Recommendations on Telecom Regulatory Authority of India Consultation Paper on Telecommunication Infrastructure Sharing, Spectrum Sharing, and Spectrum Leasing

Reference on TRAI's Consultation paper dated on 13/01/2023.

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Chapter 1

About ITU-APT Foundation of India (IAFI)

We, the ITU-APT Foundation of India (IAFI), are a registered non-profit and non-political industry association registered under the Cooperative Societies Act of India. IAFI has been recognized by the International Telecommunication Union (ITU), the UN Organisation for ICT issues, as an international/ regional Telecommunications organisation and has been granted the sector Membership of the ITU Radio Communications Bureau (ITU-R), ITU Development Bureau (ITU-D) and ITU Telecommunication Standardisation Bureau (ITU-T). IAFI is also an affiliate member of the APT.

IAFI is a non-partisan Foundation and does not identify with any Industry sector or group. We support all telecom and IT sectors: 4G, 5G, GSO –NGSO Satellites, Wi-Fi, Broadcasting, Aviation, etc. IAFI activities continued to be well covered by the Media with 30 stories during the year. IAFI submitted more than 20 responses to TRAI, DOT and other consultations. IAFI has been working for the last 20 years to encourage the involvement of professionals, corporate, public/private sector industries, R&D organisations, academic institutions, and other agencies in the activities of the ITU.

For more details regarding IAFI, please visit https://www.itu-apt.org/.

Chapter 2

Responses to the TRAI Questions

<u>Please note that response on Infrastructure Sharing, Spectrum Sharing, and Spectrum Leasing in respect of Satellite Networks are separately included in Chapter 3. The responses in this chapter relate to terrestrial networks.</u>

Question 1 - Should passive infrastructure sharing be permitted across all telecommunication service licenses/ authorizations? Kindly justify your response.

Answer- Telecommunication infrastructure sharing can be divided into two broad categories

1. Passive infrastructure sharing
2. Active infrastructure

Passive infrastructure sharing means allowing operators to share the electrical, civil and engineering elements of telecommunication networks. It includes rights of way or easements, ducts, pylons, masts, trenches, towers, poles, equipment rooms and related power supplies, air conditioning, and security systems.

Initially, access service providers were permitted to share passive Infrastructure as per existing licensing conditions of Unified Access Service License (UASL) and Cellular Mobile Telecom Service (CMTS) license only.

We believe that passive infrastructure must be permitted across all telecommunication service licenses due to the following reasons:

a) Extensive investments have been made by various types of licenses holders and their vendors in fixed and mobile infrastructure for providing fixed broadband as well as mobile wireless services. Such investments can be better leveraged by <u>sharing both active and passive infrastructures as this will substantially</u> reduce the entrance and operational costs and further reduce the development risks for all operators when offering new services and applications.

b) Infrastructure sharing will <u>enable rationalization of legacy networks</u>, such as basic, 2G or 3G networks along with 4G or Long-Term Evolution (LTE) networks. Considering the falling revenues of basic, 2G or 3G networks and moving to 4G & 5G, rationalization of these legacy networks needs to be encouraged.

c) Passive infrastructure sharing enables operators to focus on the competition in the service layer. Operators can share the <u>whole</u> or <u>some</u> <u>strategic</u> parts of its passive infrastructure, as appropriate and cost effective for them.

d) It has also been pointed out by TRAI that cost reduction will take place with the sharing of passive infrastructure and may help service provider to provide cheaper services to its customers.

e) Passive infrastructure sharing also reduces the carbon footprint and helps in substantial environmental impact reductions.

Question 2- Should active infrastructure elements deployed by service providers under various licenses/authorisations, which are not permitted to be shared at permitted to be shared at present, be permitted to be shared among licensees of telecommunication services?

Answer-

Yes, the active infrastructure elements which are not permitted to be shared at present should be permitted to be shared among licensees of telecommunication services due to following reasons**:**

