

NELCO / TRAI/ 212201  
23.04.21

To  
Advisor ( NSL)  
TRAI  
MTNL, JLN Marg  
New Delhi -02

**Kind Attn: Shri ST Abbas**

Sub: Consultation paper on Licensing Framework for Satellite-based connectivity for low bit rate applications.

Dear Sir,

Please find enclosed our suggestion /comments on Consultation paper on Licensing Framework for Satellite-based connectivity for low bit rate applications.

We M/s Tatanet Services Ltd (TNSL) , A Tata Enterprise, is a Satellite Communication Service Provider in India, providing highly reliable connectivity solutions across the country. TNSL currently holds licenses for Commercial VSAT Closed User Group (CUG) Communication Services and have the IFMC authorization from DOT.

Thanking you

For **Nelco Ltd.**



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## Nelco's Response to

### TRAI CP on Licensing Framework for Satellite-based connectivity for low bit rate applications

Tatanet Services Ltd (TNSL) is a Satellite Communication (SatCom) Service Provider in India, providing highly reliable connectivity solutions across the country. TNSL currently holds licenses for Commercial VSAT Closed User Group (CUG) Communication Services and have the IFMC authorization from DOT. We have been playing an important role in the development and growth of VSAT services in important industry segments like Maritime, Aero IFC, Banking & Financial Services, Renewable Energy, Mining, offshore Oil & Gas exploration etc. We are the first to launch the IFMC services in India and have fully functional Maritime communication as well as well as Aero IFC services.

We strongly believe that SatCom services have a great future and will play a very important role in bridging the digital divide in India. We have partnered with Telesat for deploying their LEO satellite based broadband services in India. Our continuous endeavour is to grow the SatCom services business in all possible market segments, where there is need of reliable data connectivity mainly in remote locations for business-critical needs. IoT/M2M is a very important technology domain, as it will help in automation and digitalisation of various industrial and business processes. IoT will enable organizations to improve their customers' experience and provide greater transparency to end users as well as improve efficiency of their businesses. There is need for ensuring that IOT/M2M becomes easily accessible to all citizens and businesses across the country and SatCom will play a crucial role in the IoT/M2M domain. However, proper regulations are required for facilitating such low-data rate applications.

**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.**

#### **OUR RESPONSE**

We are of the opinion that each model has its own use-case and applicability and thus both should be permitted.

#### **i) Hybrid model consisting of LPWAN and Satellite:**

In many cases IOT sensors might be in fixed locations with every fixed location having multiple IOT sensors from which the information & telemetry data is required to be sent to central servers. As the number of such sensors are high in a limited area - in such cases, having 'Direct to Satellite' may not be technically & commercially suitable due to the following reasons:

- i) the power requirement should be low to allow operations upto few years with single charge and
- ii) the antenna size should be very small – capable of being accumulated within sensors design, and
- iii) the solution should be commercially viable

Few examples of such use case with IOT implementation:

- a) in a farm – wherein lot of IOT sensors are required to send important telemetry information
- b) in a large factory, wherein lot of IOT sensors may be deployed on various machines enabling automation and quality control processes.

In such cases, hybrid solution will be more practical, wherein all these IOT sensors in a small area may transit over suitable RF IOT protocol like LORAWAN, Sigfox, Zigbee, etc and the aggregator in that area may collect the local IOT sensor data and then communicate to central server via satellite link. In such a scenario Hybrid model consisting of LPWAN and Satellite will be more suitable.

## ii) Direct to Satellite

In other IOT use case, the information is required to be sent either from dispersed sensors on fixed location or sensors which are installed on moving vehicles or moving devices – e.g., railways/state or private road transport, marine vessels or even aircrafts, from where these sensors send important telemetry information to central servers.

In such cases hybrid model will not add much value as it will increase the cost of the solution by adding aggregators along with associated cost of aggregation/disaggregation of data. This will increase points of failure and if sensors are installed on moving vehicles or moving devices, then putting up aggregators & implementing LPWAN on all the routes of moving sensors may not viable.

In such scenarios, 'Direct to Satellite' is most practical option wherein IOT sensors will directly communicate with satellite for sending crucial telemetry information to central servers. IOT on 'Direct to satellite' is a proven model world-wide and most of the IOT deployments over satellite today fall into this category. For example, L band IOT offering by Inmarsat, Iridium etc with millions of user terminals fall into this category. Myriota (an Australia-based startup), Hiberband Direct (a Netherlands based startup), Astrocast, etc. are some of the other global providers in low-cost, low-power, secure direct-to-satellite connectivity for the Internet of Things.

