## Appendix I: Decisions on Recommendations (DORs) Matrix from the Second of Two Rounds of Public Consultation on the *Spectrum Plan for the Accommodation of Non-Terrestrial Networks*

The following summarises the comments and recommendations received from the second of two rounds of public consultation on the *Spectrum Plan for the Accommodation of Non-Terrestrial Networks* (the Plan), which took place from 22nd April 2025 to 20th May 2025. The decisions made by the Telecommunications Authority of Trinidad and Tobago (the Authority) have been incorporated in the approved version (ver. 1.0) of the Plan, where applicable. The Authority wishes to thank the following stakeholders for all the comments and recommendations received:

1. AST SpaceMobile
2. Digicel (Trinidad & Tobago) Limited (Digicel)
3. Global System for Mobile Association (GSMA)
4. Mobile Satellite Services Association (MSSA)
5. Sateliot
6. Skylo Technology
7. Telecommunications Services of Trinidad and Tobago (TSTT) Limited

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| 1 | AST SpaceMobile | 1.1 Background | On the definition of non-geostationary orbit, TATT relies on a 2020 ITU definition of NGSO. This definition does not reflect current technology with a minimum altitude of 700 Km in LEO. For instance, AST SpaceMobile's LEO network will be deployed as low as 520 Km and there are other LEO constellations that have an even lower altitude. In a 2023 publication of regulation of satellites in Earth's orbit, the ITU defined LEO between 200 and 2,000 Km above the Earth's surface (https://www.itu.int/hub/2023/01/satellite-regulation-leo-geo-wrs/). | AST SpaceMobile recommends that TATT amend the NGSO definition to align with recent ITU publications or at least to define a ceiling, but not a floor, on the altitude of LEO satellite networks. | The Telecommunications Authority of Trinidad and Tobago (the Authority) thanks AST SpaceMobile for its comments and recommendations on the *Spectrum Plan for the Accommodation of Non-Terrestrial Networks* (the Plan).<br><br>The Authority accepts AST SpaceMobile's recommendation. As such, the definition of non-geostationary orbit has been amended and now reads: "Non-geostationary Earth orbit moves relative to the Earth's surface and occupies a range of orbital positions, such as low Earth orbit (LEO), between 200 and 2,000 km above the Earth's surface and medium Earth orbit (MEO), located mainly between 8,000 and 20,000 km above the Earth's surface" (ITU 2023). |

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| 2 | AST SpaceMobile | 1.7 Review Cycle | AST SpaceMobile has concerns with the proposed four-year review cycle of the NTN 2 GHz band regulatory regime, as this will create uncertainty for licensees. AST SpaceMobile understands that, due to constant technological updates, mainly related to the use of the S-Band, revisions to this regime may be necessary. However, satellite companies authorized to use the 2 GHz Band must have regulatory certainty to invest in their networks. | AST SpaceMobile recommends that TATT make clear that the review cycle should not negatively impact the rights granted to 2 GHz band licensees. | The Authority advises that a review of the Plan is not directly associated with an amendment. As stated in section 1.7, the Plan may be reviewed at any time during a four-years cycle at the discretion of the Authority or based on proposals for immediate modification submitted by stakeholders or members of the public. The Authority will welcome AST SpaceMobile's proposal for modification at any time during its review cycle of the Plan.<br><br>The Authority assures AST SpaceMobile that stakeholders shall be consulted prior to the adoption of changes that may impact the rights granted to licensees for the use of the 2 GHz band. |
| 3 | AST SpaceMobile | 3 Frequency Planning Principles | AST SpaceMobile generally supports the proposed frequency principles, including making the 2 GHz band available only for FDD use. However, AST SpaceMobile is concerned about item 7, requiring the licensee uses in-band guard bands to mitigate harmful interferences. It is worth noting that there are other ways to mitigate harmful interference, such as defining limits on unwanted emissions for transmissions from user terminals communicating with non-geostationary satellites in the 2 GHz band. In a similar case, the European Telecommunications Standards Institute established the ETSI EN 301 442 V2.1.1 standard (Harmonized Standard for NGSO Mobile Earth Stations including handheld earth stations, for Satellite Personal Communications Networks operating in the 1980 MHz to 2010 MHz, earth-to-space, and 2170 MHz to 2200 MHz, space-to-earth, frequency bands under the Mobile Satellite Service), with the goal of protecting the operation of IMT mobile systems in adjacent bands<br><br>https://www.etsi.org/deliver/etsi_en/301400_301499/301442/02.01.01_60/en_301442v020101p.pdf<br><br>As TATT is aware, using guard bands is not the most efficient use of spectrum and, as new technologies are developed, licensees should be allowed to use them as ways to protect against harmful interference. | AST SpaceMobile recommends that TATT consider allowing the use of other technology methods, instead of using guard bands, that can meet this same goal and provide such flexibility in its authorizations. | AST SpaceMobile is reminded that Trinidad and Tobago remains technology neutral and, as such, supports the use of any technology by licensees that does not cause harmful interference to adjacent services.<br><br>The Authority thanks AST SpaceMobile for sharing the European Telecommunications Standards Institute (ETSI) standard EN 301 442 V2.1.1 for harmonised non-geostationary satellite orbit (NGSO) mobile earth stations (MES), including handheld earth stations, for Satellite Personal Communications Networks (S-PCN). The Authority further advises of its adopted standards, outlined in section 4.3, Table 6 (Maximum technical operating specifications) for Non-Terrestrial Networks (NTNs) in the 2 GHz band, to mitigate the risk of harmful interference to adjacent channels occupied by other services. Section 3, item 7 has been amended and now reads: "The |