- By sharing active infrastructure, operators can reduce their capital and operational expenses, while still providing high-quality service to their customers.
- By using open interfaces and standardized protocols, operators can mix and match equipment from different vendors, reducing vendor lock-in and increasing competition. In addition to the benefits of interoperability and vendor diversity, active infrastructure sharing can also reduce costs. This can be particularly useful in areas where there is limited space for new infrastructure, or where it is difficult to obtain rights of way or location for new sites.
- The active infrastructure sharing with Open RAN is a new approach to building and operating telecommunications networks. It is based on the principles of open standards, interoperability, and software-defined networking. With Open RAN, operators can share active infrastructure components such as radio access network (RAN) equipment, base stations, and small cells, as well as core network functions, including policy control, billing, and subscriber management.
- Open RAN is built on an open architecture that allows different vendors to interoperate with each other. This is in contrast to traditional RANs, which are typically based on proprietary equipment from a single vendor.
- One of the key components of Open RAN is software-defined networking (SDN). SDN allows operators to manage their networks more efficiently and dynamically, by separating the control and data planes of the network. This makes it easier to deploy new services, optimize network resources, and respond to changing traffic patterns.
- Another important aspect of Open RAN is virtualization. By virtualizing network functions, operators can run multiple services and applications on a single physical infrastructure. This can help to reduce the complexity and cost of managing the network, while also improving scalability and flexibility. Open RAN is still in the early stages of adoption, but it has already attracted significant interest from operators and vendors alike.
- Overall, active infrastructure sharing with Open RAN represents a promising new approach to building and operating telecommunications networks. By using open standards, interoperability, and software-defined networking, operators can reduce costs, increase competition, and provide high-quality service to their customers. As the technology continues to evolve, it is likely that we will see more and more operators adopt Open RAN in the years to come.
- Sharing of active infrastructure through slicing offers a number of benefits for operators and their customers. Slicing refers to the process of dividing a physical network into multiple virtual networks, each with its own set of resources and capabilities:
- **Reduced capital and operating expenses**: By sharing active infrastructure through slicing, operators can reduce their capital and operating expenses. This is because they can use the same physical infrastructure to support multiple virtual networks, rather than having to build separate networks for each service or customer. This can lead to significant cost savings, particularly in areas where there is limited space for new infrastructure or where it is difficult to obtain permits for new sites.

- **Increased Network Efficiency:** Sharing active infrastructure through slicing can also increase network efficiency. By dividing the network into multiple virtual networks, operators can allocate resources more effectively and optimize network traffic based on the needs of each customer or service. This can help to improve network performance, reduce congestion, and increase the overall quality of service.
- **Greater Flexibility and Agility:** Slicing also offers greater flexibility and agility. Operators can easily create and modify virtual networks based on changing customer needs, market demands, or other factors. This can help to accelerate the deployment of new services and applications, reduce time-to-market, and improve the overall customer experience.
- **Improved Security and Resilience:** Slicing can also improve network security and resilience. By isolating traffic and resources within each virtual network, operators can better protect against cyber threats and other security risks. Additionally, if one virtual network experiences an outage or disruption, other virtual networks can continue to operate normally, helping to ensure continuity of service.
- **Increased Innovation and Competition:** Sharing active infrastructure through slicing can also increase innovation and competition. By allowing multiple service providers to use the same physical infrastructure, slicing can lower barriers to entry and encourage the development of new services and business models. This can help to create a more competitive market that benefits both operators and customers.
- Overall, sharing active infrastructure through slicing offers a number of benefits for operators and their customers. It can reduce costs, increase network efficiency, improve flexibility and agility, enhance security and resilience, and foster innovation and competition. As such, it is likely that we will see more and more operators adopt slicing as a way to share their active infrastructure in the years to come.

Unified Licensees are permitted to share active infrastructure limited to antenna, feeder cable, Node B, Radio Access Network (RAN) and transmission system only in addition, sharing of infrastructure related to Wi-Fi equipment such as Wi-Fi router, Access Point etc. is also permitted to Unified Licensees. As per the DoT order dated 06/04/2021 at present Unified Licensees are permitted to share active infrastructure limited to antenna, feeder cable, Node B, Radio Access Network (RAN) and transmission system only. In addition, sharing of infrastructure related to Wi-Fi equipment such as Wi-Fi router, Access Point etc. is also permitted to Unified Licensees.

Therefore, considering the present requirement we are of the view that service providers should be allowed to share all active infrastructure elements.

Question 3 - If your response to the Q2 is in the negative, which active infrastructure elements should not be permitted to be shared? Further, which active infrastructure elements should be permitted to be shared with which licensees/ authorization holders? kindly provide details for each authorization with detailed justification

Answer- Not applicable in lieu of above

Question 4 - In case it is decided to permit sharing of any additional active infrastructure elements among licensees,

   a) **What precautionary conditions should be put in place to avoid disruption in telecommunication services due to any unforeseen situation? The response may be provided for each active infrastructure element.**

Answer-

a) The precautionary conditions regarding the sharing of **additional active infrastructure elements among licensees** are the following:

   (i)   Active Infrastructure sharing is a complex process involving many interfaces but is necessary for cost efficiencies and for maintaining strategic differentiation within service providers. Therefore DoT should regularly monitor the sharing of active infrastructure and may ask the licensed operators for submitting status reports from time to time.

