MANGATA

May 18, 2023

Submitted via email to advmn@trai.gov.in

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Re: Comments on Consultation Paper on Assignment of Spectrum for Space-based Communication Services (Consultation Paper No. 6/2023)

Dear Mr. Trivedi:

Mangata Networks ("Mangata")[1] submits the following comments in response to the Telecom Regulatory Authority of India's ("TRAI") Consultation Paper on Assignment of Spectrum for Space-based Communication Services.[2] Mangata urges TRAI to preserve as much of the 27.5-28.5 GHz band for the Fixed Satellite Service ("FSS") as possible to ensure that geostationary orbit ("GSO") and non-geostationary orbit ("NGSO") satellite systems serving India can deliver the highest level of capacity possible to enhance the reach and reliability of broadband networks to Indian citizens. Additionally, Mangata urges TRAI not to auction or otherwise assign FSS spectrum on an exclusive basis for flexible use licenses since doing so would harm competition and result in an inefficient allocation of spectrum resources among satellite systems attempting to serve the Indian market. Should TRAI determine that it wishes to proceed with some version of flexible use licenses in these frequency bands, it should very narrowly define the densely populated service areas covered by such licenses.

Introduction

Mangata Networks was founded in 2020 with a mission to deliver the lowest cost and highest performance capacity to anyone, anywhere by skillfully and cost-effectively combining

[1] Website available at https://www.mangatanetworks.com/.
[2] *Consultation Paper on Assignment of Spectrum for Space-based Communication Services*, Telecom Regulatory Authority of India (April 6, 2023), available at https://trai.gov.in/consultation-paper-assignment-spectrum-space-based-communication-services ("Consultation")

terrestrial and satellite technologies to create a socially responsible, global network service provider. Mangata's system is optimized for very high throughput data services using the Ka-band, including the frequency range 27.5-28.5 GHz, and Q/V-band frequencies. These services are ideal for increasing the reach and resiliency of fixed and mobile broadband networks to bring connectivity to unserved and underserved populations, connecting government users during emergencies, connecting enterprise to the internet and cloud, and connecting travelers on ships, aircraft, trains, and vehicles through high-capacity mobility connectivity services using earth stations in motion.

Mangata's satellite system is a hybrid system operating in uncongested highly elliptical ("HEO") and medium earth ("MEO") orbits and is comprised of an entirely non-geostationary orbit ("NGSO") constellation. This enables Mangata's constellation to provide a robust, high-availability service to consumer, enterprise, and government applications, while also protecting invaluable orbital resources. The system's orbital configuration is designed for accelerated deployment, space sustainability, optimal global coverage, and maximum system performance.

Comments

Q10. In the frequency range 27.5-28.5 GHz, whether the spectrum assignee should be permitted to utilize the frequency spectrum for IMT services as well as space-based communication services, in a flexible manner? Do you foresee any challenges arising out of such flexible use? If yes, in what manner can the challenges be overcome? Kindly elaborate the challenges and the ways to overcome them.

Mangata proposes that TRAI preserve the 27.5-28.5 GHz frequency range for Fixed Satellite Services ("FSS") to the greatest degree possible and in both densely and sparsely populated areas. This range has been and is increasingly becoming more essential to satellite services, ranging from fixed terminal deployments to earth stations in motion ("ESIMs"). In addition to the established services from geostationary satellites, the satellite industry including Mangata, is hard at work investing billions of dollars to deploy next-generation NGSO satellite constellations, which provide high capacity, low-latency services that extend fixed and mobile broadband networks to areas unconnected by fiber, as well as providing critical resiliency solutions to terrestrial networks in all areas that ensure connectivity is quickly restored in the event of a disruption.

The Ka-band is particularly effective in delivering very high throughput satellite services to gateway earth stations and user terminals due to the higher available bandwidth compared to FSS services in the C-band and Ku-band. These high-capacity services are being used by internet

