



Telecom Regulatory Authority of India

Chavannes-près-Renens,  
April 22, 2021

Our ref.22042021-1

TRAI Consultation Paper on Licensing Framework for Satellite-based connectivity for low bit rate applications

Dear Madam, Sir

I have an honour on behalf of Astrocast Switzerland to submit to your attention Astrocast's reply to the consultation mentioned above.

I seize this opportunity to express Astrocast's great interest in developing its activities in India and to offer our services to Indian consumers.

I hope that our response will be kindly considered and I remain open to any further questions you may have in this regard

Kind regards

Laurent Vieira De Mello

A handwritten signature in black ink, appearing to be "L. Vieira De Mello", written over a light blue horizontal line.

## Response from Astrocast to the:

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

#### ASTROCAST – Company Introduction

Astrocast, in partnership with ESA and Airbus, is developing an advanced Nanosatellite network for IoT. Our network will consist of 100 CubeSat satellites in LEO, fully deployed by 2024.

Though disruption is currently underway in cities and urban areas with new innovative applications being deployed on LoRa, Sigfox, and NB-IoT networks, remote areas on land, seas, and skies are still untouched. While cellular technology seems pervasive, it is important to remember that it only covers about 10% of the earth's surface, and these new LPWAN technologies only a fraction of that. Since M2M/IoT requires very little data per month, the current offerings from established satellite operators are too expensive for these IoT applications. Astrocast is the first Nanosatellite IoT network to address this market need in remote areas and for urban LPWAN applications needing satellite backup. This is possible using the cost-efficient Nanosatellites' highly optimized communication protocols and hardware designed by Astrocast and Airbus.

Our founders and technical team, developed, launched, and operated the first Swiss satellite, "SwissCube", in 2009. This satellite holds the record for the longest operating CubeSat satellite. Today, Astrocast has around 60 employees and is expected to grow to 100 employees by the end of 2022.

The beginning of commercial operations is planned for Q2 2021 after the launch of the first planes of satellites and the manufacture of the remote hardware terminals. By end 2024 the constellation will be fully operational with 10 planes of 10 satellites each and essential features such as 2-way communication, low latency, global broadcasting, and OTA updates.

The modules with very low prices will also be supplemented with the longer-term addition of a chipset at a highly competitive price. This is critical for enabling cost-sensitive applications such as livestock tracking and can also be used for applications such as virtual fencing systems and the transmission of data relating to the health of the animal. This can include for example collar temperatures and movement patterns which can be vital in the early identification of livestock with infectious diseases, thereby enabling greatly improved bio-security.

Astrocast's low cost both in relation to hardware and data, combined with its very low power consumption, also helps to enable other sensitive cost applications in India. A key example of this is the tracking of storage tanks for fuel and water: the addition of low-cost connectivity allows for monitoring devices to be easily connected to such tanks, thus enabling the user to remotely manage their infrastructure without the need for time-consuming checks or fixed routine filling schedules when the tanks may not need refilling.

Overall, Astrocast sees the potential for significant business opportunity in India which would simultaneously offer diverse and potent benefits for end-users. And through the various cost-savings opportunities as well as efficiency gains for clients' operations, made possible by Sat-IoT services, we foresee also significant potential to boost Indian self-reliance.

**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.**

**Response:** Astrocast is of the opinion that there is no need for a restrictive choice of the models for the provision of the IoT and low-bit-rate applications. Both models may well satisfy markets needs for different purposes and it is for the consumers and businesses to choose the most suitable one. Astrocast is convinced that the absence of regulatory barriers is stimulating for competition and innovation and will naturally lead to a greater offer of high-tech, cost-effective solutions. Astrocast strives to provide its potential clients with a low-bit-rate IoT solution that is customised for individual businesses intent on optimising their operations, while also remaining cost effective and adaptable to particular market requirements.