**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.**

### Our RESPONSE

In our opinion, all the types of satellite constellations – Geo stationary (GEO), Medium (MEO) and Low Earth Orbit (LEO) Satellites, should be allowed for providing satellite-based low-bit-rate connectivity. The use of satellite for low-bit-rate should not be limited to particular satellite constellation as,

- a) from demand perspective - the various types of applications may require to use GEO, MEO or LEO satellites depending on the specific need of the application
- b) from supply perspective - the satellite providers across the world provide low-bit-rate services in different satellite constellation

Let us consider each types of the satellites and their applicability for low-bit-rate applications:

#### **Geo Stationary:**

Geo-stationary (GEO) satellites offer most stable, reliable and consistent latency satellite communication option. In addition, the geo-stationary satellites have other important advantages viz. a viz. only three satellites are required to cover the complete earth, the operational cost is much lower (as compared to MEO and LEO satellites) and highest satellite life. The GEO satellites have been in use ever since inception of satellite communication and has maximum availability of satellite bandwidth today in India. The latency is higher at around 250 ms one-way as the distance of the satellite is around

36,000 km from earth. However, there are many applications that can work effectively with such latency.

The Geo stationary option is widely used for IOT application & most of the low-bit-rate deployments across the world are currently using such satellites.

#### **Low Earth Orbit (LEO) satellites:**

LEO satellite constellations operate at just 600 – 1500 km from the earth surface, which enables the latency in the range of 25-40 msec, which is comparable to terrestrial connectivity including fiber. LEO satellite constellations can provide high capacity as well as allow flat panel antenna with lower size.

Some of the satellite operators like IRIDIUM, Globalstar and ORBOCOM use LEO satellites for offering low-bit-rate services.

In our opinion the GEO, MEO as well as LEO satellites should be allowed to be used for offering low-bit-rate services, as all satellites will need to be utilised to their best capability and will have mix of applications – using high or low bandwidth per terminal. As such any artificial barrier in restricting any of these satellites will hamper the growth of this sector.

**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.**

#### **OUR RESPONSE**

In our opinion, for low bit-rate applications all bands like L-band, S-band, C-band, Ku-band and Ka-band should be allowed. Currently in India, for low-bit rate connectivity like for ATM, SCADA etc., C-band (Extended C) and Ku-band are already in use. While for L-band based IOT connectivity, it is understood that the same is already in use for few specific government applications. Recently Skylo Networks have also announced L-band based IOT offerings in partnership with BSNL. Advantage of L-band offering is that it allows relatively smaller antenna size and ability to work with non-parabolic antenna shapes, which makes it viable for wider deployment in IOT environment.

Worldwide, L-band is most widely used for offering IOT services – 80%+ of Satellite-based IOT/M2M services revenue come from L-band satellite offerings. Existing providers like Inmarsat offers its services in L-band worldwide. Similarly, Thuraya offers L-band based low-bit-rate services. Another service provider – Ligado, plans to develop satellite supported 5G services using its L-band spectrum.

S-band spectrum also can be used for offering satellite based IOT communication and offers cost-effective, very stable & consistent services. Globalstar offers S-band based IOT/M2M services. Similarly, Inmarsat and Iridium offer IOT/M2M services in S band as well, in addition to popular L-band based services.

As Ka-band allows usage of much lower antenna sizes and large capacities are expected to be made available over India, allowing its usage for IOT/M2M application will be useful for the industry

Following may be considered when allowing these bands for satellite-based IOT/M2M communication:

- a) **Reference of usage** of satellite based IOT/M2M services in the specific band. As represented above, there are multiple references for wide usage of L-band and S-band in market world-wide, in addition to C, Ku and Ka bands.
- b) **Supply side availability:** -capacities are available on satellite on L-band/S-band/C-band/Ku band and Ka band to enable satellite based IOT/M2M services.
- c) **Technical Viability:** As per references available, L-band and S-band are most suitable for offering IOT/M2M based services due to availability of an evolved device eco-system. Though the existing C-band and Ku-band are also being used for IOT/M2M applications, the devices supported on these bands currently make it unviable for sensor level satellite communication.
- d) **Spectrum availability:** Enough spectrum should be made available to enable IOT/M2M based services in L-band/S-band. The spectrum should be non-overlapping with other services like Mobile 2G/3G/4G services to facilitate reliable communication for IOT/M2M devices, which are normally used for critical applications.

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

#### **OUR RESPONSE**

In our opinion, existing licensing framework for Commercial VSAT services should be suitably amended to include provision of satellite based IOT/M2M connectivity.

