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Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan
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New Delhi – 110 002

Submitted by email to: advmn@trai.gov.in

Attention: Shri Syed Tausif Abbas, Advisor
(Networks, Spectrum and Licensing),

Response to Consultation Paper on Licensing Framework for Satellite-based connectivity for low bit rate applications (dated 12 March 2021)

Intelsat, which operates the world's largest satellite services business,[1] appreciates TRAI's efforts to formally discuss how the low-bit-rate applications of IOT/M2M can be operated on different satellite systems. Intelsat provides a critical layer in the global communications infrastructure. For example, Intelsat Epic$^{NG®}$ is a high performance, next generation satellite platform that delivers global high-throughput technology. The Intelsat Epic$^{NG®}$ platform is an innovative approach to satellite and network architecture utilizing C-, Ku- and Ka-bands, wide beams, spot beams, and frequency reuse technology to provide a host of customer-centric benefits. India is an important market for Intelsat and for the services it offers – across the different domains.

In coming years, Intelsat expects that applications like IOT/M2M will define the new era of networks where a lot of the traffic between machines and the cloud will be carried around the globe reliably and efficiently so that intelligent decisions on how gadgets and machines and systems operate can be taken quickly for the benefit of humans.

Intelsat is also pleased, as a critical partner in promoting Indian industry, to provide our views on the ease-of-doing-business and making satellite services more competitive.

Intelsat Responses:

Q1. There are two models of provision of Satellite-based connectivity for IoT and low-bit-rate applications — (i) Hybrid model consisting of LPWAN and Satellite and (ii) Direct to satellite connectivity. (i) Whether both the models should be permitted to provide satellite connectivity for IoT devices and low-bit-rate applications? Please justify your answer. (ii) Is there any other suitable model through which the satellite-based connectivity can be provided for IoT devices? Please explain in detail with justifications.

Intelsat believes that both the models are appropriate for different use cases.
The the implementation should be in a manner that accounts for the most suitable model to be implemented in different geographical locations, consistent with the scalability of the respective models.

[1] Intelsat provides diversified communications services to the world's leading media companies, fixed and wireless telecommunications operators, data networking service providers for enterprise and mobile aeronautical, maritime and land communications services, and to multinational corporations and ISPs.

Q2. Satellite-based low-bit-rate connectivity is possible using Geo Stationary, Medium and Low Earth orbit Satellites. Whether all the above type of satellites should be permitted to be used for providing satellite-based low-bit-rate connectivity? Please justify your answer.

All of these types of satellites should be allowed for this application. Eventually the best techno-commercial solution for a given requirement would evolve over time.

GEO satellites provide high-bandwidth and high-reliability. Furthermore, a single GEO satellite can broadcast communications over wide areas, including remote rural zones where terrestrial infrastructure is unavailable. The challenge when using GEO satellites in IoT applications is the path loss between earth and satellite and the slotted nature of the GEO orbit. This results in the need for rather large terminal antennas, with enough gain to close the link and with sufficient directivity to avoid interference into adjacent satellites and systems. IoT applications, on the other hand, typically require low cost and small size terminals and should not necessitate any manual pointing toward a satellite. LEO/ MEO constellations operate much closer to earth than the GEO satellites. Therefore, there is less path loss and consequently the requirement for terminal power and antenna directivity for closing a link is lower. However, these also come with the shortcoming of moving satellites, causing a high time variant communication channel and the need for steerable antennas, to accommodate the constant transition. Resultantly, an IoT terminal operating a LEO or MEO network requires both a waveform tailored to adapt to the communication channel as well as a suitable antenna design. The downside is that a constellation of many satellites is required to ensure the global coverage of the Earth surface, increasing the complexity of the system. In addition, handover mechanisms are required as the satellite that disappears over the horizon must be seamlessly replaced with other to maintain the communication.[2] This will result in higher investments in terms of operations and management.

Q3. There are different frequency bands in which communication satellites operate such as L-band, S-band, C-band, Ku-band, Ka-band and other higher bands. Whether any specific band or all the bands should be allowed to be used for providing satellite based IoT connectivity? Please justify your answer.

All existing Satellite Frequency bands should be exploited to provide satellite services. The idea is to let the market decide which is the best band for a specific IOT/M2M application. This would depend on various factors associated with the frequency bands, including the following:

- Narrowband or low-bit-rate applications can easily be supported by the lower bands, while higher bandwidth applications may be better suited in the higher bands;
- Directivity gains needed for a signal to reach from the ground terminal to the satellite may determine the size of reflectors/antenna;
- Availability of electric (AC/DC) power at the terminals will be critical to support RF amplifier requirements as part of the satellite terminals;
- Signal penetration through walls may be an issue, if required for any specific use case;
- Reliability and resiliency of a particular band in transmitting the data to the satellite and effects of weather on that frequency band.