**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.**

**Response:** Astrocast believes that there is no reason to limit satellite-based connectivity to only one earth orbit. Satellites functioning on different orbital regimes have a high capacity to provide IoT solutions, and it is the cost and the purpose of a given technology that will determine its market application and its popularity. While GSO satellites are traditionally more expensive and necessitate longer terms to roll out the constellation, LEO is suited for smaller and cheaper satellites that will be able to provide more affordable solutions.

For example, Astrocast is using LEO for its nanosatellite constellation which will deliver IoT services worldwide. Astrocast's small and economic terminals require less terminal power, antenna directivity and antenna gain; low earth orbit is therefore the logical solution for applications that do not require high speed and precision and low latency applications. This choice is however consciously made to serve markets that do not require broadband satellite connectivity through satellite.

**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.**

**Response:** Astrocast is of the opinion that all the bands may be used for the satellite communications. While Ku and Ka Bands are suitable for broadband communications and have a high potential to serve a large number of unconnected people, L and S Bands are generally known for their high resilience and greater availability.

Astrocast has opted for L band narrowband connectivity, as its business model is based on small amounts of data transfer and low airtime charges. In addition, the antenna size may be significantly

reduced in L band applications; this is an important feature of Astrocast's solution which offers very compact terminals able to fit on small moveable platforms. Moreover, the L band allows integration of the GNSS, which is also important for the offers Astrocast is planning to make.

**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.**

**Response:** Astrocast believes that satellite-based connectivity for low-bit-rate applications necessitates a simpler regulatory framework compared to the existing ones that are applicable to satellite connectivity. Low-bit-rate connectivity is often developed by small innovative companies that do not have sufficient financial and human resources to comply with all the requirements that are applicable to satellite operators providing voice, non-voice messages, and data. High regulatory barriers such as strict security requirements, necessity to build gateways, high entry and licencing fees, and long and complex bureaucratic procedures necessitating the approval of several actors in the national administration are discouraging for a small company aiming to provide a niche service to a limited number of users. High regulatory barriers will also inevitably have repercussions on the costs of the final products that will be put on the market. Barriers such as the limitation of the foreign equity participation should not exist as they are unsurmountable for the young companies who lack solid local contacts to build a credible and profitable presence. Recurrent licence fees amounting to 10% of the Gross Revenue in addition to the capital investment required from the operators in the form of the establishment of a local earth station or any other infrastructure lead to the increase of the final prices to the detriment of consumers in the best case, and in the worst case may lead to the abandonment of market access efforts by the new entrants. While security is an important aspect in the telecommunications sector, it highly desirable to minimise related requirements for the IoT operators that are unlikely to pose any serious security threat due to the particularities of their technology which transmits only small amounts of data relating to the measurements and monitoring of other devices. No voice or broadband data transmission is possible via connectivity solutions such as Astrocast's and therefore it is counterproductive to impose onerous security conditions. Astrocast is therefore in favour of a light touch regulatory framework similar to the general authorisation framework enacted in the EU members states, which requires merely a notification at the beginning of the provision of the electronic communications services. Spectrum usage charges should also be nominal and the administrative charge should cover the administrative expenses related to the issuance of the licence and should not be prohibitive and thereby hinder the development of the innovative technology.

**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.**

**Response:** The GMPCS Unified Licence as it is currently framed allows data services, which covers in theory IoT services through satellite. However, Astrocast believes that in practice the conditions imposed on the GMPCS operators make it impossible for small operators like Astrocast to provide its services under this framework. Requirements related to the foreign equity participation, establishment of the gateways, banks deposits, high licence fees, the recurrent licence fee prorated to 10% of the Adjusted Gross revenue, and a bank guarantee that is equivalent to 140 K USD make Astrocast's market access under the GMPCS licence impossible. Heavy capital investments for market access are not compatible with Astrocast's model that counts on flexible financing models and reduced costs to provide its connectivity solutions.