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| | | | | | licensee shall employ in-band guard bands and any other feasible methods to mitigate harmful interference." |
| 4 | AST SpaceMobile | 4.1 Frequency Assignment Plan | AST SpaceMobile welcomes TATT's initiative to consider the 2005-2020 / 2185-2200 MHz band spectrum for NTN. However, analysing Table 3, the 1995-2025 / 2180-2200 MHz band spectrum is reported as unassigned and available. In this regard, AST SpaceMobile understands that TATT can allocate the entire band of 2000-2 020 / 1980-2200 MHz for NTN, enabling 20+20 MHz of spectrum. Not only will this be in accordance with 3GPP standards for Band Class n252, which is nearly complete (on track to be adopted this year), but a 20+20 MHz spectrum allocation will allow the deployment of more robust solutions in Trinidad and Tobago, such as AST SpaceMobile's space-based cellular broadband services.<br><br>In addition, AST SpaceMobile is of the view that TATT should consider larger channel blocks than 1 MHz for the 2 GHz band, since some countries around the globe have found that allocating at least 5 + 5 MHz channelization, but in most cases, countries have found that at least 10 + 10 MHz, enables the most efficient use of spectrum by licensees. | AST SpaceMobile recommends that TATT allocate the entire 2000-2020 / 1980-2200 MHz band for NTN, enabling 20+20 MHz of spectrum.<br><br>Furthermore, AST SpaceMobile recommends that TATT consider larger channel blocks than 1 MHz, with 5+5 MHz or 10+10 MHz channelization, what would enable the most efficient use of spectrum. | The Authority agrees and has made amendments in support of 3GPP band n252. As such, Table 1 – frequency assignment plan for the 2 GHz band based on 3GPP band n252 has been adopted to make spectrum available based on 3GPP band n252 standards. AST SpaceMobile is advised that full adoption of band n252 is not possible, as it would prevent the accommodation of band n256 licensees. AST SpaceMobile is further advised that the Authority has proposed a 5 MHz guard band between public mobile telecommunications services (PMTS) operating in the 1900 MHz band and band n252; as such, 2x20 MHz cannot be allocated to NTN.<br><br>The 1 MHz channel assignment plan supports a competitive market and is based on research conducted by the Authority and supported by contributions to the first round of consultation on the Plan. A spectrum cap of 10 MHz (i.e., 2 x 5 MHz) will accommodate at least two operators with an equal quantum of spectrum in this band and safeguard smaller Internet of Things (IoT) operators that require smaller bandwidth. The Authority may consider larger channel blocks in a subsequent revision of the Plan, based on market interest and spectrum availability. |
| 5 | AST SpaceMobile | 4.2 Licensing Process and Conditions | While overall AST SpaceMobile agrees with TATT's proposed licensing process, it does have a concern regarding the possible use of a competitive process that would result in the auction of the 2 GHz band. While spectrum auctions are appropriate for terrestrial spectrum, there are different considerations for satellite spectrum. Unlike terrestrial spectrum, satellite spectrum is global. As many other countries have recognized, including the United States and, more recently, Brazil, it is economically unsustainable | AST SpaceMobile recommends that TATT consider a competitive approach to licensing other than auctions, such as beauty contests. | The Authority advises that the use of a competitive process does not automatically suggest an auction. A competitive licensing process shall be considered, based on the demand for spectrum. As outlined in section 4.2, "the assignment of spectrum shall be via |

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| | | | for a satellite operator to participate in and win auctions in some, let alone all, of the markets covered by an operator's system. Accordingly, as TATT considers its licensing process, if it pursues a competitive approach to licensing, it should consider approaches other than auctions, such as beauty contests.<br><br>Furthermore, AST SpaceMobile understands that the agreement with the public telecommunications network operator could be concluded after obtaining the authorization to operate in the 2 GHz band. This will enable a more efficient licensing process and give sufficient time for the satellite licensee to negotiate such an arrangement.<br><br>Finally, assuming that the full 2 000-2 020 / 1 980-2 200 MHz band is allocated to NTN, AST SpaceMobile believes that the adoption of a spectrum cap of no more than 20 MHz (2 x 10 MHz) is the most beneficial approach. This will allow the regime to accommodate at least two operators ensuring efficient use of the 2 GHz band spectrum and enabling robust service to end users. In addition, its important to notice that 10 + 10 MHz of spectrum per operator is consistent with one of the best configurations for frequency and polarization reuse of 3GPP TR 38.821 (Technical Specification Group Radio Access Network; Solutions for NR to support non-terrestrial networks). | Furthermore, AST Space Mobile recommends that TATT consider that the agreement with the public telecommunications network operator can be concluded after obtaining the authorization to operate in the 2 GHz band.<br><br>Finally, AST SpaceMobile recommends that TATT adopt a spectrum cap of no more than 20 MHz (2 x 10 MHz) to accommodate at least two operators, ensuring efficient use of the 2 GHz band spectrum and enabling robust service to end users. | "first come, first served" or a competitive licensing process, based on demand for this spectrum, as determined by the Authority."<br><br>The Authority confirms that an agreement between the NTN operator and a local terrestrial network operator can be concluded after the granting of a concession to provide a public service. However, AST SpaceMobile is reminded of section 4.2, item 7, which states, "An established agreement between the NTN operator and a local terrestrial network operator is a requirement for the issuance of a licence in the 2 GHz band." As such, the agreement between the NTN operator and a local terrestrial network operator must be concluded before the granting of a licence to operate.<br><br>A spectrum cap of 10 MHz (i.e., 2 x 5 MHz) will accommodate at least two operators with an equal quantum of spectrum in this band and safeguard smaller IoT operators that require smaller bandwidth. Larger spectrum caps may be considered in future revisions of this Plan, based on market interest and spectrum availability. |
| 6 | Digicel | General | Digicel (Trinidad & Tobago) Limited ("Digicel") wishes to thank the Authority for the opportunity to provide its feedback on this consultation document.<br><br>Please note that the views expressed herein are not exhaustive. Failure to address any issue in this response does not in any way indicate acceptance, agreement or relinquishing of Digicel's rights. | | The Authority acknowledges Digicel's appreciation for the opportunity to comment in the second of two rounds of public consultation on the Plan and notes its position regarding its rights. |
| 7 | Digicel | 4.2 Licensing Process and Condition | We note item 7 under this heading whereby the Authority has stated that an established agreement between an NTN operator and a local terrestrial network operator is a requirement for the issuance of a licence in the 2 GHz band. Digicel inquires as to the | The Authority is asked to provide clarification and further details on this agreement and the operation and parameters of the Authority in relation to the formation | The Authority clarifies that section 4.2, rule 7 outlines the prerequisite for the issuance of a licence in the 2 GHz band. As spectrum may be used to extend the coverage of local mobile |

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| | | | nature of the agreement to be established between the NTN and a terrestrial network operator.<br><br>We note that section 4.2 has been amended to allow NTN satellite operators to apply for a concession and a licence prior to establishing an agreement with local terrestrial network operators. Further, under item 1 of this heading, we note that since the spectrum is to be used for the operation of a public telecommunication network a Type 1 concession will be a pre-requisite for the assignment of spectrum. An NTN operator may apply for a concession with a preliminary letter of intent from a terrestrial network operator. However, a letter of intent is a non-binding document that purports to outline only the intentions of a party, such terms and conditions to be subject to a legally binding agreement or contract. Digicel is not of the view that a letter of intent is sufficient. | Agreements between the NTNs and terrestrial network operator.<br><br>The Authority is asked to reconsider its position on the preliminary letter of intent from the terrestrial network operator. | netwok operators (MNOs) without offering service directly to the end users/mobile subscribers, Digicel is advised that an established agreement between an NTN operator and a local MNO is a prerequisite for the issuance of a licence. The terms of the agreement are strictly between the NTN operator and local MNOs.<br><br>Digicel is advised that a letter of intent does not guarantee the issuance of a licence to the NTN operator but rather informs the Authority of their intention to establish a formal business agreement with a local MNO. As referenced under section 4.2, item 7, an established agreement between the NTN operator and a local terrestrial network operator, not a letter of intent, is a requirement for the issuance of a licence in the 2 GHz band. A letter of intent is a requirement for an application for a concession, and an established agreement is a requirement for the issuance of a licence. |
| 8 | GSMA | General | The GSMA thanks TATT for the opportunity to comment on the second public consultation on its Spectrum Plan for the Accommodation of Non-Terrestrial Networks in Trinidad and Tobago. The GSMA sees this area as important for present and future of mobile services.<br><br>Following the response from GSMA in 2024, we would like to highlight the evolving NTN space in terms of direct-to-device (D2D) connectivity with service launches from some vendors on top of significant investments from mobile operators in the space sector-here focused on the MSS solution under discussion in this proposal.<br><br>Questions remain on the role that D2D will play in advancing global connectivity. This is a coverage technology that can potentially be applied to the 4% of the global population which does not live within a mobile footprint, also known as the 'coverage gap'. Existing D2D services will not be able to solve the 39% of the global population that live within a mobile broadband network but are not using it, known as 'the usage gap'. Two thirds | | The Authority acknowledges GSMA's appreciation for the opportunity to comment in the second of two rounds of public consultation on the Plan.<br><br>The Authority welcomes the additional information on the growth of direct-to-device (D2D) and clarifies that the authorisation of services directly to consumers using D2D, both within the mobile satellite service (MSS) spectrum and in IMT bands, is beyond the scope of this Plan. The provision of services using D2D communication directly to consumers or within bands for public mobile telecommunications services will be considered in a framework for the |