   (ii)   There should be a long-term commitment between the operators regarding the time-bound sharing of various components of the active infrastructure, as service providers have the right to reserve capacity for future use based on the future network roll-out plans. However, details of such commitments should be left to the operators to decide without any guidance from the licensing authorities.

   (iii)   An open environment for active infrastructure sharing expands the ecosystem, and with more vendors providing the building blocks, there is more innovation and more options for the Operators which can help them focus on the services and thus they can add new service offerings.

b) Whether there is a need to have a provision for permission from/ intimidation to the licensor before commencement of such sharing? If yes, what provisions and timelines need to be prescribed for each active infrastructure element?

Answer-

   b) It could be argued that it would be beneficial for the DoT to be involved in the implementation of active infrastructure sharing, but whether it should be mandatory is a more complex question. On the one hand, the DoT has a mandate to promote competition in the telecommunications market, as well as to ensure that consumers have access to affordable and high-quality services. Active infrastructure sharing could help to achieve these goals by reducing the barriers to entry for new players and increasing the efficiency of the network. By promoting the adoption of open standards and interoperability, the DoT could help to create a more competitive market that benefits both consumers and operators.

Furthermore, the DoT has a role to play in ensuring that telecommunications networks are secure and resilient. By promoting the use of software-defined networking and virtualization, as well as encouraging operators to share infrastructure, the DOT could help to create a more flexible and robust network that is better able to withstand cyber-attacks, natural disasters, and other disruptions.

On the other hand, there are potential downsides to involving the DoT in the implementation of open RAN or active infrastructure sharing. One concern is that regulatory involvement

could stifle innovation and slow down the development of new technologies. Another concern is that the DoT could inadvertently create new barriers to entry or favour certain players over others, thereby undermining the very competition it seeks to promote. Ultimately, whether the DoT should be involved in active infrastructure sharing depends on the specific circumstances and goals of DoT.

Therefore, IAFI is of the view that while it may be beneficial in some cases, it should not be mandatory across the board. Instead, the DoT should take a measured approach that balances the potential benefits with the need to promote innovation, competition, and consumer welfare.

Question 5 - Whether any other amendment is required to be made in the telecommunication services licenses/ authorizations with respect to the provisions relating to both active and passive infrastructure sharing to bring clarity and remove anomaly? If yes, clause-wise suggestions in the telecommunication services licenses/ authorizations may kindly be made with detailed justification.

Answer- We believe that there is an already suggested relevant Para -33 of the Unified License that should be suitably amended, and in addition to that, Para – 4.2(i) and 4.2 (iv) of the UL should also be suitably amended.

Question-6 - Should there be any obligation on telecom service providers to share infrastructure that has been funded, either partially or fully, by the Government through Universal Service Obligation (USO) Fund or otherwise, with other telecom service providers? Kindly justify your response.

Answer- Infrastructure developed by any TSP's as per the <u>direction and funds</u> from USOF, are generally assigned to TSPs on <u>nomination or on a tender basis </u>by the USOF. Herein, adopting all practices the evaluation of bids and award of project/ scheme is carried out based on the least quoted total subsidy and the entire funds will be provided by the USOF. The Service Provider is required to set up, operate, maintain, and manage the respective infrastructure as per the terms and conditions laid down in the agreement signed between TSP and USOF.

Therefore, we are of the view that the infrastructure so created by TSP, utilizing public money must be made available to all TSPs through some mandatory infrastructure sharing regulation to extend the benefits to more and more population living in such area and should not be restricted to the subscribers of the particular TSP. We believe DoT should issue suitable guideline for the same.

Question-7 - In case it is decided to impose some obligations on telecom service providers to share the infrastructure funded by Government with other telecom service providers, is there a need to provide a broad framework for sharing of such infrastructure? If yes, kindly suggest the key aspects of such framework with detailed justification.

Answer – Infrastructure developed utilizing public money need to be used by all the service providers willing to provide telecom service in the area. DoT should issue necessary broad guidelines regarding the sharing of the infrastructure developed by all these service providers

willing to provide telecom services in the area while leaving the commercial arrangements to be agreed between the concerned service providers.

USOF has supported many projects for development of infrastructure in rural/remote area specially for BharatNet, mobile infrastructure in J&K, Meghalaya, Arunachal Pradesh, uncovered villages of KLWE area, hilly/remote area in UP, Bihar, Uttarakhand and other part of the country. Any new service provider wanting to use such infrastructure, should enter into a reasonable commercial agreement with the main service provider, who developed the infrastructure and is maintaining the same.

