INDIAN SPACE ASSOCIATION

ISpA

Bhumandal Se Brahmaand Tak

Consultation Paper (No. 6/2021)

Licensing Framework for Establishing Satellite Earth Station Gateway: Comments by ISpA

1. At the outset, we thank the TRAI for the opportunity to provide comments on **"Consultation Paper on Licensing Framework for Establishing Satellite Earth Station Gateway".**

Introductory Comments

2. With the emergence of new generation satellite system such as Geostationary Satellite Orbit (GSO) & Non-Geostationary-Satellite Orbit ("NGSO") High Throughput Systems (HTS), it is imperative to have policies in place, for licensing and operational framework of satellite gateway(s).

3. As pointed out in the consultation paper, till now Geostationary (GEO)– wide beam satellites are mostly used and as such satellites, one beam covers complete India – there was no need to have a separate Earth Station license. But with the advent of GSO/NGSO HTS constellations there will be a complex network of satellites, beams, and gateways, where we would need different sets of protocols for better understanding and clarity.

4. The Consultation Paper has been thoroughly looked over through in-house brainstorming with Industry Members as well as experts who have been working in related fields. The ISpA has collated from inputs received from a wide variety of experts and industry which would include R&D, Production, Installation, Operators and Service Providers.

Important Recommendations

5. The Consultation Paper is forward looking and would help to streamline the licensing framework for satellite gateways(s) operations encompassing aspects like license fee, entry fee, bank guarantee, NOCC charges, and any other issues(s) which may be relevant for the LEO/MEO/GEO HTS systems in India. To facilitate the formation of

licensing framework, a summary of recommendations/comments of ISpA for considerations by TRAI, are as follows:

Issues Proposed By TRAI For Consultation

Q1. Whether there is a need to have a specific license for establishing satellite Earth Station Gateway in India for the purpose of providing satellite-based resources to service licensees? Do justify your answer.

Under GEO HTS-

6. As of now, satellite service providers are primarily providing services using Geostationary satellites, mostly on traditional wide-beam satellites. The Service licensee operating on Geostationary wide-beam satellites have invested heavily considering existing licensing frameworks and created their long-term business models around the same. It is important to protect the investment made by Service licensee on GEO wide-beam satellites. *Thus, for GEO-wide beam satellites, the Earth Stations are established by Service Licenses and thus there is no need to have a separate license for establishing satellite Earth Station Gateway in India.*

7. There are two types of GEO-HTS satellites: HTS Type – I (Single Gateway per Satellite) and HTS Type – II (Multiple Gateway per Satellite). In these **HTS Type – I,** though there are multiple user beams, there is only one Gateway which caters all the beams over India and sometimes beyond India as well. *In such a scenario, the gateway investment is required only in one location, which is similar to that of GEO wide-beam satellites.* Currently the VSAT Service licensee installs such gateways and that is a very fair and viable option. In such scenarios, there is no need to have a separate license for satellite Earth Station gateway in India. Under **HTS Type – II**, there are multiple user beams and there are multiple Gateways required – either one Gateway per beam or one Gateway for a set of beams, to cover the overall footprint over India. *In such cases, to make it more efficient and make it easier for the usage of bandwidth on various beams there should be a separate license for establishing Satellite Earth Station Gateway in India.*

Under GSO HTS-

8. The service providers essentially share the antenna and RF systems setup by the satellite operator to access and operate the satellite capacity (Model 1) or the satellite operator chooses to partner with a Unified License holder to set up and operate the gateway on their behalf (Model 2), and the service provider mostly uses their baseband to convert the satellite capacity received in MHz into Mbps to deliver a service to B2B and B2C. *For Model 1- the gateway can be set up by simply taking an IP-1 registration as it is only an infrastructure that is being set up and for Model 2- the gateway can be set up using the service provider's existing license (as long as they have the appropriate licenses/authorizations).*