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| | | | of those 39% do not own a device, showing affordability and literacy remain key to closing the usage gap.<br><br>D2D is a low-bandwidth solution, delivering limited messaging and emergency services when outside the areas served by the MNO's-although some improvement is expected in the mid-term. Although the S band has been standardised by 3GPP, the percentage of MSS D2D device compatibility remains very low. D2D may also provide IoT solutions requiring a non-population footprint and enhanced reliability, but satellite connectivity still comes at a premium cost over terrestrial services.<br><br>Although the bands in this consultation do not require additional comments from the GSMA as they are globally harmonized MSS bands, at a national level, licensing mechanisms and regulatory frameworks governing D2D via MSS bands will need to be developed, also considering neighbouring countries. Satellite services are typically licensed with lighter regulatory and financial burden on the service provider, so 'same service, same rules' rights will require further analysis in the MSS space.<br><br>The GSMA and our members are keen to see D2D develop as a robust means of providing services to customers and not a distorted playing field or technical risk. We remain available for any questions and any meetings required to further explain our submissions on the matter. | | authorisation of satellite services. To clarify, the scope of this Plan was revised during the first round of consultation to read: "This Plan accommodates the operation of NTNs using allocated spectrum to extend the coverage of domestic terrestrial network operators for the provision of public telecommunications services. This Plan does not address the allocation and licensing of spectrum bands for terrestrial networks, including public mobile networks, fixed wireless access and private mobile networks. The provision of direct-to-device communication directly to consumers or using spectrum bands for public domestic mobile services is also not addressed." |
| 9 | MSSA | General | MSSA provided comments to the Telecommunications Authority of Trinidad and Tobago's (TATT/ the Authority) first consultative document on this matter in October 2024 and welcomes the opportunity to provide comments on the Second Consultative Document on the Spectrum Plan for the Accommodation of Non-Terrestrial Networks in the chart that follows in section 4. As reflected in the specific comments and recommendations offered below, MSSA appreciates that the Authority has considered several of our recommendations to facilitate the introduction of NTN services in Trinidad and Tobago. That said, MSSA remains concerned with certain aspects of the proposed framework including the band plan, the mandate to partner with a mobile network operator, and the spectrum cap which will inadvertently limit the capability/performance of the services and the flexibility with which those services can be offered or erect unnecessary barriers to market entry. We would welcome the opportunity to further engage with the Authority- including by meeting with the TATT to further discuss our proposals. | | The Authority acknowledges MSSA's appreciation for the opportunity to comment in the second of two rounds of public consultation on the Plan.<br><br>MSSA is informed that, since the NTN services would be offered to MNO customers, an established agreement between the NTN operator and a local MNO is a requirement for the issuance of a licence to NTN operators. The Authority also advises that a spectrum cap of 10 MHz (i.e., 2 x 5 MHz) will accommodate at least two operators with an equal quantum of spectrum in this band and safeguard smaller IoT operators that require smaller bandwidth. Larger spectrum caps may be considered in |

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| | | | | | future revisions of this Plan, based on market interest and spectrum availability. |
| 10 | MSSA | 1.1 Background | The Consultative Document adds a definition of NTN as "Non-terrestrial networks: Networks, or segments of networks, using an airborne or space-borne vehicle to embark on a transmission equipment relay node or base station (3GPP, 2024)." | In its comments in the Authority's first consultation, MSSA recommended that TATT add a definition for NTN and clarify that the definition does not favor any specific technology. MSSA appreciates that TATT added this NTN definition to the document and recommended that it be used consistently throughout the document. | The Authority acknowledges MSSA's appreciation for the inclusion of the definition of NTN and is committed to ensuring that it is used consistently throughout the document. |
| | | | In section 1.1 Background, the Consultative Document continues to describe "NTN" as "wireless communication systems that operate above the earth's surface, involving high-altitude platform stations (HAPS), unmanned aerial vehicles (UAVs) such as balloons and drones, satellites in geostationary Earth orbit (GEO), medium Earth orbit (MEO) and low Earth orbit (LEO), or a combination of these elements." No source for this definition is provided. | In its previous response, MSSA recommended that a source be cited for this statement. Based on Internet research, it appears that the reference may come from the:https://www.everythingrf.com/community/what-are-non-terrestrial-networks.We suggest including this source. | MSSA is advised that the description of NTN in section 1.1, Background, is a combination of information from several sources. As such, no one source can be cited as the true source of the NTN description. Notwithstanding that, the Authority agrees to include the recommended source in the reference section of the Plan as a research material source used in developing the Plan. |
| | | | In this Section 1.1 Background, the Consultative Document has removed the statement, "LEO satellites provide the foundation for many NTN use cases". The new text reads "Curently, many NTN applications use GEO, MEO and LEO satellites." | MSSA appreciates the Authority for considering our comment that current NTN operators successfully use a wide variety of satellite technologies (e.g., GEO, MEO, and LEO) to support wireless communication links, including direct satellite-to-mobile handset connections. These connections have been used to serve mobile users for decades. Indeed, "NTN" use cases involving MSS spectrum are merely an extension of the well-established MSS concept. As a result, this type of NTN can be provided today without the need for additional national or international regulatory measures. | The Authority acknowledges MSSA's appreciation for the revision made to section 1.1, Background, based on the comments received in the first round of consultation. |

