conditions in this regard.

Answer:

Analysis of the global developments suggests that international practice and findings are overwhelmingly against the approach of auctions for the allocation of satellite spectrum. Countries like the US, Mexico and Brazil had attempted to assign frequencies through auction but eventually did not succeed and at last resorted to administrative licensing. There is merit in appreciating the experience and learnings from other jurisdictions and avoiding the auction model of spectrum allocation. To this end, the international administrative spectrum charges can certainly serve as a helpful point of reference to determine the charges/ fees.

Some of the spectrum charging mechanisms being followed in other prominent jurisdictions include:

a. Satellite Bands in Europe & UK:

In the EU and UK, an annual licence fee is currently applied to the licence products for permanent and transportable earth stations and VSATs. The licence fees are based on algorithms incorporating the bandwidth to which access is authorised, the peak transmits power and a number of modifiers used to capture aspects of satellite operation that might affect the spectrum access denied to other users.

b. Satellite bands in Canada:

Satellite spectrum licences for Fixed-Satellite Service (FSS) and Broadcasting-Satellite Service (BSS) are typically issued for a term of 20 years. The fee is payable on an annual basis. The annual radio authorization fee of \$137.86 per megahertz (MHz) is imposed to authorise the use of FSS and BSS spectrum.

c. Allocation and charging mechanism of satellite spectrum bands in the USA

In the US, applications need to be filed by going online at licensing.fcc.gov/myibfs and submitting the application through the International Bureau Filing System (IBFS). The bands are assigned through a licensing procedure. The annual regulatory fee for VSAT and Equivalent C-Band Antennas operating in the 12 and 14 GHz is \$595 per licence or authorisation and \$595 for each associated hub station.

Q 46. If the answer to the above question is yes, should the administrative spectrum charges/fees be normalised for cross-country differences? If yes, please specify in detail the methodology to be used in this regard.

Answer: Yes, normalising the charges/fees is critical to ensure equitable access across geographies. The regulator in each geography introduces fees with a view to aligning them with the objective of cost recovery of associated spectrum management expenditures. Towards this, the normalisation of the charge should be done in each country in view of the following factors:

- salaries for skilled professionals (including monitoring and enforcement) and administrative spectrum management staff;
- investments in ICTs and databases including spectrum management tools, national frequency allocation tables, spectrum users databases and monitoring systems and equipment such as fixed and mobile monitoring stations and their upgrades/calibrations;
- Capex and Opex for automated spectrum management functions and their upgrades;
- office space and services for utilities;
- research activities and costs associated with consultations and publications;
- interference coordination/mitigation activities;
- participation in ITU and other international meetings;
- management overheads;
- legal fees of enforcement actions.

It is also important to ensure that a standardised approach is adopted across countries for charging the spectrum fees to prevent any exploitative practices by companies where they may use the spectrum from one particular country with significantly lower rates to provide services in another with significantly higher rates. Towards this, it may be helpful to establish a formalised procedure and platforms for countries to come together and deliberate on a standardised mechanism for determining the spectrum fees/charges.

Q25. What should be the terms and conditions for assignment of frequency spectrum for both user links as well as gateway links for each type of space-based communication service? Among other things, please provide your detailed inputs with respect to roll-out obligations on space-based communication service providers. Kindly provide a response for both scenarios viz. exclusive assignment and nonexclusive (shared) assignment with justification.

Ensuring last-mile internet and connectivity across the country requires a deeper look at how the foundational infrastructure is built and maintained. While terrestrial-based internet infrastructure has constraints in terms of serving unserved and remote localities, the recent developments in the form of space-based communications services using low-orbiting satellites are designed to serve fast and affordable broadband services to unserved and underserved communities around India. Therefore, to buttress space-based communications services in achieving their objective of taking the internet to the last-mile, the terms and conditions for assigning the frequency spectrum, viz. exclusive assignment and nonexclusive (shared) assignment for both user links as well as gateway links as to be optimal with minimum entry barriers. With this in mind, we propose the following terms and conditions that governments can consider as parameters for the frequency spectrum assignment.