service providers to enhance broadband network reliability, connect consumers while traveling on trains, vehicles, aircraft, and ships, enable edge cloud computing and high-speed internet services to enterprises, and ensuring public safety by delivering connectivity to emergency response entities after human-made or natural disasters. Counter to the notion that FSS operates in the 27.5-28.5 GHz frequency range solely in sparsely populated areas or only for gateways, several NGSO constellations and GSO satellite systems use the Ka-band, including the 27.5-28.5 GHz frequency range for both gateway earth stations and user terminals located in both sparsely populated and densely populated areas. The availability of the Earth-to-space 27.5-28.5 GHz range for uplink communications to NGSO satellite systems from user terminals supports symmetrical data speeds that in many instances can replicate the experience of fiber. This enables real-time internet applications such as video and voice chat, cloud computing, and gaming. Service providers can use these symmetrical speeds to expand the reach and reliability of their broadband networks while maintaining quality of service that is nearly indistinguishable from terrestrial-only networks. For example, cloud service providers may locate data centers in an urban area and may wish to use a FSS terminal with access to the full Ka-band to ensure the maximum satellite capacity is available to ensure fiber-like redundancy to their terrestrial fiber. Likewise, a mobile operator with an internet interconnection point in an urban area may also require such a satellite resiliency solution. The same can be said for the headquarters or hubs of large enterprises that require constantly available internet access to ensure business continuity.

The introduction of IMT into the 27.5-28.5 GHz frequency range would greatly limit the capacity available to deliver the critical services described above because network operators would be unable to deploy earth stations on a ubiquitous basis using these frequencies in areas designated for IMT licenses, thereby depriving Indian citizens and enterprise of the satellite broadband and resiliency services described above. Likewise, the introduction of IMT base stations in the 27.5-28.5 GHz frequency range will increase aggregate interference to space station receivers operating in the band, constraining FSS services both in India and neighboring countries. Accordingly, Mangata urges TRAI to limit the identification of IMT in this frequency range to the greatest extent possible. As noted in the consultation, because the "mmWave spectrum is going to be used for capacity requirement, its deployment is not likely to be ubiquitous rather it is more likely to be kind of hotspots or urban micro cells."[3] Thus, if TRAI permits IMT in the 27.5-28.5 GHz frequency range, it should only be permitted in defined very densely populated areas for surge capacity and authorized subject to coordination with FSS. Likewise, FSS should not be constrained by theoretical IMT deployment, but only in those narrowly defined zones requiring surge capacity and only once IMT systems are deployed.

[3] Consultation at 56.

Preserving the 27.5-28.5 GHz frequency range for FSS service on a primary basis is consistent with international harmonization efforts. While the ITU does not include discrete frequency allocations for IMT, it specifically mentions that "[t]he frequency band 24.25-27.5 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications."[4] The ITU deliberately makes no such recommendation for the 27.5-28.5 GHz frequency range because of the increasing importance of the range for FSS. Likewise, the Electronic Communications Committee's ("ECC") Radio Spectrum Policy Group opined before WRC-19 that IMT/5G services should not be permitted in the range 27.5-29.5, and subsequentially the European Conference of Postal and Telecommunications Administrations ("CEPT") recognized the band for use in broadband satellite services and ESIMs. This frequency range is home to over 120 satellites, and there are plans for hundreds more to be launched in the coming years.[5] This band is used for FSS primarily but is increasingly being used for mobility services such as ESIMs on aircraft and ships. Numbers of low earth orbit ("LEO") satellites and medium earth orbit ("MEO") satellites are being deployed in the coming years. Considering these future needs, it becomes clear why the ITU and European groups have preserved this range for FSS services and, therefore, why TRAI should do the same.

Meanwhile, the case for IMT in the 27.5-28.5 GHz range is unproven except perhaps for surge capacity deployments for events. In 2018, The Republic of Korea auctioned licenses for 2,400 megahertz of spectrum between the 26.0-28.0 GHz range, including spectrum within the 27.58-28.5 GHz range, for mobile network operators to use to deploy IMT services. However, the auction winners only deployed a fraction of the base-stations expected, and more recently only 2% of the 215 base stations can utilize the spectrum in the Ka-band range. The challenges of using the 27.5-28.5 range for IMT are encapsulated by a Korean operator's CEO, who said, "[e]stablishing nationwide coverage just can't be done," and further explained that the spectrum "travels straight and it can't go around obstacles. It can't deliver the same speed once it travels a few hundred meters."[6] Recently, Korea mobile network operators lost their IMT/5G licenses for the Ka-band for their failure to properly utilize the allocation, with the regulator