Under LEO/MEO/HTS systems

9. The satellite operator sets up the gateway (either on its own or by getting into an arrangement with an Indian entity) that includes the antenna, the RF systems and the baseband. The satellite operator then sells the capacity to the service provider. The service plans are configured on the NMS installed at the gateway. The satellite operator might partition the NMS with an objective of giving access to the service provider for the portion of the network that is used to provide the service to the service provider and to its customers. In this case it is only possible to bifurcate spectrum between the usage by the gateway and the usage by the user terminals. It is not possible to bifurcate spectrum service provider wise. *In such a model, there is a need to establish an Earth Station Gateway Authorization that allows for setting up of the gateway and that is de-linked from service provisioning. A separate entity/body (duly authorized under Indian Telegraph Act) can be introduced to establish and operate Satellite Gateway Earth Stations, which will also align India's satellite and gateway licensing with the global regimes.*

Q2. If yes, what kind of license/permission should be envisaged for establishing Satellite Earth Station Gateway in India? Do provide details with respect to the scope of the license and technical, operational, and

financial obligations, including license fee, entry fee, bank guarantees, and NOCC charges, etc.

10. With reference to GEO-HTS (type- II mentioned above), the scope of the license should cover establishing Gateway infrastructure, operations & management of the infrastructure. Earth station licensees should be required to set up the teleport and offer it to Service licensees. The resource sizing like number of antennas required etc. should be done by Earth Station licensee as per regulatory guidelines. Earth Station licensees would also do the operations & maintenance of the infrastructure to provide SLA based services to Service licensees. The Services should be supported by the required helpdesk and trouble-ticketing system.

11. The Service Licensee is paying license fee as a percentage of overall AGR. In addition, Spectrum usage charges are also paid by Service licensee as a percentage of overall AGR. As these charges are already paid by Service licensee, there is no need for charging additional license fee or SUC charges. It is recommended to do away with NOCC charges as in the global examples there is no such body such as NOCC and the satellite operators themselves take care of interference coordination. With the complexity of GSO/NGSO HTS having multiple gateway and user beams, it would be very difficult for NOCC to set up an infrastructure across all beams. Even today, NOCC has the infrastructure to monitor only a few satellites, even though the charging is done for all satellites. This adds to the cost of service, which ultimately increases the price to the ultimate consumer/customer.

12. As Earth Station Operator is going to make large investments w.r.t. gateway infrastructure including land, RF, antenna farm etc. at Gateway location, it is expected that only serious Indian entities – Satellite operator/subsidiary of satellite operator/Indian entities having tie-up with satellite operator, will be applying for the Earth Station Authorization. Considering this, the entry fees should be kept at the minimum.

13. In the case of model 1 (refer pt.8), the Earth Station gateway operator can be an IP-1 registration holder. All the terms and conditions as

stipulated in the IP-1 registration can be followed. For model 2(refer pt.8), no separate license/authorization is required.

14. For LEO/MEO HTS systems, a separate license needs to be created. The scope of this authorization should be only for setting up & operating the Earth Station Gateways and it should not have any provision to provide a telecom service to a subscriber.

15. The technical scope should enable the gateway operator to set up a gateway anywhere in India and access an authorized satellite (authorized by Department of Space or INSPACe) and provide satellite bandwidth to other telecom service providers (Access/NLD/VSAT/ISP). The technical scope should enable the gateway operator to provide both backhaul/access bandwidth as long as they do not provide the service to the ultimate consumer/customer (who is not a telecom licensee).

16. The license fees can be only notional annual fee of Re.1(similar to In-Flight and Maritime Connectivity (IFMC) Authorization). Since the telecom services to end customers will be provided by the licensed service provider only under Unified Licence and not by the Gateway operator, a simple authorization on the lines of IFMC Authorization will be the appropriate approach. Furthermore the license fees and the spectrum charges are anyway charged from the service provider as a percentage of AGR. It should not be double charged.

17. The Unified License *Chapter VI Security Conditions* mandates service providers to take adequate measures for the purpose of security. We believe that adequate conditions may also be applicable to the gateway operator as in the case of a satellite network the security precautions apply more to the gateway and less on the customer premises equipment.

Q3. Whether such Earth Station license should be made available to the satellite operator or its subsidiary or any entity having a tie- up with the satellite operator? Do justify your answer.

18. For arrangement under Model 1(refer pt.8), we suggest that the norms followed by IP-1 registration can be applied, but for LEO/MEO systems, it

should be possible for both the satellite operator or/and a designated Indian entity to apply for the Earth Station Gateway Authorization. In both cases, the authorization applicant should be an Indian company (entities incorporated under Indian Laws and authorized by DoT).