Providing IOT/M2M services is similar to Access services where the end terminal is to be connected with the backbone network and is well covered under Commercial VSAT license.

There should be a common and simple licensing framework wherein all kinds of satellite-based connectivity solutions should be available under a single authorization. The Commercial VSAT service authorization may be considered for such type of authorization, as currently all the B2B satellite-based applications are served through this authorisation. Moreover, it should be noted that some of the low data rate applications like ATMs, SCADA etc are already served by the VSAT operators with Commercial VSAT service license and hence this is a natural extension. It will boost the effective utilization of existing infrastructure, avoid duplicity of creation of similar infrastructure, which can lead to cost reduction of satellite-based services.

Also, the scope of Commercial VSAT CUG services should be enhanced as already recommended by TRAI vide its recommendations on 'Provision of Cellular Backhaul Connectivity via Satellite through VSAT under Commercial VSAT CUG Service Authorization' dated 28th July 2020, wherein it recommended that the Commercial VSAT CUG Service provider should be permitted to provide backhaul connectivity for cellular mobile services through satellite using VSAT to the Access Service providers.

There is no need to have separate licensing framework, as

- i) it will not be optimal usage of resources
- ii) will not be in customer interest as it will increase the cost of services
- iii) making it complex for an operator who wants to offer multiple services to the customer.
- iv) It is not possible to draw a line differentiating between the existing low data rate applications (e.g., ATM connectivity & SCADA applications) served by the VSAT operators from the larger scope of low-data rate applications

**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.**

#### **OUR RESPONSE**

No, the scope of GMPCS authorization should not be enhanced to permit the licensees to provide satellite-based connectivity for IoT devices within the service area.

The GMPCS service was envisaged as consumer services (B2C service) for enabling personal phone services over satellite. Provision of connectivity to IoT devices is not mentioned in the scope of service nor was it the intention. IOT/M2M services are typical B2B services offered to enterprise customers and involves more than just providing connectivity. Services like data analytics and correlation etc may also be provided by such IOT/M2M satellite services provider.

Allowing GMPCS to offer such satellite based IOT/M2M connectivity will overlap with services provided under commercial VSAT CUG license. It is advisable that GMPCS service providers focus on providing its intended purpose of Global Mobile Personnel Communication over Satellite and making good success, in that domain.

**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.**

#### **OUR RESPONSE**

In our opinion, scope of Commercial VSAT CUG service authorisation should be enhanced to permit the use of any technology & and kind of ground terminals to provide satellite based low-bit-rate connectivity for IOT devices, as long as it meets the basic technical parameters like link budget etc. This is considering the fact that the technology has changed a lot over last few years, providing new types of terminals with wide variety of antenna systems like Electronically Steerable Antenna/Flat Panel antennas with small form-factor etc.

Thus, flexibility towards use of any technology/any kind of ground terminals should be permitted, as long as it is meeting basis link budget requirements.

The scope of the Commercial VSAT CUG service authorization currently includes provision of data connectivity between various sites. Therefore, it is already within the scope of Commercial VSAT CUG service authorization to provide satellite-based connectivity solutions. The satellite-based low-bit-rate connectivity for IoT devices should be considered as sub-part of the commercial VSAT authorisation and thus may also be provided under the scope of this license. It will boost the effective utilization of existing infrastructure, avoid duplicity of creation of similar infrastructure, which can lead to cost reduction of satellite-based services. Moreover, there will be gradient of low-data-rate applications starting with few bytes to few kilobytes and hence the VSAT service provider addressing the entire scope would facilitate the best solution for the customers.

Moreover, scope of services permitted under this authorization is to be made technology agnostic and data speed agnostic and more liberalised by removing the restrictions of the CUG. While envisaging satellite-based low-bit connectivity for IoT devices, there may be a CUG nature of user, or it may be a

non-CUG also. It will depend upon the customer use-case and solution architecture. Allowing non-CUG connectivity will provide the required flexibility needed to design most optimal solution to the customer.

Under Commercial CUG Service authorizations following amendments should be done:

- Remove the restriction of providing service to a CUG only, considering that IOT/M2M may be within customer CUG or may be provided to IOT/M2M organisations which will deploy such IOT/M2M sensors at their client locations.
- Allow to operate IOT/M2M Services on all bands including L-Band and S-Band, Moreover, there must be provision to include any other bands that are being adopted globally in future.
- The licensee should be allowed to operate IOT/M2M Services on GEO/MEO/LEO satellites.

