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RE: Comments on the Consultation Paper on Auction of Frequency Spectrum in 37-37.5 GHz, 37.5-40 GHz, and 42.5-43.5 GHz bands Identified for IMT

Kuiper Systems LLC (**Kuiper**), a wholly owned subsidiary of Amazon.com Services LLC (together, **Amazon**), welcomes the opportunity to submit these comments on the Consultation Paper on Auction of Frequency Spectrum in 37-37.5 GHz, 37.5-40 GHz, and 42.5-43.5 GHz bands Identified for IMT (**Consultation Paper**).

Amazon has successfully launched into orbit and tested its initial two (2) satellites, and now is focusing on the deployment of Project Kuiper to increase global broadband access through a constellation of satellites in low Earth orbit (LEO). Project Kuiper's non-geostationary satellite orbit (NGSO) constellation will bring fast, affordable broadband to unserved and underserved communities around the world, including in remote parts of India. Project Kuiper will provide ubiquitous, high-capacity, high-speed, low latency broadband services to residential customers, schools, businesses, and institutions around the world, and also communications to terrestrial mobile network operators, global enterprise, and government users, among others. Through Project Kuiper, Amazon will enable connectivity where it is lacking, thereby helping to close the Digital Divide and ensure reliable access to communications.

Amazon welcomes the opportunity to provide comments to the Consultation Paper, and urges the TRAI to consider allowing possible future earth stations in motion (**ESIM**) to operate in the 37-37.5 GHz, 37.5-40 GHz, and 42.5-43.5 GHz bands, without requiring additional licensing for these stations.

Further, to address the effective sharing of spectrum between IMT and Fixed-Satellite Service (**FSS**) stations in these frequency bands, Amazon supports (i) the use of small license areas (e.g., akin to a secondary switching area (**SSA**) under the Unified License (**UL**)) for terrestrial licensees, in recognition of the significant propagation issues at these frequencies; and (ii) using power flux-density (**pdf**) thresholds and frequency coordination procedures for the protection of receiving satellite earth stations (space-to-Earth) in the 37-37.5 GHz, 37.5-40 GHz, and 42.5-43.5 GHz bands.

A. General Comments

Demand for Space-based Communications is Growing in the 37.5-40 GHz, 40-42.5 GHz, and 42.5-43.5 GHz Frequency Bands.

Space-based communication services are transforming due, in part, to NGSO systems like Project Kuiper. Amazon commends the Department of Telecommunications (**DOT**) and the TRAI for ensuring access to space-based communication services in the 37.5-40 GHz, 40.0-42.5 GHz, and 42.5-43.5 GHz

frequency bands. We also applaud the proposals to (i) reserve the 40.0-42.5 GHz band specifically for Customer Terminals (CTs) -- shared with satellite gateway earth stations -- and without any sharing with IMT, and (ii) seek input on appropriate protection criteria where IMT and satellite gateway links co-exist. These efforts recognize both the importance of (i) access to spectrum by FSS systems like Project Kuiper, and (ii) adopting policies to address effective sharing of the finite spectrum resource. Allowing a wide variety of satellite applications in these frequencies would help to meet evolving needs of space-based communications, and align with international initiatives. Access to large contiguous frequencies, such as these, would allow advanced satellite systems like Project Kuiper to assign capacity dynamically and in real time between customer stations and gateway stations in reaction to changing demands, enabling a better customer experience and benefiting customers. Moreover, at the 2023 World Radiocommunication Conference (**WRC-23**), Administrations agreed to study ESIM operations in these frequency bands to meet the growing demands for globally available broadband connectivity in the aeronautical and maritime sectors.¹

B. Specific Comments

Q5. Whether the spectrum in (a) 37-37.5 GHz, (b) 37.5-40 GHz, and (c) 42.5-43.5 GHz frequency ranges should be assigned for the existing licensed service areas (LSAs) for Access Service (i.e. Telecom Circles/ Metros), or it should be assigned for smaller service areas? In case you are of the opinion that the spectrum in these bands should be assigned for smaller service areas, please suggest the criteria for defining such service areas? Kindly provide your response with detailed justifications.

Amazon Response: We urge the TRAI to keep in mind the significant propagation losses for IMT at these frequencies while deciding the license area size. Additionally, license areas for IMT should connect with sufficiently high population densities that are able to put such large bandwidths to meaningful use. Recognizing these realities and adopting appropriately small license areas for IMT would ensure the successful shared use of these frequency bands with the FSS systems, and allow cooperation between IMT and satellite gateway earth stations in disparate geographies.

Q11. Whether there could be any challenges in sharing of 37.5-40 GHz and 42.5-43.5 GHz spectrum frequency ranges between IMT and Satellite Gateway links? If yes, what challenges do you foresee and what measures could be adopted to mitigate such challenges? Kindly justify your response.

Q12. In case it is decided to share (i) 37.5-40 GHz, and (ii) 42.5- 43.5 GHz spectrum frequency ranges between IMT and Satellite Gateway links, -

(i) Whether there is a need to prescribe a protection/keep off distance between IMT stations and Satellite Earth Station Gateways? If yes, what should be the protection distance?

(ii) What other parameters should be prescribed for the coexistence of IMT and Satellite Gateway links?

¹ See, Agenda Item 1.1: to consider the technical and operational conditions for the use of the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space), or parts thereof, by aeronautical and maritime earth stations in motion communicating with space stations in the fixed-satellite service and develop regulatory measures, as appropriate, to facilitate the use of the frequency bands 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space), or parts thereof, by aeronautical and maritime earth stations in motion communicating with geostationary space stations and non-geostationary space stations in the fixed-satellite service, in accordance with Resolution 176 (Rev. WRC-23).

Amazon Response to Q11 and Q12:

If the TRAI decides to share the 37.5-40 GHz and 42.5-43.5 GHz bands with terrestrial services, Amazon supports defining clear technical thresholds between terrestrial and space-based services. Namely, the TRAI has recommended that gateway station deployments be placed outside city limits,² with the understanding that the frequency bands in question will not be used by IMT outside city limits. Amazon supports this recommendation by the TRAI. Should the TRAI adopt this recommendation, frequency coordination among satellite and terrestrial service stations should not be necessary but could be adopted as a fallback mechanism between the concerned stations should the technical thresholds be exceeded.

In some jurisdictions, such as the United States, pfd thresholds are used to develop coordination contours around satellite earth stations to protect these stations from ground-path interference.³ Amazon supports the use of pfd thresholds as opposed to static protection/keep off distances. A static separation distance assumes one size fits all, while pfd thresholds allow satellite each earth station to obtain the protection necessary for its unique situation. Another good example for the TRAI to take into account is the threshold for fixed-wireless access (**FWA**) stations adopted by the Australia Communications and Media Authority (**ACMA**), where IMT base stations operate in accordance with the existing 3GPP standards for local area base stations and/or indoor use with set power levels not exceeding a TRP of 25 dBm/200 MHz and the IMT base station antenna beams must be pointed below the horizon plane.⁴

² See section 6.7, Recommendations on Auction of Spectrum in frequency bands identified for IMT/5G (11 April 2022), available at https://www.trai.gov.in/sites/default/files/Recommendations_11042022.pdf.

³ See 47 CFR §25.136, available at <https://www.ecfr.gov/current/title-47/section-25.136>.

⁴ See Table 15 in Appendix H, Licensing and coordination procedures for area-wide apparatus licensed services in the 26/28 GHz bands, available at <https://www.acma.gov.au/sites/default/files/2022-07/RALI%20MS46%20-%20July%202022.pdf>.