Kinéis response to TRAI consultation

Reference	1.0
Date	22nd April 2021
Public version	

Table of Content

1. Background

1. Kinéis, as MSS operator

Kinéis is a real European start-up success story. It has reached its capital-raising target of 100 million euros that allows, in a Covid-era, to proceed with the constellation launch on time for commercial deployment in 2023.

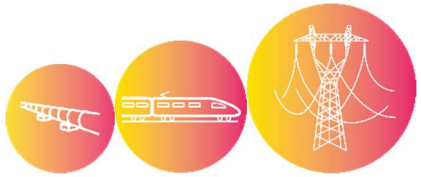
Kinéis as an operator is looking to bring space IoT connectivity to India through local partnerships around key applications for India.

Kinéis offers innovative space connectivity solutions for IoT applications with a strong focus on applications contributing to environmental monitoring, safe transport, critical infrastructures monitoring, smart agriculture and sustainable resource management. Kinéis' connectivity can also act as a complement to terrestrial IoT networks through hybrid solutions to extend their reach to less populated areas.

2. IoT applications relevant to Indian market

The following table proposes some applications that will flourish in India in light of its specificities.

Sector	Examples	
Science and environment		**Wildlife tracking**. Around 4,500 birds are monitored every month with ARGOS-Kinéis satellite services. New species whose migratory behaviour was unknown can now be tracked, thanks to: - the miniaturization of the transmitters, which are increasingly light (some weigh only 2g), - and the sensitivity of the receivers on board satellites, which can record very low power emissions (100 mW),
Rural coverage and communities		**Delivery of medication**. Medicines are very vulnerable consumables, which need to be stored under precise temperature conditions and protected from impacts, despite long transport distances in areas that sometimes have poor roads. Space technology makes it possible to track convoys wherever they go and to schedule alerts in the event of anomalies occurring, which the drivers themselves can also receive, to enable them to react as quickly as possible.
		**Drinking water** is a major issue for many people around the world. Collection sites (wells, cisterns) may be far from residential or grazing areas, and the roads to get there may be risky. Space technology makes it possible to monitor the levels and improve the quality of water, to inform the population to avoid them travelling needlessly, or to inform NGOs or public organisations in charge of supplying collection sites.

Maritime		**Artisanal fishing.** Artisanal or traditional fishermen are far enough away from the coast to be out of range of terrestrial networks. However, some of their problems are identical to those of larger boats: staying safe and being able to alert the rescue services, tracking their movements and their equipment, providing traceability evidence for the products they bring back.
Connected Agriculture		**Water and soil quality**. When crops are grown over large areas, it may be necessary to travel many kilometres to monitor growth, soil quality or to set watering rates. Spatial connectivity makes all this information available to the farmer and allows him to control his instruments remotely. It can thus count on better yields and optimise its water consumption and the use of its agricultural machinery to consume less fuel.
Network and infrastructure		Large infrastructures are often in isolated locations, not always easy to access due to their location or length. Yet they require careful monitoring because they carry strategic goods. Being able to connect them, order alerts in the event of anomalies and limit human intervention to what is strictly necessary and at a specific point improves the safety and efficiency of their use. E.g. pipelines, railways tracks or high-voltage power lines that can reach thousands of km
Transport and logistics		In today's globalised world, with exchanges from one end of the planet to the other, the means of transport are multiplying and following one another during the same journey, which makes the task of logisticians more complex. To provide peace of mind, with monitoring throughout the route, even outside the terrestrial connectivity networks, and whoever is responsible for a particular section, spatial connectivity provides monitoring and assures you of its quality and delivery date. E.g. tracking of containers handled in ports, goods transported on the seas or reefer containers.

2. Kinéis response

Kinéis has provided responses to the following questions: **Questions 1 to 4 and question 12.**

2.1. Satellite-Based Connectivity for Low-Bit-Rate Applications

1. Satellite Connectivity Models for Low-Bit-Rate Applications

Question 1. 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-based 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.

As described in the consultation document, IoT has shown recent technology developments in both terrestrial and satellite industries. **Dual connectivity will be crucial** for the Indian territory that required continuous coverage between city, maritime and rural areas to ensure quality of service to the end-user. Kinéis brings worldwide coverage that is complementary to any IoT terrestrial deployment from fixed and mobile (2G to 5G) to LPWAN operators as it will ensure to address low bitrate connectivity needs, in particular in challenged areas of the Indian territories.

Regarding the model to provide satellite-based connectivity for IoT low-bit-rate applications, Kinéis offers a **direct to satellite connectivity that could complement any terrestrial network, provided the device is equipped with Kinéis connectivity on top of the terrestrial one.**

Such model allows flexibility for the end-user that will design its IoT solution to fit its need in term of coverage, data rate and power consumption with regards to the technology available and their corresponding cost.