Q4 (i) Whether a new licensing framework should be proposed for the provision of Satellite-based connectivity for low-bit-rate applications or the existing licensing framework may be suitably amended to include the provisioning of such connectivity? Please justify your answer. (ii) In case you are in favour of a new licensing framework, please suggest suitable

[2] Prediction of Satellite Shadowing in Smart Cities with Application to IoT, by Susana Hornillo-Mellado , Rubén Martín-Clemente and Vicente Baena-Lecuyer (2020), https://www.mdpi.com/1424-8220/20/2/475/htm.

entry fee, license fee, bank guarantee, NOCC charges, spectrum usage charges/royalty fee, etc.

Low-bit-rate applications like IOT/M2M can be supported across different satellites and satellite technologies, and through the different Service Authorizations as laid out in this Consultation. Moreover, all IOT/M2M applications would not be low-bit rate in nature, as some may require broadband access. Hence, it may be difficult to create a new category of Authorization for such applications. Instead, Intelsat recommends amending the 4 existing Authorizations to allow for providing low-bitrate satellite-based services.

Presently, the conditions and scope of the Unified License is broad, enabling service providers to provide satellite-based connectivity services under the applicable authorization. It is essential to examine the specifics of each of these authorizations, and then suitably amend the provisions which have a potential conflict with the nature of satellite-based connectivity service proposed to be provided.

Q5. The existing authorization of GMPCS service under Unified License permits the licensee for provision of voice and non-voice messages and data services. Whether the scope of GMPCS authorization may be enhanced to permit the licensees to provide satellite-based connectivity for IoT devices within the service area? Please justify your answer.

Yes. Enabling provisions may be incorporated in the scope of GMPCS Service Authorization to enable the licensee to provide low-bit-rate IOT/M2M solutions. The existing infrastructure, ground segment as well as space segment, may be effectively utilized to provide this service. By expanding the scope of GMPCS service authorization, it can be made more commercially attractive for providing such new services.

Q6. Commercial VSAT CUG Service authorization permits provision of data connectivity using VSAT terminals to CUG users. (i) Whether the scope of Commercial VSAT CUG Service authorization should be enhanced to permit the use of any technology and any kind of ground terminals to provide the satellite-based low-bit-rate connectivity for IoT devices? (ii) Whether the condition of CUG nature of user group should be removed for this authorization to permit provision of any kind of satellite-based connectivity within the service area? Please justify your answer.

Yes. Enabling provisions may be incorporated in the scope of the Commercial CUG VSAT service authorization.

Q7. (i) What should be the licensing framework for Captive licensee, in case an entity wishes to obtain captive license for using satellite-based low-bitrate IoT connectivity for its own captive use? (ii) Whether the scope of Captive VSAT CUG Service license should be modified to include the satellite-based low-bit-rate IoT connectivity for captive use? (iii) If yes, what should be the charging mechanism for spectrum and license fee, in view of requirement of a large number of ground terminals to connect large number of captive IoT devices?

Yes. Enabling provisions may easily be incorporated in the scope of the Captive CUG VSAT service authorization. It will allow for effective utilization of existing infrastructure, avoid duplicity of creation of similar infrastructure, which can lead to cost reduction of satellite-based services. It is noteworthy that the Captive VSAT CUG service will accelerate the effective utilization of existing infrastructure, and avoid duplicity of creation of similar infrastructure, which can lead to cost reduction in satellite-based services.

Q8. Whether the scope of INSAT MSS-R service authorization should be modified to provide the satellite-based connectivity for IoT devices? Please justify your answer.

Yes. Enabling provisions may easily be incorporated in the scope of the INSAT MSS-R service authorization to enable the licensee to provide low-bitrate IOT/M2M services. It will allow for effective utilization of existing infrastructure, avoid duplicity of creation of similar infrastructure, which can lead to cost reduction of satellite-based services.

Q9. (i) As per the scope mentioned in the Unified License for NLD service Authorization, whether NLD Service providers should be permitted to provide satellite-based connectivity for IoT devices. (ii) What measures should be taken to facilitate such services? Please justify your answer.

Yes. Enabling provisions may easily be incorporated in the scope of NLD Service Authorization to provide low-bit-rate IOT/M2M services. This should be subject to the licensee having a satellite Earth station in India in order to facilitate such connectivity. Ease of doing business by simplification and reduction of the SUC charges as recommended by TRAI must be implemented.

With the advancement in satellite technologies like High Throughput Satellite (HTS), it is not economically viable to have gateways separately for VSAT, NLD or other services.
Moreover, any artificial barriers on carrier speeds or terminal antenna sizes should be eliminated.

This will permit higher data rates which are now possible with advanced satellite technologies, without any restrictions.

Q10. Whether the licensees should be permitted to obtain satellite bandwidth from foreign satellites in order to provide low-bit-rate applications and IoT connectivity? Please justify your answer.

Yes, licensees should be allowed to obtain satellite bandwidth from foreign satellite operators. [Gaurav: can we add language that there would not be sufficient capacity without foreign

The present licensing regime is subject to the conditions imposed by the Licensor, i.e., the Department of Telecommunications, and will allow for capacity to be extended to the applicant, from a domestic or a foreign satellite as per the availability, and prescribed conditions only. This process is heavily regulated and constant monitoring of activities and services are also part of the licensing regime. So, in the event where there is a requirement to augment the capacity required, the licensees should be allowed to obtain satellite bandwidth from foreign satellites.