19. Depending on business needs, the flexibility should be provided from a regulatory perspective and should be best decided by the market.

Q4. What mechanism/framework should be put in place to regulate the access to satellite transponder capacity and satellite based resources of a Satellite operator/Earth Station licensee by the service licensees so as to get the resources in a time-bound, transparent, fair and non-discriminatory manner?

20. Earth station Operator will be either satellite operator or Indian entity having tie-up with satellite operator, and it will be managing the ground segment infrastructure, which will result in Earth Station Operator having better control over service levels.

21. The tariff and the terms and conditions should be market driven. This is entirely dependent on the quantum of bandwidth hired, the type of service availed, the pre-commitment/commitment that is being offered by the service provider to the Satellite operator.

Q5. Whether the Earth Station Licensee should be permitted to install baseband equipment also for providing satellite bandwidth to the service licensees as per need? Provide a detailed response.

22. For GEO HTS Type I & Type II (refer pt.7) and GSO HTS Model 1& Model 2 (refer pt.8) – the Earth Station Operator need not be permitted to install the baseband equipment and can simply take an IP-1 registration to install the gateway RFT. Baseband equipment should be installed by Service licensee only to have full control over the services provided to its customers. Any related troubleshooting, change management is also done by Service licensee. This way Service licensee has control, visibility & management over quality of services. This domain is core part of the

Services provided by Service provider and thus should remain with Service licensee.

23. However, in the case of NGSO HTS, the entire capacity of the satellite for the given spectrum is derived only because it is closely tied to the baseband. The Earth Station Operator /satellite operator is in the best position to exploit the spectral efficiency. Spectral efficiency is a function of the baseband and so the Earth Station Operator /satellite operator should be able to install & operate the baseband equipment as well. The baseband controls the quantum of spectrum used, the modulation/coding schemes, the IP address schemes, the access schemes (CIR/MIR, handling of real-time traffic needed for cellular backhaul networks) and all the security aspects of the network. The service plans are also defined in the associated NMS of the baseband. The quantum of spectrum that needs to be authorized for a given gateway also depends on the baseband equipment.

24. Another perspective is that baseband equipment should be put by Service Licensee based business understanding with Satellite operators as it provides them complete control over services to its customers. It should be mandated to partition the Network Management System and provide such partitioned NMS to respective Service licensee so that respective Service licensee gets full control, configuration & management of the services provided to its customer.

Q6. What amendments will be required to be made in the existing terms and conditions of the relevant service authorizations of Unified License, DTH License/Teleport permission to enable the service licensee to connect to the Satellite Earth Station Gateway established by Earth Station Licensee/Service Licensee, for obtaining and using the satellite transponder bandwidth and satellite-based resources? Do justify your answer.

25. The recent amendment to the license under clause in Part-I Chapter-V under Operating Conditions sub-clause 33.3 reads as "*An authorized Gateway hub operated by the Satellite Provider itself is permitted to be shared*

with the bandwidth seeker".

This clause needs further amendment. Firstly, the bandwidth seeker should be an authorized service provider either authorized by DoT or MIB. Secondly, the Earth Station Gateway needs to be operated either by the Earth Station Operator/satellite operator themselves or a designated Indian entity that needs to be incorporated. Thirdly, it is not sharing infrastructure with the service provider. The gateway operator provides bandwidth to the service provider. This also needs to be addressed. The suggested text for the above clause can read as follows:

"An authorized Earth Station Gateway/Hub operated either by the Satellite Operator or its designated Indian entity is permitted to provide gateway services to an authorized service provider holding an appropriate authorization".

26. Similarly, the amendment to the license under clause in Part-I Chapter-V under Operating Conditions sub-clause 33.2 reads as *"The Licensee may share its own active and passive infrastructure for providing other services authorized to it under any other telecom license issued by Licensor."* This amendment only allows the service provider to share gateway infrastructure across the multiple licenses it holds. It does not allow service providers to share the gateway infrastructure with each other. This needs to be enabled for Model 2(refer pt.8) through a suitable amendment.

27. Migration path on no worse off conditions (for existing licensees) should be provided to the existing service licensees who opt to migrate to a separate Gateway Earth Station Authorization from their existing license/authorization.

Q7. Whether the sharing of Earth Station among the licensees (between proposed Earth Station licensee and Service Licensee; and among service licensees) should be permitted? Do provide the details with justification.