[4] *ITU Regulations*, International Telecommunications Union at 5.532AB (2020).
[5] *See GSOA response on PTS demand analysis for the 26 GHz and 28 GHz bands*, Global Satellite Operators Association (June 16, 2022), available at https://gsoasatellite.com/wp-content/uploads/2022-06-16-GSOA-contribution-PTS-demand-analysis-for-28-GHz.pdf.
[6] Byungwook Kim, *Analysis: South Korea's high-speed 5G mobile revolution gives way to evolution*, Reuters (May 13, 2022), available at https://www.reuters.com/business/media-telecom/skoreas-high-speed-5g-mobile-revolution-gives-way-evolution-2022-05-13/.

citing that "none of the operators even met the minimum buildout requirements for the 28 GHz band and they also offer no devices to consumers that support that spectrum band."[7]

Additionally, Mangata strongly cautions against auctioning or assigning exclusive flexible use licenses as the means for deploying satellite services in the 27.5-28.5 GHz range (or any FSS range for that matter), even in densely populated areas. While TRAI has correctly recognized that satellite services are critical for delivering services in sparsely populated areas, as discussed above, Ka-band satellites ensure broadband networks in all areas are sufficiently resilient by providing high capacity, low latency links to back-up terrestrial fiber. To effectively deliver these services and provide fiber-like connectivity via satellite, satellite operators need access to the full range of satellite frequencies available. The practical realities of exclusive flexible use assignments within satellite spectrum would deprive India of such solutions. For example, under a flexible use assignment, each satellite operator would need to enter into agreements with every single flexible use licensee to provide the maximum level of services. Practically speaking, this would create scenarios where a satellite system would only be able to access a portion of the spectrum otherwise available to satellite systems resulting in suboptimal capacity availability. Another suboptimal scenario is where only a select number of satellite systems can reach agreements or secure flexible use licenses, limiting the number of satellite service providers serving the Indian market, limiting the available satellite capacity, and increasing prices for satellite capacity through stunted competition. Neither of these results provide the maximum level of satellite capacity serving Indian consumers and businesses.

Mangata instead suggests that TRAI rely predominantly on the ITU's current framework for spectrum management that enables satellite operators to access to the full range of Ka-band frequencies and TRAI should only resort to flexible use licenses in the very narrowly defined areas where surge capacity is required for IMT systems.[8] Spectrum sharing among satellite systems will maximize the total satellite capacity available for service. Whereas introducing ubiquitous IMT systems in the 27.5-28.5 GHz frequency range and relying on only on exclusive spectrum licenses to enable satellite services would suppress competition and deprive Indian citizens of the benefits of high throughout satellite services.

Q11. In case it is decided to permit flexible use in the frequency range of 27.5 - 28.5 GHz for space-based communication services and IMT services, what should be the associated terms

[7] Sue Marek, *KT and LG Uplus lose their 28 GHz spectrum licenses*, Fierce Wireless (Nov. 12, 2022), available at https://www.fiercewireless.com/5g/kt-and-lg-uplus-lose-their-28-ghz-spectrum-licenses.

[8] See generally *Appendix 7 (Rev.WRC-19) Methods for the determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz*, *ITU Regulations*, International Telecommunications Union (2020).

and conditions including eligibility conditions for such assignment of spectrum? Kindly justify your response.

As discussed above, Mangata maintains that the 27.5-28.5 GHz frequency range is more suitable for satellite services, which are widely deployed in this range around the world. However, if TRAI permits IMT to operate in the 27.5-28.5 frequency range, it should clearly establish that FSS has primary status over IMT services in sparsely populated areas where IMT is unlikely to be deployed in millimeter wave bands. Additionally, TRAI should limit any IMT deployments in the 27.5-28.5 frequency range to serve specific zones where surge capacity may be required. FSS deployment in these designated zones should only be limited by actual IMT deployment subject to coordination with FSS. Such an arrangement will ensure that advanced satellite services can both extend broadband networks in sparsely populated areas where the economics of terrestrial deployment hamper services, but also enable satellites to provide critical resiliency services to broadband networks in all environments, including densely populated areas. If TRAI adopts this approach, it would then be appropriate for licensees to be able to use the spectrum for either IMT or satellite services in areas covered by the narrowly tailored flexible use licenses. In such a scenario, a licensee could perhaps deploy a dual use network where IMT services are activated for surge capacity to response to events and satellite services are activated when terrestrial networks fail.

Mangata appreciates TRAI's consultation opportunity and recognizes your efforts in creating an effective plan for the assignment of spectrum. We believe that the propositions in the plan are well considered and important to our industry. We would be happy to further discuss our objectives and viewpoints regarding this Consultation.

Respectfully submitted,

/s/Noah Cherry

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