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| | | | | MSSA applauds the Authority for adopting an orbit-neutral approach to NTN, acknowledging that LEO, MEO, and GEO systems can all be employed. We appreciate that the Authority is orbital neutral and is not promoting any specific orbital positions for wireless communication links. | |
| 11 | MSSA | 1.4 Scope | This Consultative Document incorporates a proposed frequency assignment plan for the 2 GHz band and specifies how licenses would be awarded to concessionaires under that plan. The Consultative Document states, "This Plan accommodates the operation of NTNs using allocated spectrum to extend the coverage of domestic terrestrial network operators for the provision of public telecommunications services. This Plan addresses neither the allocation nor licensing of spectrum bands for terrestrial networks, including public mobile networks, fixed wireless access and private mobile networks. The provision of direct-to-device communication directly to consumers or using spectrum bands for public domestic mobile services is also not addressed." | MSSA suggests the sentences in this section be written as follows:<br>*"This Plan accommodates the operation of NTN using spectrum to the mobile satellite service for the provision of MSS including direct-to-device (D2D) and Internet of Things (IoT). This Plan addresses neither the allocation nor licensing of spectrum bands for terrestrial networks, including public mobile networks, fixed wireless access and private mobile networks. The provision of direct-to-device communication directly to consumers or using spectrum bands for public domestic mobile services is also not addressed."*<br><br>However, offering direct-to-device services directly to consumers using mobile satellite services (MSS) spectrum which has long been allocated should be feasible within the existing regulatory framework without requiring the use of a mobile network operator. Satellite connectivity has been provided directly to "devices" in MSS spectrum bands, including in the mobile context, for decades. Emerging NTN/D2D services are simply an application of the long-existing MSS concept in which terrestrial and satellite bands can be accessed | The Authority disagrees with the proposed wording, since the use of the phrase, "…the provision of MSS including direct-to-device (D2D)…" contradicts the latter part of the proposed wording which states, "…the provision of direct-to-device communication directly to consumers or using spectrum bands for public domestic mobile services is also not addressed."<br><br>MSSA is reminded that the authorisation of MSS D2D services directly to consumers, both within the MSS spectrum and in IMT bands, is beyond the scope of this Plan and will be considered in a framework for the authorisation of satellite services, currently under development.<br><br>The Authority acknowledges MSSA's comments as they relate to the offering of D2D services using MSS spectrum and agrees that critical maritime and aeronautical communications solutions do not require the involvement of MNOs.<br><br>The Authority clarifies that the provision of services using D2D communication directly to consumers or within bands for PMTS may be considered in a framework for the authorisation of satellite services. To clarify, the scope of this Plan was revised during the |

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| | | | | using a single device. Certainly, one application of NTN is to extend the coverage of domestic terrestrial network operators for the provision of public telecommunications services, but there are many applications including lifesaving emergency services which satellite operators are today providing directly to consumers. In addition, critical and important maritime and aeronautical communications solutions do not require the involvement of a mobile network operator. We appreciate that the Authority acknowledged MSSA's comments as they relate to the two approaches to D2D, i.e., the use of allocated and licensed MSS spectrum and the use of spectrum allocated to terrestrial services and licensed to mobile operators. | first round of consultation to read: "This Plan accommodates the operation of NTNs using allocated spectrum to extend the coverage of domestic terrestrial network operators for the provision of public telecommunications services. |
| 12 | MSSA | 2.1 The Global Environment | The Consultative Document specifically describes 3GPP Release 17 and Release 18 and suggests that these standards will provide a basis for future NTN deployments. | MSSA supports the 3GPP ecosystem for NTN and supports technology neutrality, so that operators should have the flexibility to choose the technology that best aligns with their business model and serves the interests of consumers.<br><br>Notably, most of TATT's current proposed band plan does not support 3GPP NTN standards. Currently only 2 x 5 MHz of the band plan aligns with 3GPP standardized bands. As it currently stands, the assignment plan would not allow for the deployment of 3GPP NTN NR because a minimum of 5 MHz is needed for one channel and at least 2 x 10 MHz or 2 x 15 MHz needs to be allocated so a reuse plan can be implemented. Even in a small country, numerous spotbeams would be required to serve the country efficiently. Considering the amount | The Authority acknowledges MSSA's support for 3GPP's ecosystem for NTN and a technology-neutral approach to reduce barriers to market entry and promote competition.<br><br>The Authority agrees and has made amendments in support of 3GPP band n252. As such, Table 2 – frequency assignment plan for the 2 GHz band based on 3GPP band n252 has been adopted to make spectrum available based on 3GPP band n252 standards. The assignment plan is based on 3GPP's bands n256 and n252. These plans accommodate the frequency division duplex (FDD) mode of operation but with different duplex spacings. 3GPP's n256 and n252 have a duplex spacing of 190 MHz and 180 MHz, respectively. 3GPP's NB-IoT NTN standard uses |

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| | | | | of 2 GHz spectrum available for MSS in other markets, a minimum of 2 x 20 MHz, and ideally 2 x 30 MHz should be allocated.<br><br>In addition, channels 8-15 proposed by TATT are not standardized by 3GPP nor used in the United States. This band is currently primarily used for terrestrial mobile services in the United States. As highlighted in its previous submission and below, MSSA strongly suggests that TATT follow the new 3GPP band n252 created for North America which is 2000-2020 MHz uplink paired with 2180-2200 MHz downlink. This band will be finalized at the June 2025 3GPP meeting and will be published in July 2025. This band will be able to be utilized immediately. | narrowband technology that requires minimal spectrum to deliver nationwide coverage. A minimum spectrum cap of 2 MHz (2x1 MHz) is sufficient for satellites that require smaller bandwidths to operate at full capacity. This safeguards smaller IoT operators and supports a competitive market. Systems that require larger bandwidths can be achieved by concatenating multiple contiguous frequency channels of the reference channel bandwidths, which would equate to contiguous spectrum.<br><br>The frequency band 2000-2020/2185-2200 is part of the allocated MSS band in the United States and not terrestrial mobile services, as outlined in the FCC's *Establishment of Polices and Service Rules for Mobile Satellite Service in the 2 GHz Band.*<br><br>The Authority agrees and has made amendments in support of 3GPP band n252. As such, Table 3 – frequency assignment plan for the 2 GHz band based on 3GPP band n252 has been adopted to make spectrum available based on 3GPP band n252 standards. MSSA is advised that full adoption of band n252 is not possible, as it would prevent the accommodation of band n256 licensees. The Authority has proposed a 5 MHz guard band between PMTS operating in the 1900 MHz band and band n252; as such, 2x20 MHz cannot be allocated to NTN. Future revision of the Plan may accommodate new bands based on market interest and spectrum availability in Trinidad and Tobago. |
| 13 | MSSA | 2.2 NTN Frequency Bands | The Consultative Document updated Table 1 to reflect the satellite bands found in document 3GPP TS 38/101-5 which clearly distinguishes between uplink and downlink frequencies. | MSSA appreciates that the Authority considered our recommendation to include this reference to ensure consistency with | The Authority acknowledges MSSA's appreciation for the revision made to section |