28. Sharing of Earth Station resources between Service licensees should

be allowed to bring in required cost & operational efficiency. For example, in case of GSO HTS there are multiple beams focused on a particular region/state and as Earth Station licensees would be putting investment to install and operate Earth station gateway, sharing of gateway will help to bring in cost and operational efficiency.

29. For NGSO, the Gateway will require large resources (land, antenna, RF etc.) and to make it commercially viable for Earth station licensee/Service licensee, sharing of Earth Station resources among Service licensee should be allowed.

30. For LEO Constellations, Gateway Earth Station sharing is not technically feasible between different LEO constellations since these systems are specifically purpose built for particular satellite constellations, and hence, every satellite operator will have to build their own gateway and apply for their Earth Station Authorization separately. However, satellite earth station operators should be able to provide service to multiple service providers (and vice versa: allowing local licensees to access all possible satellites) to ensure that capacity utilized over India is maximized, and end consumers have multiple choices on the service provided.

Q8. To whom should the frequency carriers be assigned: the Earth Station Licensee, or the Service Licensee, or whoever establishes the Satellite Earth Station? Do justify your answer.

31. The notion of assigning frequency carriers should be done away with. Since the satellite spectrum is a shared spectrum used by many users/service providers, they are only authorized for the use of this spectrum. The entire quantum of spectrum for gateway operations and terminal operations should be looked at as two blocks. The authorization that is provided today by DoS and tomorrow by INSPACe will allow for the satellite operation in India and the spectrum that is being used to access the satellite. The inter satellite coordination done by ISRO/DoS also considers the usage of spectrum by any given satellite. Broadband satellites used in the C, XC, Ku, Ka and V/Q bands use shared spectrum. This means

the same spectrum is used across multiple orbital positions/orbital planes. As a result, there is no exclusive assignment of spectrum taking place. The authorization provided by DoS/INSPACe will take into account the spectrum allocation as per the National Frequency Allocation Plan. Further NOCC approves a detailed carrier plan. So technically, the assignment of spectrum has already taken place for a given satellite, when it is authorized. The carrier plan needs to be recorded by WPC and the gateway operator/service provider be suitably licensed.

32. Still, if there is a specific need to assign spectrum for gateway operations and terminal operations, the spectrum used by the Earth Station gateway should be assigned to the Earth Station Licensee and the terminal end spectrum should be assigned to the service provider. It is worth pointing out that modern GSO/NGSO HTS use dynamic spectrum management. So, it will be impossible to bifurcate spectrum between service providers when multiple service providers share a common gateway. In such a case, the end terminal spectrum needs to be assigned to all the service providers.

33. Since the charging of spectrum for service providers is based on a percentage of AGR, it would not matter. However, if there is any attempt to tweak the charging based on the quantum of spectrum, that mechanism will fail as the spectrum used by each terminal is not clearly identifiable.

Q9. What should be the methodology for the assignment of spectrum for establishing satellite Earth Station? Provide a detailed justification.

34. The orbit-spectrum resources for satellite communications will continue to be globally coordinated and assigned at the ITU level. The satellite will use the globally coordinated spectrum/frequencies. The NFAP on the other hand shall specify the frequency bands to be used for specific services. A satellite at any point in time will have only that frequency/spectrum for usage that it has got assigned after global coordination and assignment. This spectrum is then assigned to the Service

Licensee for delivery of satellite-based services.

35. Satellite orbital location and spectrum are closely tied to each other and cannot be separated. Therefore, the globally followed methodology for assignment of spectrum i.e., on an administrative basis, should continue. Countries that have auctioned satellite resources have auctioned satellite orbital slots and spectrum together for this reason. Only those orbital slots can be auctioned that belong to an administration/country. As a country we cannot auction the orbital slot that has been notified/filed by another administration/country. Many of the foreign satellites today operate on orbital slots filed by other administrations. They cannot be auctioned. Two countries that auctioned the orbital slot & spectrum combination eventually failed as they soon ran out of orbital slots that had a priority in terms of filing. After this happened, for the remaining orbital slots/spectrum there were no takers. Today India does not have adequate orbital slots with priority in filings. That is the reason, the draft Spacecom policy 2021 expects satellite operators to transfer orbital resources from their respective administrations to India when applying for authorizations.