Question – 8- Any other suggestion to facilitate infrastructure sharing may kindly be made with proper explanation and justification.

Answer- In order to facilitate infrastructure sharing, IAFI suggests the following;

i) Infrastructure sharing should be visualised in broad perspective and must include all types of telecom services including services rendered by TSPs/ISPs/GSO-NGSO Satellite Operators, existing and likely to existing and likely to roll-out in the near future, PMRTS/GMPCS/VAT etc, as all types of service providers are facing complexity of technology migration, regulatory requirements and constant increase of capital expenditure

ii) DOT may develop non-binding guidance including sample sharing agreement templates including time limits to conclude agreements and to provide actual access.

iii) TDSAT should be empowered to resolve any disputes between the licensees

iv) Service Providers should be allowed for developing self-regulation for routine operations.

v) Licensor/DoT should encourage network sharing and site sharing by the service providers providing services in rural and remote areas by providing needed incentives in terms of License fees or rebates in spectrum charges. Specific list of such area, where such incentives are available should be uploaded on the DOT website.

vi) Licensor/DoT should consider providing subsidies related to network sharing in rural and remote areas, specially developed by TSPs with the support from USOF.

Connectivity Issues Faced by the Subscribers in Remote and Far-flung Areas of the Country

Question – 9 - What measures could be taken to encourage roaming arrangements among telecom service providers in remote and far-flung areas? What could be the associated regulatory concerns and what steps could be taken to address such concerns? Kindly provide details on each of the suggested measures with justification.

Answer- As per the extant licensing regime in the country, roaming arrangements among telecommunication service licensees are permitted, but not mandated.

IAFI is of the view that considering the hardship faced by the subscribers due to connectivity issues in remote and far-flung areas and non-availability of the network of any service provider in a complete area, the licensor/DoT should encourage the operators to enter into roaming arrangements among the various mobile service providers operating in such areas by

providing some incentives to the operators. DoT should publish a list of such area on its portal.

Question- 10 - What could be the other ways to ease out the hardship faced by the subscribers in remote and far-flung areas due to connectivity issues of the home network provider? Kindly provide detailed response with justification.

Answer- IAFI is of the view that the best way to ease out the hardship faced by the subscribers in remote and far-flung areas due to connectivity issues would be for accessing high-speed broadband connection, through Wi-Fi, Haps or through Satellite. DOT should consider delicensing more spectrum for Wi-Fi, particularly in 6GHz and V band. Further many NGSO satellite service providers are also working toward improving their services with improved performance, faster data speeds, and larger capacity for easier downloading of data. Wi-Fi routers with mast/tower can be installed for providing last mile services. DOT needs to ease the licensing norms for such systems, including their Gateway earth stations.

Funds collected by USOF can be provided to such willing service providers as CAPEX/OPEX subsidy for extending high-speed broadband services in such difficult area.

As TRAI correctly noted in the consultation, telecommunications services in remote areas of India have not improved, and the need to promote connectivity in these regions is an essential element to guarantee social and economic development.

Mandatory roaming arrangements amongst TSPs to promote connectivity in remote areas of the country might prove an inefficient mechanism, due to the lack of economic incentive for TSPs to invest is such areas. If the TSPs that invest in such areas are subsequently mandated to share their network infrastructure with other TSPs, their investment interest might be further reduced as it will not necessarily result in an increase of their customer base.

The satellite industry is best positioned to promote connectivity in areas that lack essential access to fast and reliable communications networks. The industry is ready and willing to invest in connectivity solutions, and to contribute in bridging the digital divide in the country. Therefore, we submit to the TRAI that satellite technology is the best solution to promote connectivity in remote areas of the country due to its natural extended coverage.

Issues relating to inter-band spectrum sharing among access service providers

Question- 11 - Whether inter-band access spectrum sharing among the access service providers should be permitted in the country?

Answer- Yes, we believe that inter-band access spectrum sharing among the access service providers should be permitted in the country. This is because spectrum is a scarce and natural resource, so any amount of frequency spectrum, if not used optimally and efficiently, results not only in financial losses to the government but also hinders the socio-economic development of the country. Inter-band access spectrum sharing among the access service will lead to enhancing of spectral efficiency.