It is important to note that TEC's Interface Requirements (IR) too, as mentioned in the scope of service, need to be revised accordingly to permit various antenna sizes and data rates provided it meets with prescribed link budget norms. This is an important enabler for allowing these services in the country.

**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-bit-rate 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?**

#### **OUR RESPONSE**

In our opinion, the scope of Captive VSAT CUG Service license should be modified to include the satellite-based low-bit-rate IOT connectivity for captive use.

The terms and conditions related to scope of service, technology used, antenna size, data bit rate, mobility of antenna, TEC's IR specifications, etc. need to be examined and considered. Further, as the annual license fee for captive VSAT license is Rs. 10,000/- per VSAT Terminal/Earth Station and expected number of IoT devices would be too large, the issue of license fee needs to be examined and a mechanism is to be evolved for a reasonable license fee.

It is recommended that the license fee should be rationalised across various options of providing satellite-based connectivity. TRAI has already recommended under Recommendations on 'Provision of Cellular Backhaul Connectivity via Satellite Through VSAT Under Commercial VSAT CUG Service Authorization, dated 28<sup>th</sup> July 2020 has recommended that spectrum usage charges (SUC) under Commercial VSAT CUG should be revised to 1% of AGR. Similarly, SUC charges under Captive VSAT license should be rationalise to fixed fee per terminal per annum rather than existing number of carrier based multiplication based complex formula'. It is important that these recommendations are implemented at the earliest.

**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.**

#### **OUR RESPONSE**

No. The INSAT MSS-R service is a very specific service providing one-way messaging using satellite media. The scope of INSAT Mobile Satellite System-Reporting (MSS-R) Service authorization, as described under Clause 2.1 of Chapter XV of Unified License, is as follows:

**Clause 2.1** *The scope of service is to provide INSAT Mobile Satellite System-Reporting service, which is a one way Satellite based messaging service available through INSAT. The basic nature of this service is to provide a reporting channel via Satellite to the group of people, who by virtue of their nature of work are operating from remote locations without any telecom facilities and need to send short textual message or short data occasionally to a central station. The service provides one way message reporting (Transmit only) facility from anywhere in India (Restricted to Geographical boundaries of India). INSAT-MSS Reporting Service is a low speed data service with the maximum capacity limited to 300 bps.*

As per the above clause, the scope of this license is to provide a very low speed one-way satellite-based messaging service with maximum capacity limited to 300 bits per second (bps). This has not been a very popular license and had limited usage. In today's world with advanced technologies, two-way communication is increasingly becoming important to have better control on the remotes as well as doing remote diagnostics & troubleshooting. It is recommended for the sake of ease of doing business, to have just one kind of general authorisation under commercial CUG license for all kinds of satellite-based services including satellite based connectivity for IoT devices.

**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.**

#### **OUR RESPONSE**

We don't think IoT should be allowed under the NLD license. The Scope of NLD is to provide backhaul links rather than providing last miles or connecting the end customer locations. End customer connectivity is envisaged under the scope for Access license for the terrestrial communications and under Commercial VSAT CUG for satellite-based connectivity. The IoT services will require providing last mile connectivity to very large number of IOT devices, which is broadly an access service and should be provided under Commercial VSAT license.

Just like NLD and Mobility licenses are separate and backhails for mobile networks are built using a separate service network and license, similarly segregation of machine to machine or IoT networks from NLD backhails through a separate license and network is desirable.

**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.**

#### **OUR RESPONSE**

In order to make Satellite IoT services affordable and viable in India, the satellite spectrum prices should be competitive. This may only be achieved once we allow the licensee to purchase capacities from any available satellites/constellations of their choice. There are multiple satellite options available globally, which are designed specifically for Narrow Band IoT (NB-IOT) services operating in GEO and LEO orbits. These satellites use various frequency bands from UHF bands to Ka bands and are not limited to only a few specified bands. Most of these satellites do have coverage over India as well and should be allowed to be used.

The licensees may be allowed to use these foreign satellite systems, provided all the mandatory conditions are met, such as all the traffic landing within India through a gateway installed in India operated by a valid license holder etc.



**Q11. In case, the satellite transponder 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.**

**OUR RESPONSE**

Clear guidelines as regards procurement of bandwidth from authorised suppliers on existing satellite systems must be laid down which should be 'on par' with domestic satellite systems. This would provide a 'level playing field' to both the foreign satellite systems and Indian satellites as well as provide the choice to the VSAT service providers to procure the most optimal capacity for their requirement.

