

Sateliot Response to TRAI “Consultation Paper on Assignment of Spectrum for Space-based Communication Services”

Consultation Paper No. 6/2023

Contact information

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Sateliot thanks TRAI for the opportunity of participating and submitting a contribution for the Consultation Paper No. 6/2023.

India has recently issued the Indian Space Policy 2023. There, the nation’s vision, strategy, and policies for the space sector are outlined. Sateliot, as a non-governmental entity within the established framework, would be allowed and encouraged to undertake activities in the space sector by offering space-based services and performing commercial space activities,. In line with India’s space policy objectives, Sateliot intends to provide NB IoT in India, thus providing and enhancing mass connectivity in the country at low cost, aiding different verticals relevant to India’s economy and national priorities. Sateliot is, then, fully aligned with India’s Space Policy’s vision and strategy, of encouraging greater private sector participation and improving the local space ecosystem to boost the nation’s socio-economic development and security, protect the environment and lives, pursue peaceful exploration of outer space, and stimulation of public awareness and scientific quests.

In India, at present, the frequency assignment for commercial communication services in S-band is 1980 MHz – 2010, MHz 2170 MHz – 2200 MHz FDD; which is one of Sateliot’s main bands of interest. This document will reflect Sateliot’s input on the relevant questions that relate to assignment of spectrum for space-based communication services needed to provide IoT connectivity with global coverage through the 5G NB-IoT NTN standard.

Please, find below the answers to the questions that apply to Sateliot’s business model and operations.

Q15. What should be the methodology for assignment of spectrum for user links for space-based communication services in L-band and S-band, such as- (a) Auction-based (b) Administrative (c) Any other? Please provide your response with detailed justification.

Auctions are an inappropriate means of licensing satellite spectrum. International experience in other jurisdictions (USA pre-2004, Brazil, Mexico) has showcased that auction-based methodologies yield poor results and are eventually abandoned in favour of administrative solutions (USA, Brazil) or faced auction failures (Mexico). In turn, administrative assignment of satellite spectrum is the standard method of assignment in virtually all jurisdictions.

In addition, satellite companies require long-term investments and are capital intensive, thus requiring long time frames of regulatory stability and should avoid short term fluctuations in regulatory or spectrum policy.

The space industry provides scale. LEO Satellites operate in several countries and require international approvals at the International Telecommunications Union (ITU) and coordination with other operators. Spectrum shifts of individual countries consisting of market-based methodologies can jeopardise the business model of many operators.

Considering the above, Sateliot favours an administrative methodology for assignment of spectrum.

Q18. In case it is decided to auction user link frequency spectrum for different types of services, should separate auctions be conducted for each type of services? Kindly justify your response with detailed methodology.

Sateliot recommends that, if it were to be decided that auctions of user link frequency spectrum are the chosen methodology for assignment of spectrum, separate auctions should be conducted for each type of services.

5G NB-IoT for non-terrestrial networks can have a significant socio-economic impact at a low cost, thus benefiting India and local MNOs. The proposed methodology would be to allocate frequency spectrum by accommodating and dividing the band, or parts of the band, as NB IoT only uses small portions of spectrum.

Sateliot’s business model is based on the 3GPP Standard, which means it provides an affordable, non-proprietary solution, enabling the use of cheaper devices and cheaper subscriptions for connectivity: the service will offer connectivity based on a standard protocol, which will enable the service to be mass-delivered at low cost.

In view of the above, and in response to question 18 of this Public Consultation, Sateliot requests that, if auctions were to be conducted, TRAI divides the use of the S-band in India and determine the use for 5G NB-IoT NTN applications with a minimum bandwidth of 5 MHz of the frequencies identified by the 3GPP standard, i.e. in the frequencies 1980 - 2010 MHz (UL) and 2170-2200 MHz (DL). This division should be done in a way that guarantees that each operator can have an exclusive frequency range for their operations.

Certainly, Sateliot advocates for amounts of bandwidth designated to integrate NB-IoT NTN applications, given that this application allows for **efficient use of spectrum** by a high density of **low power, low data rate IoT devices**. Critical applications requiring high reliability, and interference management would benefit the most from such decision. IoT NB NTN requires a small portion of national spectrum to operate without system interference, designed to support applications with total bandwidth of no more than 200KHz, deployed using 180 KHz carrier bandwidth and OFDMA for the downlink, while using SC-FDMA and 12 subcarriers of 15 KHz each for the uplink.

Under 3GPP Release 17, the following frequencies were defined for NTN networks in the 2GHz:

NTN Satellite Band #	Uplink (UL) operating band Satellite Access Node receive / UE Transmit $F_{UL\ Low} - F_{UL\ High}$	Downlink (DL) operating band Satellite Access Node receive / UE Receive $F_{DL\ Low} - F_{DL\ High}$	Duplex mode
255	1626.5 MHz – 1660.5 MHz	1525 MHz – 1559 MHz	FDD
256	1980 MHz – 2010 MHz	2170 MHz – 2200 MHz	FDD

Table 1: MSS allocations in the frequency range 1 - 3 GHz and the specific ranges of the bands 255 and 256

3GPP chose bands 255 and 256 as the first 5G NB-IoT NTN standardised bands because:

- 1) these bands are MSS allocated bands across all three ITU Regions;
- 2) these are symmetrical paired bands that can be exploited in FDD (i.e. there is a UL component and a DL component, of the same size);
- 3) and these are bands that received wide support from industry to develop future applications.