Question- 12- In case it is decided to permit inter-band access spectrum sharing among access service providers, please provide detailed inputs to the following questions:

   a. **What measures should be put in place to avoid any potential adverse impact on competition and dynamics of spectrum auction? Kindly justify your response.**
   b. **Considering that surrender of spectrum has been permitted in the country, what provisions need to be included in the guidelines for inter-band access spectrum sharing so that any possible misuse by the licensees could be avoided? Kindly justify your response.**
   c. **What should be the broad framework for inter-band access spectrum sharing? Whether the procedure prescribed for intra-band access spectrum sharing could be made applicable to inter-band access spectrum sharing as well, or certain changes are required to be made?**
   d. **What should be the associated charges, and terms & conditions for inter-band access spectrum sharing?**

Answer-

   a. We believe that there is no possibility of any adverse impact on competition and dynamics of the spectrum due to inter-band spectrum sharing, as 5G services have started rolling out in India and the development of the complete eco-system may take at least two to three years. Since many 5G/ IMT Applications requires very large amount of data, therefore more spectrum will be needed by all telecos by 2025. It should be kept in mind that all natural resources should be optimally used including spectrum.
   b. We believe that the chances of surrendering of spectrum is merely impossible as IMT roll-out is picking up pace. Even in all national/international conferences, the IMT lobby is vigorously pursuing for more spectrum in 5925-7125 MHz band to be assigned for IMT
   c. Sharing of spectrum is an effective way to provide additional spectrum for mobile broadband, therefore careful planning is necessary to craft approaches that will offer access to sufficient amounts of spectrum to support mobile broadband.

Regulators may take the following precautions

   i)   Spectrum sharing will not succeed unless incumbent users are encouraged to share their spectrum in areas where it is underused and there is clear and commercially viable, demand from other users.
   ii)   Licensor i.e., DoT should encourage mobile operators to have voluntary infrastructure sharing arrangements to help lower the cost of extending and densifying their networks.
   d. DoT should provide some financial incentives to encourage spectrum sharing.

Question – 13- Any other issues/ suggestions relevant to the spectrum sharing between access service providers, may be submitted with proper explanation and justification.

Answer- Most of the sharing techniques are categorised on the basis of coexistence or cooperation and sharing among equals or primary-secondary sharing. Therefore, DoT should keep in mind that factors like potential gains in spectral efficiency, and interference protection, congestion in the network, support for mobility have to be considered.

Issues relating to Authorised Shared Access (ASA) of Spectrum

Question – 14- Whether there is a need to explore putting in place a regime to implement Authorised Shared Access (ASA), wherein an access service provider as a secondary user could use the frequency spectrum assigned to a non-TSP primary user (government agencies and other entities) on a dynamic spectrum sharing basis? Kindly justify your response.

Answer- In dynamic spectrum sharing, the Secondary User's (SU) opportunistically access the spectrum to discover routes and to transit the data. The basic components of this system include spectrum opportunity identification, opportunity exploitation and regularity policy. The biggest challenge in such a system is the interference management. Considering interference and security aspect, many spectrum bands currently being used could be considered for dynamic spectrum sharing. Examples of CBRS in USA could replicated in India in mid bands.

Question- 15- In case it is decided to implement ASA technique for secondary use of frequency spectrum assigned to non-TSP primary users, please provide your response to the following questions with detailed justification:

   a) **What are the potential spectrum bands in which ASA implementation can be considered?**
   b) **What measures should be taken to encourage and motivate the incumbent users for participation in the spectrum sharing through ASA technique?**
   c) **What should be the broad framework for implementation of ASA technique?**
   d) **Is there a need for putting in place a mechanism for dispute handling including interference issues in case of ASA? If yes, what should be the framework?**
   e) **What methodology should be adopted for spectrum assignment to secondary users? What could be the spectrum charging mechanism for such assignment?**
   f) **Who should be entrusted the work of managing shared access of spectrum?**

Answer-

a) The potential spectrum bands in which ASA (Authorized Shared Access) implementation can be considered include mid bands between 3 GHz and 7 GHz. In particular, the 3.5 GHz band, 4.9 GHz band, 6-7 GHz band, and TV white spaces are most suitable for ASA. Such sharing can provide excellent spectrum resources for Private or Industrial networks in the bands which are currently occupied.

b) To encourage and motivate incumbent users for participation in spectrum sharing through ASA, it is important to ensure that they are not negatively impacted by the shared access. This can be achieved by implementing measures such as interference management, spectrum coordination, and dynamic spectrum access. It is also important to provide incentives to incumbent users for participating in ASA, such as sharing of infrastructure costs or access to new services or technologies.

c) The broad framework for implementation of ASA technique should include guidelines for spectrum sharing, interference management, dynamic spectrum access, spectrum coordination, and dispute resolution. It should also include provisions for spectrum assignment, licensing, and charging mechanisms.

