**Kuiper Services India Private Limited**

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**RE: Consultation Paper on Assignment of the Microwave Spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz Bands, E-Band, and V-Band**

Kuiper Systems LLC ("Kuiper"), a wholly owned subsidiary of Amazon.com Services LLC (together, "Amazon"), appreciates the opportunity to submit the following comments in response to the Telecom Regulatory Authority of India ("TRAI")'s consultation paper regarding *Assignment of the Microwave Spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz Bands, E-Band, and V-Band*. As the TRAI considers potential assignment of additional frequencies for terrestrial radio backhaul, Amazon urges the TRAI to consider and mitigate any impact that such additional assignment may have on fixed-satellite service ("FSS") operators. This is particularly true in the 18 GHz band and E-band frequencies, which will be critical to the ability of satellite operators like Amazon to provide reliable, affordable, and widely-accessible broadband service across India.

## I. Background

Amazon's Project Kuiper is an initiative to increase global broadband access through a constellation of NGSO FSS satellites in low Earth orbit ("Kuiper System"). It was designed with the goal of helping deliver high-speed, low-latency broadband connectivity to unserved and underserved communities around the world, including in India. Since committing to invest over 10 billion U.S. dollars in Project Kuiper, Amazon has made significant strides towards deployment of the Kuiper System, including successful satellite launches in April and June 2025,[1] as well as building out ground infrastructure and unveiling innovative customer terminals ("CTs") that will offer high performance in small form factors and at affordable price points.

Amazon plans to begin offering commercial broadband service in certain areas of the world this year and will expand coverage as it continues to deploy the Kuiper System. Project Kuiper will also provide backhaul solutions for terrestrial wireless carriers, as well as high-throughput mobility applications for aircraft, maritime vessels, and land vehicles.

[1] On April 28, 2025, Amazon successfully launched Project Kuiper's first set of 27 satellites. *See United Launch Alliance Successfully Launches Amazon's First Operational Satellites*, ULA Launch Alliance, LLC (April 28, 2025), https://newsroom.ulalaunch.com/releases/united-launch-alliance-successfully-launches-amazons-first-operational-satellites. Amazon successfully launched Project Kuiper's second set of 27 satellites on June 23, 2025. *See United Launch Alliance and Amazon Launch the Future of Global Connectivity*, ULA Launch Alliance, LLC (June 23, 2025), https://newsroom.ulalaunch.com/releases/united-launch-alliance-and-amazon-launch-the-future-of-global-connectivity.

## II. Comments

### A. *Question 1: What is the level of demand of the spectrum in the traditional microwave backhaul bands [viz. 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands] for radio backhaul purposes? Kindly provide a detailed response with justifications.*

Amazon's Kuiper System, like other modern NGSO satellite systems, relies on frequencies within the Ka-band, including the 17.7-19.7 GHz ("18 GHz") band for FSS operations. This spectrum supports communications with gateway stations, customer terminals, and telemetry, tracking and command stations.[2] The Ka-band offers distinct advantages over lower frequency bands like the Ku-band, including higher data throughput speeds. In addition, the Ka-band allows smaller antennas to be used on customer terminals, making equipment more compact, cost-effective, and easier to deploy.

As the TRAI evaluates the potential expansion of spectrum assignment for terrestrial use in the 18 GHz band, Amazon encourages it to take a cautious approach. This band—which has historically been "much less utilized" by terrestrial services to provide radio backhaul service in India[3]—is critical to the Kuiper System's ability deliver reliable, affordable, and widely-accessible wireless broadband access to Indian consumers. Indeed, as noted above, Amazon's Kuiper System is designed to rely on 18 GHz band to downlink information to receiving customer terminals.

Considering both the differing demand for, and co-primary designation of the 18 GHz band for FSS and FS use, Amazon encourages the TRAI to seek opportunities to facilitate the harmonious coexistence of terrestrial backhaul and satellite services. For example, the TRAI should consider first assigning any spectrum for radio backhaul services in spectrum bands like the 13, 15 & 21 GHz band, in light of the importance of the 18 GHz band to FSS operations.[4] And to the extent that additional assignments must be made for terrestrial radio backhaul in the 18 GHz band the TRAI should ensure that regardless of whether the TRAI ultimately relies on point-to-point, LSA, or circle wide licensing for backhaul deployments, information regarding such deployments—including basic parameters like EIRP, Power, Height (AGL), AMSL, etc.—is made publicly-available, in order to promote transparency around where potential sources of interference may be

[2] Specifically, within the Ka-band, Amazon currently intends to rely on 17.7 GHz – 18.6 GHz and 18.8 GHz – 20.2 GHz in the space-to-Earth direction, and 27.5 GHz – 30 GHz in the Earth-to-space direction. In the future, Amazon also intends to rely on 17.3 – 17.7 GHz in the space-to-Earth direction. With respect to these frequencies, which have already been assigned for FSS use on a primary basis in ITU Regions 1 and 2, Amazon encourages the TRAI to also support the primary allocation of 17.3 – 17.7 GHz to FSS (space-to-Earth) in Region 3. Such a potential action is the subject of WRC-27 Agenda Item 1.4.

[3] *See* TRAI Consultation Paper, §2.17 ("Amongst all MWA bands, the 15 GHz band is the most utilized band. In the 13 GHz band, generally three to four carriers out of eight carriers have been assigned to access service providers. The 18 GHz band, in which there are a total of 32 carriers, is a much less utilized band. The 21 GHz band, in which there are a total of 40 carriers, is the least utilized MWA band.")

[4] Indeed, under the Indian National Frequency Allocation Table, there is no allocation for FSS in the 21 GHz frequency band.

located. This will in turn help to facilitate coordination requirements (if any) and interference mitigation between FS and FSS operators.

B. ***Question 34: Any other suggestions relevant to the assignment of the spectrum in E-band (71-76/ 81-86 GHz) and V-band (57-64/ 66 GHz) may kindly be made with detailed justifications.***

As the Kuiper System evolves, Amazon plans to rely on additional spectrum assignments in other high frequency bands, including the E-band, to ensure that it is able to meet expected increases in capacity demand over time.[5] Amazon anticipates using E-band frequencies to increase the capacity of NGSO FSS system gateway links, which will improve service quality for domestic and global customers alike. Particularly as other frequency bands become congested, E-band frequencies will be important expansion bands for NGSO systems like Kuiper.

Given that E-band frequencies are important to the continued development of NGSO systems like the Kuiper System, Amazon also recommends that TRAI cautiously approach use of these bands for terrestrial backhaul service and preserves them for NGSO based FSS. As with the 18 GHz band, to the extent the TRAI expands radio backhaul assignments in the E-band frequencies, it should consider solutions that promote transparency, like requiring that basic parameters including EIRP, Power, Height (AGL), AMSL, etc., are made publicly-available. As noted above, such solutions can help identify where potential sources of interference may be located, and facilitate any required coordination and interference mitigation between fixed service FS and FSS operations.

## III. Conclusion

Amazon expresses its gratitude to the TRAI for the opportunity to provide comments in response to this consultation, and welcomes further dialogue with the TRAI on these important issues.

Respectfully submitted,
***/s/Faheem Shaikh***

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*On behalf of Amazon Kuiper Services India Private Limited*

[5] For example, Amazon intends to rely on 71.0 – 76.0 GHz in the space-to-Earth direction, and 81.0 – 86.0 in the Earth-to-space direction.