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| | | | The Consultative Document notes that 3GPP band n256 spans 1980-2010 MHz paired with 2170-2200 MHz, providing a 190 MHz duplex. This band is optimized for the globally harmonized frequency band, primarily used in Region 1 due to the absence of PCS operators. TATT is proposing a 2 GHz band plan with a hybrid 180 MHz / 190 MHz duplex separation, covering 2005-2020 MHz paired with 2185-2200 MHz. | 3GPP standards documents and avoid unnecessary confusion.<br><br>MSSA strongly recommends that the Authority change the band plan to use 3GPP band n252, 2000-2020 MHz (uplink) paired with 2180-2200 MHz (downlink) expected to be approved and published by July 2025. This will ensure more efficient use of spectrum and the ability to offer more robust NTN services, including both NBIoT and NTN NR. Trinidad and Tobago has sufficient spectrum available to utilize this band and it will prevent a mismatched duplex band plan between band n256 and a band channelization that not used in the United States. | 2.2, Table 1, based on the comments received in the first round of consultation.<br><br>The Authority agrees and has made amendments in support of 3GPP band n252. As such, Table 4 – frequency assignment plan for the 2 GHz band based on 3GPP band n252 has been adopted to make spectrum available based on 3GPP band n252 standards. MSSA is advised that full adoption of band n252 is not possible as it would prevent the accommodation of band n256 licencees. The Authority has proposed a 5 MHz guard band between PMTS operating in the 1900 MHz band and band n252; as such, 2x20 MHz cannot be allocated to NTN. Future revision of the Plan shall accommodate new bands based on market interest and spectrum availability in Trinidad and Tobago. |
| 14 | MSSA | 2.3 National Considerations | The Consultative Document outlines the existing uses of the 2 GHz band in Trinidad and Tobago and the availability for NTNs to operate on a non-interference basis noting that 1995-2020 MHz is unassigned and available and that 2180 – 2200 MHz is unassigned and available. | Given the availability of spectrum in Trinidad and Tobago, there is no need to limit the amount of spectrum available for NTN to 2 x 15 MHz. Due to the growing demand for D2D services and the available spectrum in Trinidad and Tobago, MSSA recommends allocating 2 x 20 MHz for NTNs dedicated to MSS, rather than the initially suggested 2 x 15 MHz. This adjustment will enable TATT to leverage the 3GPP n252 frequency band and support a wider range of band channelization options. | MSSA is advised that full adoption of band n252 is not possible as it would prevent the accommodation of band n256 licensees. Additionally, the Authority has proposed a 5 MHz guard band between PMTS operating in the 1900 MHz band and band n252; as such, 2x20 MHz cannot be allocated to NTN. Future revision of the Plan may accommodate new bands based on market interest and spectrum availability in Trinidad and Tobago. |
| 15 | MSSA | 3 Frequency Planning Principles | The Consultative Document provides that "All plans shall have a reference channel bandwidth that serves as the minimum assignable channel bandwidth. Frequency channels that require larger bandwidths can be achieved by concatenating multiple non-contiguous frequency channels of the reference channel bandwidth, which would equate to contiguous spectrum. All assignments to an operator shall be contiguous as far as possible." | Given the requirements for NR NTN with 5 MHz channel bandwidths, MSSA has concerns regarding the proposed minimum assignable channel bandwidth of 1 MHz. Even though the goal is to have contiguous frequency blocks, concatenating multiple | 3GPP's NB-IoT NTN standard uses narrowband technology that requires minimal spectrum to deliver nationwide coverage. A minimum spectrum cap of 2 MHz (2x1 MHz) is sufficient for satellites that require smaller bandwidths to operate at full capacity. This |

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| | | | | non-contiguous frequency channels may not result in contiguous spectrum, or it might not be feasible at all. | safeguards smaller IoT operators and supports a competitive market. Additionally, section 3, item 2 states, "Frequency channels that require larger bandwidths can be achieved by concatenating multiple contiguous frequency channels of the reference channel bandwidth, which would equate to contiguous spectrum. All assignments to an operator shall be contiguous as far as possible." |
| 16 | MSSA | 4.1 Frequency Assignment Plan | The Consultative Document notes that the frequency plan presented therein is a mix of 3GPP band n256 and the FCC's MSS 2 GHz band plan with both accommodating FDD but with different duplex spacings. Channels 1 to 5 are based on n256 and channels 6 to 15 are based on the FCC's band plan. The Authority is of the view that the adoption of a channel assignment plan based on 3GPP's band n256 and the FCC's MSS 2 GHz band accommodates a wider range of NTN systems that support duplex spacings from both band plans. | MSSA previously commented that this band plan is not aligned with 3GPP standards, particularly blocks 8-15. Given that TATT has the 1995-2005 MHz unassigned and available, the Authority has the opportunity to follow the new 3GPP band 252 2000-2020 MHz band (uplink) paired with the 2180-2200 MHz band (downlink). Based on the spectrum availability in Trinidad and Tobago, this solution best aligns with 3GPP standards and Region 2 band planning. Of note, the FCC's band channelization plan is not in use in the United States. Following a 3GPP band plan will help ensure standard handset devices are available.<br><br>MSSA also advises against assigning all blocks in 1 MHz channels, as operators aiming to deploy systems with greater bandwidth would require at least 2 x 10 MHz of spectrum for NR NTN. The ideal allocation would be 2 x 15 MHz to support a reuse pattern of 3 x 5 MHz. We would welcome the opportunity to engage in a technical discussion with the Authority to further explore the specifics of the band plan. | The Authority agrees and has made amendments in support of 3GPP band n252. As such, Table 5 – frequency assignment plan for the 2 GHz band based on 3GPP band n252 has been adopted to make spectrum available based on 3GPP band n252 standards. MSSA is advised that full adoption of band n252 is not possible as it would prevent the accommodation of band n256 licencees. The Authority has proposed a 5 MHz guard band between PMTS operating in the 1900 MHz band and band n252; as such, 2x20 MHz cannot be allocated to NTN. Future revision of the Plan may accommodate new bands based on market interest and spectrum availability in Trinidad and Tobago.<br><br>MSSA is advised that 3GPP's NB-IoT NTN standard uses narrowband technology that requires minimal spectrum to deliver nationwide coverage. A minimum spectrum cap of 2 MHz (2x1 MHz) is sufficient for satellites that require smaller bandwidths to operate at full capacity. This safeguards smaller IoT operators and supports a competitive market. The Authority shall consult with stakeholders on future revisions of the Plan. |