d) Yes, there is a need for putting in place a mechanism for dispute handling, including interference issues in case of ASA. The framework for dispute resolution should include measures such as establishing a regulatory body or committee to oversee the resolution of disputes, developing clear guidelines for handling disputes, and implementing measures for sharing spectrum data and monitoring interference.

e) The methodology for spectrum assignment to secondary users should be based on factors such as the amount of spectrum available, the type of service or application being used, and the level of demand for spectrum in a particular area. Spectrum charging mechanisms for such assignments can include auctioning, administratively assigned prices, or revenue-sharing arrangements.

f) The work of managing shared access of spectrum can be entrusted to a regulatory body or committee tasked with overseeing the implementation and management of ASA. This can include developing guidelines and regulations for spectrum sharing, coordinating spectrum use among multiple users, monitoring interference, and resolving disputes. The regulatory body can work closely with industry stakeholders and other relevant organizations to ensure the effective implementation of ASA.

Question- 16 - Whether there is a need to permit the ASA technique-based dynamic spectrum sharing among access service providers? If yes then,

   a) **What are the possible regulatory issues involved and what could be the possible solutions?**
   b) **What measures should be put in place to avoid any adverse impact on competition and dynamics of spectrum auction? Kindly justify your response**

Answer- Dynamic spectrum sharing is a technique that allows multiple users to access the same frequency band simultaneously. The Adaptive Spectrum and Signal Alignment (ASA) technique is a form of dynamic spectrum sharing that has been proposed as a way to enable access service providers (ASPs) to share spectrum in a more efficient and flexible manner.

There is a need to permit the ASA technique-based dynamic spectrum sharing among access service providers. The use of this technology can improve the efficiency of spectrum use, increase spectrum availability, and promote competition among ASPs. However, there are several regulatory issues involved in permitting ASA technique-based dynamic spectrum sharing. First, there is a need to ensure that ASPs have equal access to spectrum, without any discrimination or preferential treatment. This requires a regulatory framework that promotes fair competition and prevents anti-competitive behaviour. Second, there is a need to ensure that the dynamics of spectrum auctions are not adversely impacted. Spectrum auctions are an important mechanism for allocating scarce spectrum resources, and any changes to the auction process must be carefully considered to avoid unintended consequences.

Possible solutions to these regulatory issues include the following:

   1. Develop a regulatory framework that promotes fair competition and prevents anti-competitive behaviour. This can be achieved by establishing clear rules for spectrum allocation, setting limits on spectrum holdings, and enforcing strict antitrust regulations.

2. Ensure that the ASA technique-based dynamic spectrum sharing is transparent and predictable. This can be achieved by providing clear guidelines for the use of the technology and ensuring that ASPs have equal access to spectrum.
3. Monitor the impact of ASA technique-based dynamic spectrum sharing on competition and the dynamics of spectrum auctions. This can be achieved by collecting data on spectrum usage, ASP market share, and auction outcomes.
4. Establish a dispute resolution mechanism to handle any conflicts that may arise between ASPs. This can be achieved by establishing an independent regulatory body to oversee the use of the ASA technique-based dynamic spectrum sharing and to resolve any disputes that may arise.

In summary, permitting the ASA technique-based dynamic spectrum sharing among access service providers can have several benefits, including improved spectrum efficiency, increased availability, and enhanced competition. However, regulatory issues need to be carefully considered.

Question- 17- In case it is decided to permit ASA technique-based dynamic spectrum sharing among services providers in the country, please provide your response to the following question with the justification:

a) **Whether there is a need for prescribing any framework for such shared use? If yes, what should be the framework?**
b) **Whether access service providers should be required to obtain approval or intimate the DoT before entering into such arrangement?**
c) **Whether any fee (one time, or recurring) should be prescribed on the spectrum sharing parties? If yes, what should be the fee and who should be liable to pay such fee?**
d) **What should be the treatment of spectrum shared through ASA technique for the purpose of computing of spectrum cap?**
e) **Whether there is a need for an independent entity for managing spectrum access? If yes, who should be entrusted this work? If not, how should the spectrum access be managed?**
f) **Is there a need for putting in place a mechanism for dispute handling including interference issues or should it be left to the access service providers? If yes, what should be the framework?**
g) **What other terms and conditions should be applicable for the sharing parties?**

Answer-

Please see our response to the previous question

Question-18- Suggestions on any other spectrum sharing techniques(s) which needs to be explored to be implemented in India, may kindly be made along with the relevant details and international practice. Details of likely regulatory issues with possible solutions, interference management, dispute handling etc. may also be provided.