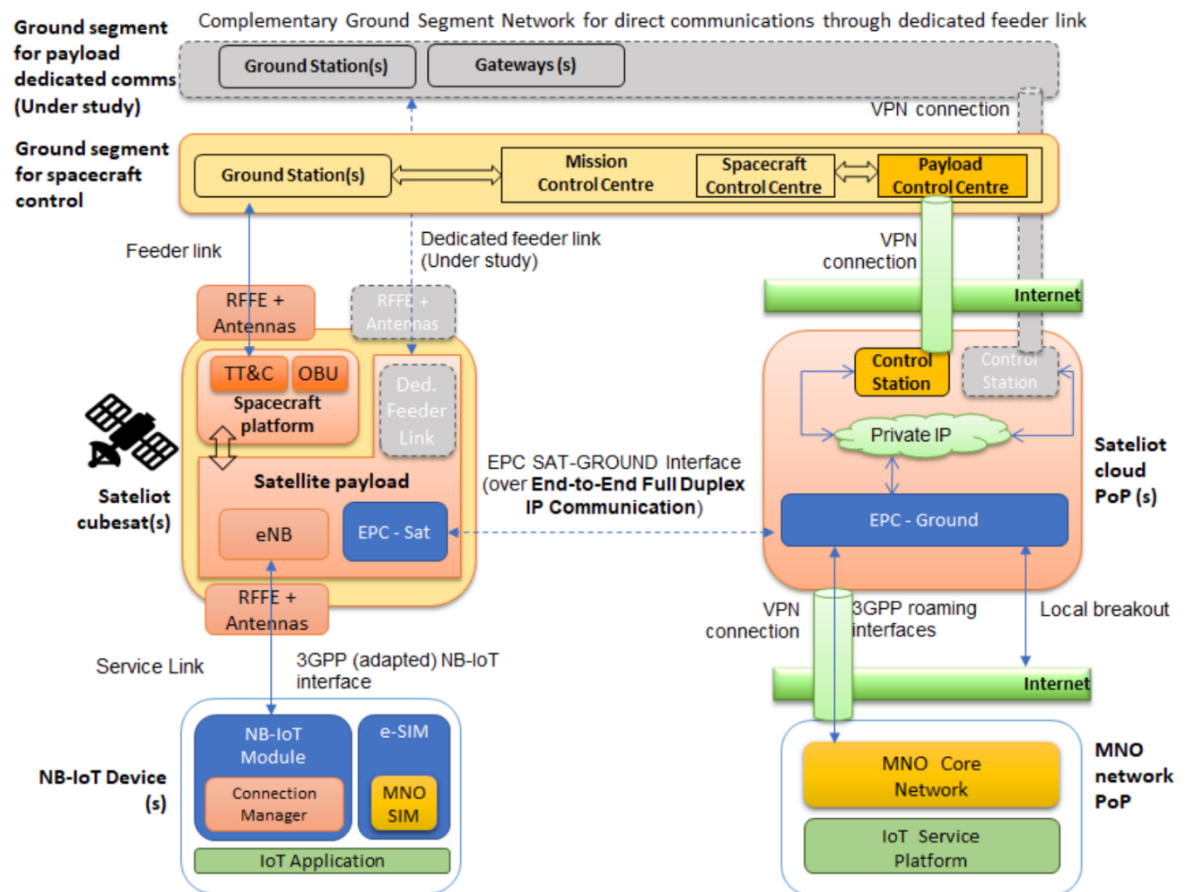


Figure 1. System architecture.

This does not preclude that other frequency bands may be specified by the 3GPP for NB-IoT NTN in the future, but for the immediate deployment of highly valuable connectivity options for IoT, these need to be prioritised. Due to channels not being able to be shared in 3GPP standard, frequency allocation needed by Sateliot requires exclusivity in the S-Band: 1980 MHz – 2010 MHz (Uplink); 2170 MHz – 2200 MHz (Downlink).

About Sateliot

Satelio IoT Services S.L. is a private limited company founded in 2018 in Barcelona, Spain with legal personality registered in the Spanish Tax Registry under the number B67334193 and domiciled in 08029 - Barcelona (Spain), calle Berlin, numero 61, Entresuelo A. The main business of the company is the provision of satellite capacity to MNO clients for the purpose of connecting non-proprietary IoT devices where terrestrial networks are unavailable.

Sateliot is a Spanish company and the first satellite operator to offer IoT connectivity with global coverage through the 5G NB-IoT NTN standard. Its constellation will act as phone towers in space, extending the coverage of mobile operators and providing global connectivity to commercial terrestrial devices without the need for modification, wherever they are. Sateliot's service will be deployed by mobile operators through roaming agreements, offering connectivity based on a standard protocol, making the service a mass market at low cost.

Sateliot launched its first commercial satellite in Q2 2023, which will be followed by four more satellites to be launched in Q4 2023. With these five satellites, Sateliot will be able to provide commercial IoT services through mobile operators. The company's full constellation is being designed and will consist of 491 satellites to be launched in the coming years.

Sateliot's business model is purely wholesale based. It will provide satellite capacity to stakeholders in the global IoT ecosystem, including MNOs, IoT operators and IoT solution providers through standard roaming agreements, so that they can offer their customers a seamless service experience. Importantly, Sateliot will not provide the IoT connectivity service directly to end users (in other words, it will not act as a service provider to the end user).

Therefore, end users will be able to purchase standard commercially available NB-IoT devices from any vendor and connect directly to our satellite network via their mobile operator, without the need for any additional hardware such as antennas, modules, or gateways.

This is due to the use of a standard protocol, which is defined and implemented by all major players in the telecommunications industry in order to massively provide services. 5G NB-IoT for non-terrestrial networks is no different.

Final Remarks

Sateliot thanks TRAI for the opportunity to participate in this consultation and is available to provide further information or clarifications regarding the topics included in this contribution.