Q.11 In case the satellite bandwidth has been obtained from foreign satellites, what conditions should be imposed on licensees, including regarding establishment of downlink Earth station in India? Please justify your answer.

Establishing a local traffic gateway in India is a condition across all the Service Authorizations and that should remain as is. However, the gateways should be able to access capacities on Indian and foreign satellites.

Q12. The cost of satellite-based services is on the higher side in the country due to which it has not been widely adopted by end users. What measures can be taken to make the satellite-based services affordable in India? Please elaborate your answer with justification.

In order to make the satellite-based services affordable, the following actions should be taken:

1. Provide choice to the VSAT Service Providers (Captive CUG and/or Commercial CUG) to directly negotiate and execute agreements with satellite providers. This will avoid intermediaries and let the free market determine the best price for a given application, making the satellite-based services more affordable.;

2. Allow service providers to operate in their choice of frequency bands, depending on the service requirements of reliability, resiliency, terminal type, QOS, SLA, narrowband/broadband service type, rather than being forced to operate on the available bands in the inventory;

3. Permit long-term bandwidth agreements, which will lower prices;

4. Reduce the cost of service by simplifying the process of getting regulatory approvals, including from the APEX Committee, the NOCC Clearance, and the WPC Operating License, and others.

5. All the levies on operating a VSAT Network should be reviewed, like NOCC charges, Spectrum Usage Charges and any other levies.

Q13.Whether the procedures to acquire a license for providing satellite-based services in the existing framework convenient for the applicants? Is there any scope of simplifying the various processes? Please give details and justification.

The procedures to acquire a license for providing satellite-based services in the existing framework does not favour paperless or online processing and continues to rely on physical filings. In view of the government's inclination to bring in "ease of doing business", paperless / online processing should be allowed/ preferred. In addition, a single-window clearance system, with defined response timelines could also benefit the permit / licensing regime. This will enable faster processing, and concerns of the authority may be suitably addressed on a near real-time basis with quicker turnaround time.

Q14. If there are any other issues/suggestions relevant to the subject, stakeholders are invited to submit the same with proper explanation and justification.
The following may also be considered from the point of Ease of Doing Business

A. <u>Time Delay in Getting Administrative Approvals</u>

All approvals should be made possible through the APEX committee, instead of separate decisions about Satellite Capacity from DOS, NOCC Approval, a WPC Decision Letter that is converted to a WPC Operating license on completion of different conditions, SACFA Clearance for the Hub, Hub Antenna MPVT Certification, and LEA compliance. A lot of these permissions are needed each time new capacity is added on the network, even though it is on the same satellite and the same network.

B. <u>Liberalisation of the CUG License</u>

In an earlier era, where most data was generated by the an enterprise for its own operational purposes, a Closed User Group for the enterprise made a lot of sense. In comparison today, user-generated data through social media and apps is large enough for networks to address that. Moreover, the user-generated data may not necessarily be generated outside of the workplace as boundaries between the workplace and home / personal space are reducing. The concept of VSAT networks being built only to address CUG data, therefore seems out of date.

The request therefore is to kindly liberalise the CUG license in view of the above.

C. <u>Removal of Regulatory Barriers on Carrier Speeds</u>

Globally, satellite-based Cellular Backhaul is now used, not just for 2G and 3G, but also for 4G backhauls and would be used for 5G backhauls in the near future. Backhaul speeds needed for 2G & 3G

is in the range of 2-4Mbps, and for 4G they need to be as high as 10-20Mbps. The requirement for 5G would be even higher. Moreover, the architecture for supporting Cellular Backhaul is migrating from Mesh Networks (as defined in TEC specs) to a Star Network with Bandwidth sharing for better efficiencies.

As per the extant TEC IR Guidelines, there is a maximum cap on the carrier speeds permitted in Star configuration is 2Mbps and in Mesh configuration is 4Mbps. This is an obvious limitation.

Today's satellites with their latest technologies provide a lot of connectivity options along with ample power and capacity resources. These need to be optimally exploited to provide the services at the right price points. Such technical barriers defeat the very advantage that new technology brings.

It is hereby requested that such Regulatory barriers due to the TEC Specifications which impose artificial restrictions on carrier speeds supported by VSAT terminals, should be completely done away with.

Similarly, care should be taken that the new TEC guidelines on the IOT/M2M applications, should be in the same direction where they do not impose limiting factors on the service.

D. <u>Nominal levies (licence fee and spectrum usage charges)</u>

Satellite Service typically is used for connectivity of rural, remote & inaccessible areas, island communities, and other special requirements, etc. The industry needs to be encouraged by reducing levies so as to encourage satellite-based services. This would do far more for the growth of the industry, as compared to providing subsidy or reimbursement for capex and opex of such services.

E. <u>Permission of interplay of free market forces:</u>

Satellite capacity from all possible sources should be permitted (indigenous satellite capacity as first preference is already stipulated for satellite services per the extant Satcom Policy). An open supply regime and a free market could help bring down the market price for such services with adequate competition.

Respectfully submitted,

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