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| 17 | MSSA | 4.2 Licensing Process and Conditions | The licensing rules specified in the Consultative Document provide that: "A point-to-multipoint spectrum licence shall be granted by the Authority in order for spectrum in the 2 GHz band to be assigned. The minimum assignment shall be 2 MHz (i.e., 2 x 1 MHz)." | MSSA recommends assigning 3 blocks of 2 x 5 MHz and 5 blocks of 2 x 1 MHz instead of 15 blocks of 2 x 1 MHz. This could accommodate both narrowband NTN and NR NTN. | MSSA is advised that full adoption of band n252 is not possible as it would prevent the accommodation of band n256 licensees. Additionally, the Authority has proposed a 5 MHz guard band between PMTS operating in the 1900 MHz band and band n252; as such, 2x20 MHz cannot be allocated to NTN. Future revision of the Plan may accommodate new bands based on market interest and spectrum availability in Trinidad and Tobago. |
| | | | The licensing rules specified in the Consultative Document provide that "The assignment of spectrum shall be via first come first served or a competitive licensing process, based on demand for this spectrum, as determined by the Authority." | MSSA advocates for administrative licensing processes (such as first come first served) for satellite spectrum rather than a competitive licensing process. This approach enables licensees to optimize their resources for providing high-quality services. | The Authority is supportive of a licensing process that is based on the demand for the spectrum. As such, the assignment of spectrum shall be via a "first come, first served" or a competitive licensing process, based on the demand for this spectrum. |
| | | | The licensing rules specified in the Consultative Document provide that: "The allocated spectrum in the 2 GHz band shall be licensed in accordance with the frequency assignment plan (as seen in Table 4)." | See MSSA's response above. We recommend aligning with the upcoming 3GPP band n252 and making 2 x 20 MHz of spectrum available for NTN MSS in 2000-2020 MHz paired with 2180-2200 MHz. | MSSA is advised that the full adoption of band n252 is not possible, as it would prevent the accommodation of band n256 licensees. Additionally, the Authority has proposed a 5 MHz guard band between PMTS operating in the 1900 MHz band and band n252; as such, 2x20 MHz cannot be allocated to NTN. Future revision of the Plan may accommodate new bands based on market interest and spectrum availability in Trinidad and Tobago. |
| | | | The licensing rules specified in the Consultative Document provide that: "The spectrum cap for the 2 GHz band shall be 10 MHz (i.e. 2 x 5 MHz)." | MSSA respectfully disagrees with the proposed spectrum cap for the 2 GHz band. For operators planning to deploy an NR NTN system, 2 x 5 MHz is insufficient to support a robust system with adequate bandwidth and quality of service. A minimum of 2 x 10 MHz, or preferably 2 x 15 MHz, is necessary. Therefore, MSSA recommends against setting spectrum caps on this band. | A spectrum cap of 10 MHz (i.e., 2 x 5 MHz) will accommodate at least two operators with an equal quantum of spectrum in this band and safeguard smaller IoT operators that require smaller bandwidth. Larger spectrum caps may be considered in future revisions of this Plan, based on market interest and spectrum availability. |

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| | | | The licensing rules specified in the Consultative Document provide that: "An established agreement between the NTN operator and a local terrestrial network operator is a prerequisite for the assignment of spectrum in the 2 GHz Band." | MSSA respectfully disagrees with the requirement for an agreement between the NTN operator and a local terrestrial operator as a prerequisite for the issuance of a license in the 2 GHz band. Such a requirement would allow MNOs to influence the ability of NTN operators to enter the market, which could be anti-competitive. NTN operators may choose to provide stand-alone services such as IoT, Maritime or lifesaving emergency services that don't require a mobile operator, or they may choose to partner with one or more MNOs for D2D services. A mandatory agreement with an MNO is unnecessarily restrictive and, as there are no concerns about using mobile network operator frequency bands as this 2 GHz spectrum is allocated to MSS. MSSA suggests that this be not imposed as a mandatory condition to allow for a competitive market approach which is to the benefit of end customers. | As spectrum may be used to extend the coverage of local MNOs without offering service directly to the end users/mobile subscribers, MSSA is advised that an established agreement between an NTN operator and a local MNO is a prerequisite for the issuance of a licence. The terms of the agreement are strictly between the NTN operator and local MNOs.<br><br>The use of NTN for the provision of private or closed user group services is beyond the scope of this Plan and shall be considered in a framework for the authorisation of satellite services. |
| 18 | Sateliot | General | Sateliot contributed to the first round of consultation on the Spectrum Plan for the Accommodation of Non-Terrestrial Networks held in October 2024 and welcomes the opportunity to contribute to round two of the consultation.<br><br>In this submission, Sateliot submits comments on some of the topics presented in the Spectrum Plan for the Accommodation of Non-Terrestrial Networks.<br><br>Sateliot looks forward to continued engagement with TATT and other stakeholders to develop a forward-looking spectrum plan that maximizes benefits for the people of Trinidad and Tobago.<br><br>We thank TATT for the opportunity to participate in this second round of this important consultation. We truly appreciate the direction the Authority is taking towards adapting and enhancing its satellite regulatory framework, while accommodating evolving technologies and services.<br><br>We remain available to support TATT in finalizing this framework and are eager to | | The Authority acknowledges Sateliot's appreciation for the opportunity to comment in the second of two rounds of public consultation on the Plan. |

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| | | | resume the process of providing our services in Trinidad and Tobago. We look forward to collaborating further and contributing to the growth and development of the telecommunications landscape in Trinidad and Tobago. | | |
| 19 | Sateliot | 2.3 National Considerations | We also acknowledge TATT's inclusion of Table 3 summarising the current usage and availability of spectrum. The current availability displayed below is well-suited to NTN service:<br>• 1995 – 2010 MHz is available<br>• 2010 – 2025 MHz is available<br>• 2180 – 2200 MHz is available<br>We also commend and applaud the TATT for taking protective measures to conduct monitoring exercises to verify that the bands 1995- 2025 MHz and 2180 – 2200 MHz are free from harmful interference before assignment. Said monitoring shall also be useful to assist TATT in these assessments. | | Sateliot's appreciation for the inclusion of Table 3, summarising the current usage and availability of spectrum in Trinidad and Tobago, is acknowledged by the Authority.<br><br>Sateliot's commendation for the Authority's monitoring exercises prior to assignment is also appreciated. This remains a critical step in ensuring assignments remain free from harmful interference. |
| 20 | Sateliot | 3 Frequency Planning Principles | We support the principles for the frequency assignment plan laid by TATT for the accommodation of NTNs in the 2 GHz band. | | The Authority thanks Sateliot for supporting the frequency planning principles for the accommodation of NTN in the 2 GHz band. |
| 21 | Sateliot | 4.1 Frequency Assignment Plan | We reiterate that TATT should consider allowing for flexibility, even if on a trial basis, for arrangements. Especially given how the arrangements remain a contentious issue ahead of WRC-27 for AI 1.13. This item has a direct bearing on the future of D2D technologies and deployments. Deciding to limit arrangements at this stage may present the need for updating the plan within a short timeframe, potentially as early as two years.<br><br>We welcome and commend TATT for taking a flexible approach to band planning, particularly with duplex separation. The inclusion of the 3GPP n256 band in channels 1 to 5 within the band. Any 1 MHz channel for UL and DL provides Sateliot the opportunity to service Trinidad and Tobago.<br><br>A minimum assignment for LDR MSS systems of 1 x 1 MHz is appropriate. LDR | | NTN operators have the flexibility of applying for spectrum, in keeping with the assignment principles of the Plan, which shall be considered via a "first come, first served" or a competitive licensing process, based on the demand and availability of this spectrum, as determined by the Authority. The Authority agrees to consider the outcome of AI 1.13 in future revisions of the Plan following the completion of WRC-27.<br><br>The Authority acknowledges Sateliot's commendation on its flexible approach to band planning, particularly with respect to duplex separation and the adoption of 3GPP band n256. |