36. Additionally, satellite spectrum is a shared spectrum. The basic principle of auction is to provide exclusive assignments. That is not possible in the case of satellite spectrum. As a result, it is prudent that the current methodology of assignment (administrative) continues.

Q10. What should be the charging mechanism for the spectrum assigned to the satellite Earth Station licensee? Elaborate your answer with justification.

37. For Model 1 & 2 (refer pt.8), there is no spectrum assignment taking place for the Earth Station Operator. Satellite Earth Station Operators are going to be infrastructure providers and will not contract with end customers, Service licensee will continue to provide services to its customer and thus will pay the applicable regulatory charges. Service Licensee is anyway paying license fee as percentage of overall AGR. In addition, spectrum usage charges are also paid by Service licensee as a percentage of

overall AGR. Charging spectrum fee from Earth Station licensee may result in duplication of such fee. As these charges are already paid by service licensees, there is no need for charging additional license fee or SUC charges.

38. Even in the case of LEO/MEO HTS systems, the service licensee would be charged a spectrum usage charge as a percentage of AGR. So irrespective of the gateway spectrum being assigned to the gateway operator and the terminal spectrum being assigned to the service provider, the spectrum usage charge will be recovered from the service provider by way of SUC. So any charges on the gateway operator would amount to double charging.

39. Various countries have adopted a gateway "system" licensing approach. For example, the US considers that "Multiple antennas in an NGSO FSS gateway earth station complex located within an area bounded by one second of latitude and one second of longitude may be regarded as a single earth station for purposes of coordination with terrestrial services." Recently, Australia has adopted such an approach as well.

Q11. Give your comments on any related matter that is not covered in this Consultation Paper.

40. Process for Spectrum Assignment: The process of spectrum assignment is very long and, in many cases, takes many months. If the spectrum is assigned to the satellite operator for the operation of the satellite (by DoS/INSPACe in consultation with WPC), then there is no separate assignment required for Earth Station operators or service providers. What spectrum is used by which service (gateway or terminals needs to be recorded). The spectrum assignment takes extraordinary time because of a lack of delegation. The assignment process is very long and has to traverse multiple levels in DOT. This should certainly be simplified. This is the single big pain point and a showstopper for satellite broadband services (considering that the open skies is just round the corner). Once an

assignment of the entire spectrum used by the satellite (on a shared basis) has happened, the Earth Station operator/service provider should not be coming to WPC with an application for additional assignment of spectrum for every increase in the usage of capacity.

41. SACFA/WPC for terminals: The Government as a part of the Telecom Reforms has simplified the SACFA process for remote sites. However, each site is still separately licensed (Wireless Operating License). While the wireless operating licenses have been exempted for mobile towers, the same has not been done for satellite broadband/VSAT sites. With the large-scale proliferation of satellite broadband terminals, this may act as a showstopper. The exemption provided for mobile towers needs to be extended to VSAT terminals as well.

42. Existing applications should have migration path available

Existing service licensees should have the opportunity to migrate to move under the new Gateway specific Authorization, and at no worse off basis.

43. NGSO gateway coexistence

While GSO and NGSO gateways can coexist in most cases, it is very difficult to have NGSO gateways to be in close proximity to other NGSO gateways. A minimum separation distance is generally needed between the gateways of different NGSO systems. The required separation distance would depend on the specific technical and operational characteristics of the concerned systems and would be negotiated during coordination discussions after detailed analyses.

In the absence of a coordination agreement between two NGSO systems, new gateway earth station licenses should not be issued for locations within a certain distance of a licensed gateway earth station. Alternatively, DoT could consult with the operator of the licensed gateway and request that they conduct analyses to determine what separation distance is feasible.

44. 28GHz

The Ka band (27.5-30.0 GHz uplink, paired with 17.8-19.3 GHz downlink) is used for the gateway earth station to satellite link in current satellites design and hence access to the full bandwidth at each gateway location is a business and operation continuity requirement in India and South Asia region. While the 28 GHz was not accepted as a potential IMT band at ITU WRC-15 and WRC-19, the ITU Members States have instead harmonized a total of 17 GHz of other mmWave bands for 5G. We recommend those bands should be exhausted before additional mmWave bands are considered for mobile.