- Some applications may require having a back-up connectivity all over the Indian territory to ensure that the asset onto which the IoT device is onboarded is followed whether terrestrial networks are available or not. Only satellite will be relevant in that case.
- Other applications may require sending very small data once per week for example (keep-alive or maintenance information). In such a case, the direct to satellite Kinéis connectivity offers a low-cost solution in terms of connectivity price but also in terms of autonomy which avoid connecting the device to a power supply, hence lowering the price of the overall solution.

2. IoT Specific Satellite Constellations

Question 2. Satellite-based low-bit-rate connectivity is possible using Geo Stationary, Medium and Low Earth orbit Satellites. Whether all the above or any specific type of satellite should be permitted to be used for providing satellite-based low-bit-rate connectivity? Please justify your answer.

Kinéis constellation has been designed specifically to optimize the service of space IoT applications:

- The development of nanosat technologies enables a drastic cost reduction from the development of the satellite to the New Space ecosystem (launcher technologies, miniaturization, etc.).
- The configuration of the 5 planes with 5 satellites per plan allows to cover the whole globe through its polar sun synchronous orbits, enabling coverage of the Earth,

including Poles, Oceans, Desert, etc., with a near real-time performances thanks to the ground station networks located around the planet.

- Kinéis chose to deploy LEO satellites at 650 km altitude to best fit the energy constraints of terminals required for space IoT solutions.
- UHF communications present propagation characteristics best suited for IoT applications (low energy, higher coverage) while allowing narrow channel to address low data rate requirements (from 400 to 4800 bps).

Kinéis is of the view that all type of satellites should be permitted and invite the Indian authorities to foster the innovation seen in the LEO market, as Kinéis has invested into a new constellation enabling to provide worldwide connectivity specifically designed for IoT services that requires low data rate, low power and low cost to fit end-user needs in various sectors.

3. Possible frequency bands for Satellite-Based IoT Connectivity

Question 3. 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.

Kinéis has chosen to operate the frequency band allocated in all three ITU Regions by the Radio Regulations to Mobile Satellite Service in the UHF band:

- 399.9-400.05 MHz for Earth to space communications
- 400.15-401 MHz for space to Earth communications

Such frequencies present propagation characteristics that are fitted to wide coverage and low power applications. Even though the available bandwidth is narrow, it is still sufficient to address the need of low data rate IoT applications that, contrary to broadband services, do not require large bandwidth.

The UHF MSS band has seen recent development worldwide.

- In CEPT, the UHF decision harmonizing frequency band for MSS operator below 1 GHz has recently been updated to include Kinéis as a pan European operator of IoT services[1].
- Australia, Brazil, USA have also addressed the regulatory regime applicable to such space IoT service the past months by updating their framework.

Kinéis welcomes the Indian initiative to review its regulatory framework for space IoT services dedicated to low datarate communications. Kinéis is of the view that Indian authorities should make available the MSS UHF frequency band for such applications. Such framework should foster competition and minimize administrative burden (procedures, fees, etc.) for the operators that seek to address this new IoT market with a low-cost target for offering services.

2.2. Current Licensing framework for satellite services

Question 4. (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.

As briefly mentioned above, many regulators have taken steps to authorize operators of LEO constellation in the UHF MSS bands. Most national frameworks were already appropriate for addressing new technologies as it allowed general authorization, blanket licenses for terminal,

[1] March 2021 revision of the ECC/DEC(99)06 on the harmonised introduction of satellite personal communication systems operating in the bands below 1 GHz (S-PCS<1GHz) is available here: https://docdb.cept.org/document/788

and usually charged no or low fees for this type of applications, fostering innovation. When fees were applied, usually it was a small part of the generated revenue.

Kinéis is of the view that a light framework should be adopted for satellite network dedicated to low data rate IoT applications.

- **Fostering the low data rate applications requires to maintain both devices and connectivity at a low price for the end-user.**
- **As operators face up-front cost for the development and the launch of the constellation, any additional administrative burdens may directly pass-on to the end-user connectivity price.**

Kinéis advises an approach based on general authorization or blanket licenses for the operators, whose number should not be restricted to foster competition. Any fee applicable should be related to the revenue expected for such market and should not become a barrier to entry to the Indian market.

Question 12. 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.

The following building blocks to a wide adoption of space IoT solutions should be fostered in India:

- As mentioned above, while the licensing process for new LEO constellation dedicated to direct to space low data rate IoT application may bring administrative and spectrum fees.
    - Those should be defined in a proportionate manner to the size of the operator and to targeted market share (i.e. low cost IoT market).
    - Any disproportionate fees will inevitably be translated to the connectivity cost, potentially hindering the space IoT broad adoption in India.

- A striving space IoT ecosystem will benefit the Indian government in many ways (solving digital dividend in the remote and not covered areas, indirect taxation with added-value services, innovative solutions that could be exported internationally, etc.).

- The availability of radio equipment is a key element for IoT integrators to benefit from reduced price that it allowed. Hence, any procedure for type approval should allow entry of innovative equipment from such new space IoT networks.
- Integrator ecosystem will benefit from the emergence of new start-up offering innovative solution to the Indian market. As mentioned in the consultation, fostering a friendly environment for such ecosystem will contribute to a wide adoption of the new constellations.