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| | | | technologies, such as Sateliot, can operate and service the entire country on 1 MHz for service links in the uplink and downlink. This spectrum efficiency should be encouraged.<br><br>To further differentiate LDR from other D2D technologies, we encourage TATT to consider other assignment models accounting for the full scope of the NTN service typology. A designated 5 MHz portion within the band for the LDR services will ensure spectrum for at least 5 competing LDR solutions, bringing maximum benefit to Trinidadians. This model has been implemented by the Kingdom of Saudi Arabia and Australia. It is also being investigated by the Radio Spectrum Policy Group of the European Union for the future of the 2 GHz band. | | The Authority acknowledges Sateliot's comment on the 1 x 1 MHz capacity required for low data rate (LDR) technology.<br><br>The Authority agrees and has considered spectrum for NTN LDR in its proposed assignment model. As outlined in section 2.1, the 3GPP standards adopted by the Authority will serve several vertical markets by LEOs and GEOs, including LDR. The Authority does not support a specific block of spectrum for LDR, as spectrum is made available for all NTN narrowband and LDR services. The 1 MHz channel assignment plan safeguards smaller IoT operators that require smaller bandwidth for LDR, and the spectrum cap of 10 MHz (i.e., 2 x 5 MHz) accommodates larger bandwidth services. |
| 22 | Sateliot | 4.2 Licensing Process and Conditions | We address our comments on this part of the consultation by referring to the specific number under 4.2 in the consultative document:<br><br>1) Since the spectrum is to be used for the operation of a public telecommunications network, a Type 1 concession will be a prerequisite for the assignment of spectrum. An NTN operator may apply for a concession with a preliminary letter of intent from a local terrestrial network operator.<br><br>We support this statement, especially with regard to the letter of intent from a local MNO. We, however, believe this can be taken a step further and allow for the joint application between the MNO and the NTN for the concession. This partnership is fundamental to many NTN wholesale (D2D) providers and offers TATT the opportunity to oversee the engagement from the start, allowing the MNO to expand network coverage and allowing the NTN to enter the market quickly. This partnership model represents a win-win scenario for the entire value chain of service delivery TN-NTN.<br>2) The licensing of spectrum in the 2 GHz band for NTNs shall be for the operation of public international telecommunications networks. | | The Authority acknowledges Sateliot's support for the letter of intent, which provides a preliminary commitment of one party to do business with another.<br><br>As spectrum may be used by the NTN operator to extend the coverage of local MNOs, Sateliot is advised that it is the NTN operator who must apply for spectrum in the 2 GHz band. An established agreement between an NTN operator and a local MNO is a prerequisite for the issuance of a licence. The terms of the agreement are strictly between the NTN operator and local MNOs. |

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| | | | We support this provision. Sateliot's wholesale network model provides GSMA-based roaming connectivity to our MNO partners when their terrestrial coverage fails. Our MNO partners own the service agreements with their customers.<br><br>3) A point-to-multipoint spectrum licence shall be granted by the Authority in order for spectrum in the 2 GHz band to be assigned. The minimum assignment shall be 2 MHz (i.e., 2 x 1 MHz).<br><br>Sateliot supports the provision of a spectrum licence and agrees with the proposed minimum assignment of 2 MHz (i.e., 2 x 1 MHz). This allocation aligns with the spectrum needs of law-data -rate non- terrestrial networks (LDR NTNs) like ours, which operate efficiently using 1 MHz in each direction. Setting this minimum supports spectrum efficiency while enabling fair access to new entrants in the market.<br><br>4) The assignment of spectrum shall be via first come first served or a competitive licensing process, based on demand for this spectrum, as determined by the Authority.<br><br>We support this approach to spectrum licensing.<br><br>5) The allocated spectrum in the 2 GHz band shall be licensed in accordance with the frequency assignment plan (as seen in Table 4).<br><br>We support this approach.<br><br>6) The spectrum cap for the 2 GHz band shall be 10 MHz (i.e., 2 x 5 MHz), which will accommodate at least two operators with an equal quantum of spectrum in this band.<br><br>We support this approach, but as stated above, we encourage TATT to account for different NTN service models, as the spectrum needs are different.<br><br>7) An established agreement between the NTN operator and a local terrestrial network operator is a requirement for the issuance of a licence in the 2 GHz band. NTN operators shall notify the Authority of any new agreement signed with a local terrestrial network operator.<br><br>We support this approach. Our business model is based upon wholesale connectivity to MNO partners. We again encourage TATT, if adopting the approach of only permitting partnerships, to then allow for joint licensing or one-stop licensing to ease the licensing process and enhance market entry. The MNOs already have existing | | The Authority acknowledges Sateliot's support for section 4.2, Licensing Process and Conditions, rules 2, 3, 4, 5 and 6.<br><br>As spectrum may be used by the NTN operator to extend the coverage of local MNOs, Sateliot is advised that it is the NTN operator who must apply for spectrum in the 2 GHz band and not the MNOs.<br><br>Since local MNOs already have existing licences and engagements with the Authority, Sateliot is further advised that NTN operators |