The licensee must be mandated to create the gateway in India for delivering the services, as is the current practice. This is important to ensure that there are adequate measures to ensure the security of the country. 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.**

**OUR RESPONSE**

The higher satellite capacity pricing has been a long pending and perennial issue of the Satcom industry. The cost of the satellite capacity is higher than any other means of communication in India. While in the last two decades the cost for the terrestrial media has dropped significantly, there has not been any major reduction in the satellite bandwidth cost that the VSAT service providers pay to Antrix (ISRO). The per unit price of satellite bandwidth doesn't come down with increasing volume on Indian satellites due to the Govt. pricing policies, which hinders growth of the satellite communication industry. Moreover, the VSAT service providers are required to pay additional fees to –

- 5% markup to Antrix, in case capacity is procured on a foreign satellite
- NOCC as monitoring charges per Mhz per annum
- SUC and License fees together constitute 12% of AGR
  - Spectrum Usage Charges (SUC) at 4% of the AGR
  - License Fees at 8% of the AGR

All of the above further increases the cost of the satellite capacity and makes it unaffordable.

It may also be noted that the satellite capacity cost in India is higher than the prices available in the Global market.

The satellite-based services can be made affordable by adopting the following:

1. Permit all the available NB-IoT GEO & LEO constellations for commercial use in India
2. Allow the VSAT licensees to procure satellite capacity directly from the satellite operators of their choice. This will create competition in the market and the VSAT licensees can negotiate better terms and rates with the satellite operators hence making satellite-based services affordable
3. Reducing the other overheads like the Antrix markup & NOCC monitoring fees
4. Reducing the aggregate of SUC & License fees from the current 12% to about 8% or below and make it level playing with the fees for terrestrial networks
5. Slab wise pricing: The bandwidth per unit price should go down with higher volume of bandwidth, especially on the Indian satellites. This will be possible when the VSAT operators are allowed to directly negotiate with the satellite operators and arrive at mutually agreeable commercial contracts.

The regulations have to be made such that it encourages the market to be competitive and fosters an environment for rapid growth of the industry. The satellite services need to be made affordable for wider acceptability by price sensitive Indian industry and end-users.

**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.**

**Our RESPONSE**

While we agree that the current framework for acquiring a license for providing satellite based services has been working for years and people have got used to it, there are quite a few points we recommend to be improved so as to enable smooth operations for the licensees like –

- a. The process of obtaining the satellite transponder capacity to be simplified with a time bound single window clearance of the all the government departments within 10-15 days.
  - Currently the time to acquire capacity from Antrix to getting it approved through the DOT takes not less than 90 days' time. Moreover, this is not a fixed time frame and there are multiple instances of the VSAT service providers taking much longer to eventually acquire and use the satellite transponder capacity
  - The VSAT service providers should be able to acquire satellite transponder capacity when they need. In the absence of this, the VSAT service providers either lose business opportunities or incur additional costs by acquiring transponder capacity in advance and keeping it vacant till the time they get the customer contracts.

We recommend that the regulations should address the following regarding acquiring satellite transponder capacity –

- Simplify the process
- Define a time bound single window clearance process
- Define a fixed timeline of not be more than 15 days
- The process of approval should be applicable only for the first-time capacity procurement for a particular satellite -
  - o The additional capacity on the existing satellite should not require repeating the entire approval process
  - o Flexibility should be provided for on demand capacity purchase for shorter term basis of less than a year without going through the approval process

**Q14. If there are any other issues/suggestions relevant to the subject, stakeholders are invited to submit the same with proper explanation and justification.**

**OUR RESPONSE**

We recommend removing the artificial barriers like antenna size, bandwidth restrictions, not allowing voice services -

- a. The antenna size restriction of minimum 1 M for Ku band should be done away with. With the advancement in technologies, there are solutions that work for smaller antenna size and those should be allowed
- b. The restrictions on maximum per terminal upload bandwidth of 2 Mbps as per the current policy should be removed. There are no technical or other issues foreseen if this is done. Today the customers require higher bandwidth per terminal and that is technically supported by the current VSAT technologies
- c. Today, VSATs serve the remotest parts of the country where no other reliable media is available. VSATs should be used to extend the PSTN voice services to these sites. The CUG

VSAT license should allow VSATs to be used as the last mile to deliver voice service to customers.

- d. More and more networks in India are required to have multiple technologies to cater to the complex needs of the customers, as is the trend globally. Considering the difficult terrain in country, VSAT communication plays an important role in providing reliable connectivity solutions to the remotest parts of the country. Permitting reselling of the VSAT services will help in growth of the industry as a whole.