Answer- We believe that there are other spectrum sharing techniques which could be explored which are

1) Open Sharing Model
2) Hierarchical access model

In an open sharing model scenario, each network accesses the same spectrum with equal probability. There is no interference constraint from one network to its neighbours. (Unlicensed band is an example of this model)

Hierarchical model consists of primary network and secondary network. The secondary network accesses the spectrum without affecting the primary network.

<div align="center"><u>**Issues relating to Leasing of Spectrum**</u></div>

Question-19- Where there is a need to permit spectrum leasing among access service providers? Kindly justify your response.

Answer- Yes, we believe that there is a need to permit spectrum leasing among access service providers, because after the entry of CNPN Licensees for developing 5G network for their captive use, DoT vide OM dated 27-06-2023 issued detailed guidelines for leasing of spectrum to CNPN by telecos. Similarly, Wireless Planning and Coordination (WPC) wing vide a letter dated 12/10/2015 issued detailed guidelines for trading of spectrum.

Leasing of spectrum will have the same advantages.

Question-20- In case it is decided to permit spectrum leasing among access service providers, please provide detailed response to the following questions:

a) **Whether spectrum leasing should be permitted for short-term period only, or for both short-term as well as long-term?**
b) **In case only short-term leasing is to be permitted, what should be the maximum duration for such spectrum leasing? Should there be any restrictions on renewal of such short-term lease?**
c) **In case it is decided to permit long term leasing, please provide your response to the following questions with justification:**
    i. **What measures should be put in place to avoid any adverse impact on competition and dynamics of spectrum auction?**
    ii. **Whether there should be a maximum duration for which spectrum leasing may be permitted?**
d) **What should be the applicable roll-out obligations for the Lessee (the access service provider which takes spectrum through leasing arrangement from the Lessor)? Whether the spectrum leasing should have any effect on the roll-out obligations applicable for the Lessor (the access service provider which has leased out the spectrum)? Whether the provisions for roll-out obligation require to be different for short-term and long-term spectrum leasing?**
e) **Should the spectrum leasing charges be levied on similar lines as applicable for spectrum trading? If no, what charges should be made applicable in case of spectrum leasing?**
f) **Should there be a lock-in period, after acquisition of spectrum, to become eligible for spectrum leasing as applicable in spectrum trading? If yes, what**

should be the lock-in period post which, spectrum holder would become eligible to lease it to another access service provider?

g) **Whether there is a need for an approval from, or intimation to DoT before the proposed leasing of spectrum? If yes, whether prior approval/ prior intimation requirement be different for long-term and short-term spectrum leasing? What should be the timelines for approval from, or intimation to DoT in each case?**

h) **Whether the spectrum held by an access service provider on short-term or long-term lease be included to calculate compliance to spectrum caps?**

i) **Considering that surrender of spectrum has been permitted in the country, what provisions need to be created in the guidelines for leasing of spectrum between access service providers so that any possible misuse by the licensees could be avoided?**

j) **What other terms and conditions need to be prescribed in respect of spectrum leasing between access service providers?**

Answer-

a) Spectrum leasing should be allowed for both short-term and long-term period, depending upon the requirement of the user.

b) Licensor/DoT should not define the minimum or maximum duration and let the service providers should decide their own.

c)

i. Spectrum trading has been allowed since October 15 and there is no adverse impact on the competition and or on dynamics of the spectrum auction, as we have seen in the case of 5G auctions. So, if spectrum trading has no adverse impact, there is no possibility of any adverse impact from the spectrum leasing also.

ii. Licensor/DoT should not define any minimum or maximum duration and let the service providers decide their own duration for which spectrum leasing may be permitted, depending on commercial considerations.

d) The rollout obligations are on the original spectrum buyer/licensee and it should be his responsibility only. It is up to the licensee how the same are enforced by the licensee on the lease holder.

e) DOT should not charge anything for spectrum Leasing and the licensees should be free to charge depending on commercial conditions between them.

f) No, we do not believe there should be any lock in period after acquisition of spectrum to become eligible for spectrum leasing. The licensee should be able to lease spectrum as soon as it receives the assignment from WPC.

g) No, we do not believe that there is any need for an approval from DOT before the proposed leasing of spectrum. We are of the view that, a suitable intimation must be given to DoT, within a defined period (say 15 or 30 days) prior to the effective date of leasing. However, DOT should not ask any details of the Commercial arraignments between the licensee and the lease holder.

h) Yes, the leased spectrum still belongs to holder and should be taken into account for spectrum caps.

i) If we consider the possibility of surrender of spectrum permitted in the country, this comes on the basis that this is a hypothetical question, since spectrum trading has been allowed since the October of 2015 and there is an adverse impact of competition and dynamics of the spectrum auction, we have seen the same case basis in the recent 5G auction.

j) The terms and conditions provided/prescribed by DoT in the spectrum assignment should be passed on the lease holder and should be fully agreed by the lease holder.