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| | | | licenses and engagements with the TATT, and this can be leveraged to speed up NTN service rollout.<br><br>8) All NTNs authorised for operation will be registered in Trinidad and Tobago.<br><br>We wish to confirm what TATT means by this statement. Will NTNs be added to a register of service providers? If so, we support such an initiative.<br><br>Alternatively, if this means NTN's must have a logical registered office, we respectfully disagree. The Republic of South Africa is currently investigating such a proposal through their new Proposed Licensing Framework for Satellite services. This includes determining the procedure to create a register of all satellite services operating in South Africa, including information from ITU filings and coordination work and whether services are provided directly or indirectly through local partnerships. Such an initiative can provide TATT with appropriate oversight over the satellite segment.<br><br>The partnership model proposed by TATT provides for local contact through the MNO. An alternative where satellite operators are required to establish a local entity places a burden on smaller NTN operators wishing to provide innovative and highly valuable services. | | can leverage their experience when establishing the agreement with local MNOs, as required for the issuance of a licence. The terms and conditions of the agreement are strictly between the NTN operator and the local MNOs.<br><br>As it relates to section 4.2, rule 8, Sateliot is advised that authorised NTN operators shall be registered as service providers in Trinidad and Tobago.<br><br>The Authority further advises that section 318 of the Companies Act provides that an external company (defined as a body corporate incorporated under the laws of a country other than Trinidad and Tobago) must register with the Registrar of Companies within 14 days of establishing a place of business in Trinidad and Tobago. Where no place of business is established, registration is not required. An operator with no local physical or operational presence would not be required to register. |
| 23 | Sateliot | Technical Operating Conditions and Specifications | We support the technical operating conditions specified in Table 5. We note, however, that Sateliot does not manufacture, distribute, or directly any terminal equipment. We connect 3GPP Release 17 and above standard terminal equipment available on the market to our satellite network through our roaming agreement with the MNO. It is the MNO which sells or otherwise makes available the terminal equipment to the local market. | | The Authority acknowledges Sateliot's support for the technical operating conditions as specified in Table 5 and its position relating to the distribution of end-user terminals. |
| 24 | Skylo Technology | 4.2 Licensing Process and Conditions | Skylo appreciates that TATT has amended section 4.2, rule 1 to include 'An NTN operator may apply for a concession with a preliminary letter of intent from a local terrestrial network operator' but remains concerned that rule 7 still maintains that the prerequisite for the issuance of a licence in the 2 GHz band is an agreement between the NTN operator and the local terrestrial operator. | | The Authority acknowledges Skylo Technology's appreciation for the amendments made to section 4.2, rule 1, based on the comments received in the first round of public consultation. Skylo Technology is advised that an established agreement between an NTN operator and a local MNO remains a prerequisite for the issuance of a licence. |

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| | | | As Skylo mentioned in its comments to the first consultation, while many of Skylo's D2D NTN applications are provided in partnership with local terrestrial network operators, there are some important and life-saving use cases for smartphones and wearables that can operate without a terrestrial operator. Working through terrestrial network operators can limit how D2D / NTN services are deployed and fundamentally operated.<br><br>Here are some relevant examples of actual NTN services being deployed around the world without an agreement with the local terrestrial operation for TATT's consideration:<br>1. Skylo's D2D NTN is natively included in all Pixel 9 and upcoming Pixel 10 smartphones so consumers can connect to emergency services via satellite to get help and share their location with their contacts with no requirement for a terrestrial network operator.<br>2. Apple's NTN service is a function of the phone, allowing users to have access to satellite SOS, roadside assistance and other emergency services without the need for a terrestrial operator.<br>3. Particularly important for nations like Trinidad and Tobago which have been looking to improve safety of life for fishers and other maritime users, NTN opens up new maritime use cases for fishers and recreational boaters for tracking and safety purposes, which cannot go through the terrestrial network operator who may not be authorized to or provide service in or outside territorial waters.<br>4. Services such as the Globalstar SPOT and Garmin inReach operate today over satellite without the need for a terrestrial network operator.<br>5. Automotive OEMs are looking to NTN for an emergency connection that is independent of the terrestrial network operator for breakdown, telemetry and other applications to measure vehicle breakdown.<br>6. Many use cases, such as public safety (e.g., tsunami, earthquake, and hurricane warnings), energy (e.g., oil rigs), agriculture, and government/military applications by design are or must be independent of the terrestrial network operator.<br><br>Skylo acknowledges the important role that terrestrial network operators play in the NTN ecosystem, but as mentioned above there are critical, life-saving use cases that do not rely on a terrestrial network operator. These NTN operators, like Skylo, would be interested in providing service in Trinidad and Tobago. Therefore, Skylo respectfully submits that TATT considers adding an alternative waiver procedure or other available | | As spectrum may be used to extend the coverage of local MNOs without offering service directly to the end users/mobile subscribers, Skylo Technology is advised that an established agreement between an NTN operator and a local MNO remains a prerequisite for the issuance of a licence.<br><br>The use of NTN for the provision of private or closed user group services is beyond the scope of this Plan and shall be considered in a framework for the authorisation of satellite services.<br><br>The Authority thanks Skylo Technologies for the information shared on the NTN service being deployed around the world without an agreement with local MNOs. Such services shall be addressed in the Authority's framework for the authorisation of satellite services. |

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| | | | licensing mechanism to permit use cases that do not require an agreement with a terrestrial network operator. | | |
| 25 | TSTT | General | Telecommunications Services of Trinidad and Tobago Limited ("TSTT") appreciates that the Telecommunications Authority of Trinidad and Tobago ("the Authority") has given operators the opportunity to comment on these matters. It should be noted that TSTT's comments on this document do not preclude TSTT from making further comments in the future. | | The Authority acknowledges TSTT's appreciation for the opportunity to comment in the second of two rounds of public consultation on the Plan and notes its position on future comments. |
| 26 | TSTT | 4.3 Technical Operating Conditions and Specifications | The technical conditions for NTN UEs are presented in Section 4.3. The proposed out-of-band emissions limit is -43 dBW, with the note that a reference bandwidth of 4 kHz shall be used. This limit would apply to NTN UEs transmitting in the 2005-2020 MHz band<br><br>The downlink band for 1900 MHz (3GPP band 25, which is in 1930-1995 MHz, is only 10 MHz away from the 2 GHz band or Band 2, which is only 15 MHz away). The proposed out-of-band limit for NTN UEs is very high and will result in strong interference to terrestrial UEs operating in the 1900 MHz band. The limit is -43 dBW/4 kHz, which is equivalent to 11 dBm/MHz. This is too high considering that terrestrial UEs and NTN UEs could be in close proximity, and the path loss will not compensate for the very high out-of-band level. | It is recommended that the Technical Operating Conditions for NTN UEs (Section 4.3) of the consultative document require compliance with the 3GPP TS 38.101-5 specification as a whole. | TSTT is informed that the out-of-band (OOB) limits in Table 6 comply with ITU-R Recommendations SM.329-13, Space Services (mobile earth stations), including user equipment (UEs), as the 3GPP standards would be too restrictive. TSTT is further informed that, in addition to the parameters specified in Table 5 to protect against harmful interference, the Authority has also proposed a 5 MHz guard band between PMTS operating in the 1900 MHz band and NTN in the 2 GHz band, as well as a 5 MHz separation between PMTS in the AWS band and NTN operation in the 2 GHz band. |
| | | | It is proposed that the Technical Operating Conditions for NTN UEs require compliance with the spurious emissions limit in 3GPP TS 38.101-5 Section 6.5.3.1. Furthermore, compliance with TS 38.101-5 as a whole should be required to ensure coexistence with other NTN systems and with other services, and to ensure efficient use of spectrum. | Specifically, for out-of-band emissions, compliance with 3GPP TS 38.101-5 Section 6.5.3.1 (spurious emissions) should be required. | As the 3GPP standards would be too restrictive for out-of-band emission, the Authority has proposed a 5 MHz guard band between PMTS operating in the 1900 MHz band and NTN in the 2 GHz band, as well as a 5 MHz separation between PMTS in the AWS band and NTN operation in the 2 GHz band, to protect incumbent services against harmful interference. Additionally, with improvements in technology, the coexistence of different services does not require a large guard band. |