- **Licensing:** In response to the consultation paper, we believe holding Unified Access Service License (UASL)/ Unified License (UL) with authorisation for Access Services or submitting an undertaking to obtain Unified License with authorisation for Access Services would be excessive as the licensing process for space-based communication service providers is a lengthy process and consumes time. For instance, any business developments involving satellites are heavily controlled by the government under the Satellite communications policy, 1997 (Satcom Policy), enforced by the Department of Space (DoS) through the Indian Space Research Organisation (ISRO). The operation using the Indian satellite and foreign satellites is subjected to approval under this Satcom Policy, where preferential treatment will be given to Indian satellites. Also, a foreign entity to provide satellite service in India must go through Antrix Corporation (ISRO's commercial arm). Moreover, in addition to the approval and licensing formalities from the space department (DoS, ISRO, Antrix), the broadband-from-space service providers are also subjected to service licensing requirements administered by the Department of Telecommunication. According to recent guidelines for establishing Satellite-based Communication Networks, the government requires service providers to apply for approval from the Inter-Ministerial Committee for Satellite Network Clearance, which in turn recommends the Satellite Licensing Division of the Department of Telecommunication to provide in-principle clearance for the proposed service. Therefore, while the service providers landscape the licensing procedure and apply for the same, meanwhile they should be allowed to

apply for frequency spectrum allocation such that lack of the licensing or an acknowledgement doesn't keep the start-ups, smaller players and others from entering the market.

- **Allowing Cross-holding:** The cross-holding should be made applicable for satellite-based service licensees, especially when the promoter directly or indirectly has a beneficial interest in another licensee company holding "Access Spectrum", which is a telecommunication service provider. Because firstly, telecommunication services and broadband-from-space services are distinct technologically and infrastructurally and follow different business models. Secondly, the satellite-based service licensees will be only serving the niche markets, i.e., the population who reside in unserved, underserved, and remote regions, therefore from a business viability perspective, it would be ideal for satellite-based service licensees to diversify their portfolio into allied services like terrestrial broadband services. Finally, as satellite-based service licensees will only be serving smaller market sizes, allowing them to cross-hold came help in sharing the residual bandwidth of spectrum frequency for providing terrestrial broadband services, which ultimately leads towards optimal utilisation of resources.
- **Basic Requirement:** Basic requirements to be considered while assigning spectrum must be minimalistic, where it could be based on (a) the technical description provided by the satellite-based service licensees, which also proves their technical capabilities to deliver the promised services, (b) information provided on the intended services and intended service areas, where the government could come up an inclusion metrics where they could evaluate the satellite-based service licensees based their intent to serve the unserved, underserved, and remote regions. Besides, the government could periodically monitor the progress the satellite-based service licensees have made in delivering digital inclusion to incentivise them to expand to other unserved, underserved, and remote regions by assigning them more frequency spectrum bandwidth and (c) evidence that satellite-based service licensees have the financial capacity to the deliver and meet the cost of the service delivery based the submitted business plan spanning details on intended sources of funding and estimated revenues.
- **Frequency Coordination:** The government could consider evaluating satellite-based service licensees based on the proposed plan for (a) using the frequency spectrum, also (b) negotiating and reaching a coordination agreement with administrative authorities (if required), (b) Coordinating with satellite system operators on technical aspects related coordination of frequency, and (c) ensuring that there is no overlap with frequency assignment to others.
- **Risk Management and Monitoring Conditions:** The satellite-based service licensees may be assigned a frequency spectrum based on their risk management. Besides, the government

could command applicants to produce periodic physical and financial progress of the establishment to monitor the progress to determine where the licensee retains the licence.

- **Frequency Parameters:** The government can also make decisions on the frequency spectrum assignment as per the value submitted by the satellite-based service licensees on parameters such as bandwidth, number of terminals (VSAT), number of satellites, population density, number of handheld population, number of the base stations, coverage area etc.