Question- 21- Any other issues/ suggestions relevant to the spectrum leasing, may be submitted with proper explanation and justification.

Answer- There is a belief that the usable radio spectrum bands are running out. This is not correct. There are many bands still available and technologies are being developed to exploit higher bands. Further, spectrum sharing can further increase the availability of spectrum.

Chapter 3

Comments on the Consultation Paper on Telecommunication Infrastructure Sharing, Spectrum Sharing, and Spectrum Leasing in respect of Satellite Networks

1. Infrastructure sharing

The Telecom Regulatory Authority of India (TRAI) had earlier issued recommendations on infrastructure sharing with respect to satellite gateway infrastructure. The DOT has accepted these TRAI recommendations and amended the Unified License, which goes a long way in ensuring that satellite gateway infrastructure is put to use in an optimal manner by different service providers. It is therefore IAFI submission that the TRAI should not make any further recommendation regarding infrastructure sharing for satellite gateway infrastructure that undoes the positive effect of earlier TRAI recommendations on satellite gateway infrastructure that have been carried out and are already incorporated into the Unified License.

2. Remote areas connectivity

As the TRAI correctly notes in the consultation, telecommunications services in remote areas of India have not improved, and the need to promote connectivity in these regions is an essential element to guarantee social and economic development. IAFI is of the view that mandatory roaming arrangements amongst TSPs to promote connectivity in remote areas of the country might prove an inefficient mechanism, due to the lack of economic incentive for TSPs to invest is such areas. If TSPs that invest in such areas are subsequently mandated to share their network infrastructure with other TSPs, their investment interest might be further reduced as it will not necessarily result in an increase of their customer base.

The satellite industry is best positioned to promote connectivity in areas that lack essential access to fast and reliable communications networks.. The satellite industry is ready and willing to invest in connectivity solutions, and to contribute in bridging the digital divide in the country. Therefore, we submit to the TRAI that satellite technology is the best solution to promote connectivity in remote areas of the country due to its natural extended coverage.

3. Spectrum sharing

Regarding spectrum sharing, we submit that the TRAI should consider the critical difference between the way spectrum is assigned for satellite use and assignments of spectrum for use by terrestrial networks. Satellite operators and service providers share spectrum in an effective manner by using the same frequencies across multiple satellites, satellite systems, and earth stations. Any fragmentation of the spectrum used to provide satellite services and to make exclusive assignments unequivocally results in a loss of satellite capacity, thus making unviable the provision of satellite services. On the other hand, auctioning of spectrum used by satellite operators and service providers on a shared basis would not add any value due to the lack of exclusivity.

Indeed, IAFI notes that shared used of spectrum causes a loss of revenue to the government and the waste of a scarce natural resource simply do not apply to satellite- based services.

On the contrary, the sharing of spectrum that takes place among satellite operators and service providers should be valued by the authorities as a means for India to achieve a leading position in the space technology sector, accelerating the availability of quality education and healthcare, and enabling the overall development of rural and remote parts of the country. The technical, economical and public interest aspects that explain why the auction of spectrum for satellite services has not been adopted by the majority of the countries around the world as an assignment mechanism should provide a good reason of why India should continue to promote the sharing of spectrum among satellite operators and service providers, as well as to maintain the administrative assignment model for spectrum used by satellite operators and service providers to ensure there are no delays to enabling increased connectivity in India through High Throughput Satellite (HTS) and Very High Throughput Satellite (VHTS) networks, both in geostationary and non-geo-stationary orbits.

The recent draft telecom bill that was released for public comments by the Ministry of Communications states in point 5 and sub-point 2 that: "The Central Government may assign spectrum for telecommunication through:

(a)   auction;
(b)   administrative process for governmental functions or purposes in view of public interest or necessity as provided in Schedule 1; or
(c)   in any other manner as may be prescribed."

The assignment of spectrum for satellite services certainly qualifies for the administrative process route, out of necessity. It is the norm, not the exception, and a practice that is followed by administrations around the world. In conclusion, the sharing of spectrum by satellite operators and service providers is an essential practice (like satellite-broadband, Direct-to-Home television, captive satellite networks, and Governmental use, including defence networks), and its overall benefits should not be jeopardized through the creation of exclusive rights or the assignment of rights of use of spectrum through an auction mechanism.

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