**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.**

**Response:** No comment

**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?**

**Response:** No comment

**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.**

**Response:** No comment

**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.**

**Response:** No comment

**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.**

**Response:** Astrocast is of the opinion that licensees should be permitted to obtain satellite bandwidth from foreign satellites to provide low-bit-rate applications. Moreover, the restrictions to obtain satellite bandwidth exclusively from a national operator is a relatively rare regulatory feature only seen in few other countries, which Astrocast considers is overall a deterrent for its business case. Astrocast believes that the variety of offers to the large Indian market will be beneficial to consumers, if the use of bandwidth from foreign operators is enabled. For example, India has great potential for developing various IoT solutions on the territory that are not always covered by the terrestrial networks but do require affordable connectivity solutions. Astrocast's own solution aims precisely at this market. While it is true that the satellite-based services offered by the traditional satellite operators are expensive, mainly due to the high capital and operational costs involved in this type of satellite infrastructure, Astrocast's services, using nano-satellites, cost a fraction of what these other traditional satellite-based services cost. Astrocast builds, maintains, and operates its own space segment, and thereby passes on these Capex and Opex cost savings to the customer, and ultimately the fees to access and use the services are at a fraction of what the traditional operators charge. Furthermore, the fact that Astrocast builds and operates its own satellites means that we are always in control of our costs and our supply chain, ensuring that these savings can be maintained, while offering an affordable solution for direct to satellite data services.

The possibility for the licensees to use foreign satellites' bandwidth will allow the penetration of new technology with cost reduced solutions, such as Astrocast's, on the Indian market.

**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.**

**Response:** In preparing our answer, Astrocast assessed the regulatory feasibility of entering the Indian market in assuming the conditions would be the same or very similar to those currently in force under the Unified License regime.

While recognising the benefits pursued by this regime's operating conditions, we observe that the wide scope of these conditions render the prospect of establishing a ground station in Indian territory unlikely for our company and our competitors. And understanding the current framework necessitates the establishment of a local ground station, this represents a major barrier for Astrocast.

We therefore propose that the scope of certain conditions be reduced and in this way the framework may become less onerous and therefore simultaneously boost interest in India as an operational market. As for the specific conditions that make the establishment of a local ground station particularly difficult, we refer to those concerning lawful intercept of data, lawful control of private infrastructure, clearance of personnel, annual security auditing, imposition of certain Security Standards, supply chain oversight, and financial penalties. We also request the TRAI to consider

enabling operators to provide services in India without the requirement of establishing a local ground station, while still implementing (in a reduced manner) all other conditions that are still applicable.

**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.**

**Response:** Astrocast is of an opinion that satellite operators should not be subject to the onerous regulatory restrictions that increase their costs of service provision. While traditional satellite operators have high costs due to the significant long-term investments they must make, the smaller, new players, with lower CAPEX, would be able to provide cheaper and more customised solutions to the Indian market that would be adopted more easily by end users. However, with the conditions that are currently required from licensees, whether under the GMPCS or VSAT licence framework, smaller players are discouraged from entering the market. It is important to underline that numerous small satellite providers are dependent on private investors who will be hesitant to approve the deployment of the systems in countries where additional infrastructure such as the construction of a local gateway is required. This necessitates important investment with an uncertain outcome. Additional bank guarantees and high initial and recurrent fees are deterrents to smaller businesses that base their model on low-cost terminals and bandwidth. Significant investment in the new markets renders their products uncompetitive while the bigger players can always count on the cross subsidies from other sources of income. And ultimately, it is the end user that will be suffering, not having access to the most cost-effective solution.

**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.**

**Response:** Astrocast is of the opinion that the existing framework is too complex for a young company. The ramifications of the process are difficult to understand, the costs are discouraging, and the delays are very unclear. For the reasons that Astrocast has mentioned above, it is highly desirable that a light touch framework is enacted, and the delays are clarified.

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

**Response:** No comment

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