



By email: [28GHz@ofcom.org.uk](mailto:28GHz@ofcom.org.uk)

September 17, 2024

Dear 28 GHz project team,

Kuiper Systems LLC<sup>1</sup> (“Amazon”) submits the following responses to the questions outlined in your August 20, 2024 letter seeking additional information on stakeholders’ current and planned use of land-based user terminals (or “customer terminals”) in the Ka band (27.5-30 GHz). For Ofcom’s convenience, Amazon includes Ofcom’s original questions below together with Amazon’s responses, omitting those questions not applicable to Amazon.

**2. For future satellite services you are planning to deploy in the next 5-10 years:**

***a. Are you planning to deploy user terminals in the Ka band?***

Yes, Amazon plans to deploy customer terminals in most of the 28.35-30 GHz frequencies. Table 1, below, lists the specific frequencies that Amazon intends to use for its customer terminals.

***b. If yes, what use case(s) will these terminals be used for?***

Amazon’s customer terminals will allow customers to connect to Amazon’s planned constellation of satellites operating in non-geostationary satellite orbit (“NGSO”), which will provide high-speed and reliable broadband service to individual, government, and business customers (“the Kuiper System”). Communicating with the Kuiper System, Amazon’s customer terminals will serve a variety of customers—including residential customers, schools and small businesses, telecommunications operators, global enterprises, and government users, among others. Moreover, Amazon’s customer terminals will enable connectivity for a wide range of use cases, including by supplying continuity/redundancy services for customers in the event of an emergency or natural disaster. Where authorized, Amazon also plans to use its customer terminals to provide resilient mobile connectivity for aeronautical, maritime, and land use cases. Mobile satellite terminals, or “ESIMs,” hold tremendous promise in opening new mobility use cases by enabling the provision of very high data rate broadband communications, navigation, situational awareness, and other services to mobile platforms that often cannot be served with existing communications technologies.

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<sup>1</sup> Kuiper Systems LLC is a wholly owned subsidiary of Amazon.com Services LLC.



**c. What is/are specific frequency range(s) that the land-based user terminals will use (uplink and downlink) to connect to your satellites?**

Table 1 provides the specific spectrum bands that Amazon’s first-generation customer terminals will be capable of using, subject to any jurisdiction-specific limitations that prevent the use of certain frequencies in a given country.

**Table 1: Customer Terminal Frequencies**

Link Type	Frequencies (GHz)
Broadband Uplink (Earth-to-space)	28.35-28.6
	28.6-29.1
	29.5-30.0
Broadband Downlink (space-to-Earth)	17.7-18.6
	18.8-19.4
	19.7-20.2

**d. When are you planning to make these services commercially available in the UK?**

Amazon plans to make services commercially available in the UK in 2025.

**3. For current and future satellite services: What are your preferred channel sizes for Ka band land-based user terminals? Do you have flexibility to use different channel sizes? If so, please provide details.**

The Kuiper System is flexible and will dynamically assign channel sizes for use by the customer terminals. The range of channel sizes is 10–200 MHz in the Earth-to-space direction and 20–500 MHz in the space-to-Earth direction.

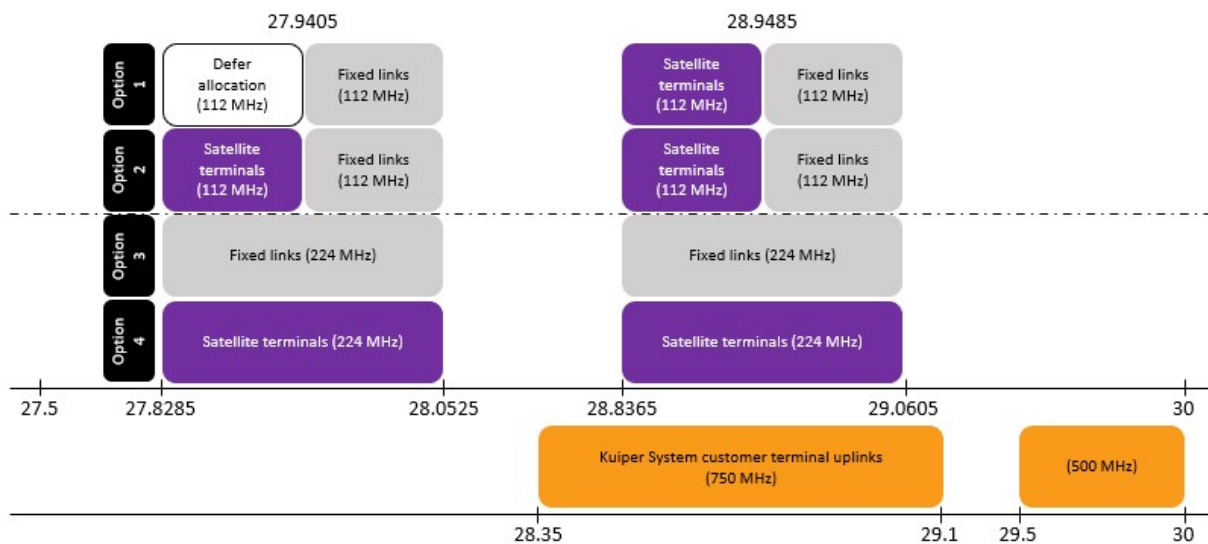
**4. Responses to our March consultation "increasing use of 27.5-30GHz" suggest that there is demand for land-based user terminals in the UK to access 2 x 224 MHz (27.8285 – 28.0525 GHz and 28.8365 – 29.0605 GHz) rather than 1 x 112 MHz (28.8365 – 28.9485 GHz). Do you have any information on how the availability of 2 x 224 MHz for land-based user terminals would impact the number of consumers and customers you could connect, product speed, or the quality of service you could provide via these land terminals (compared to just having 1 x 112 MHz available)?**

As Figure 1 demonstrates below, adopting the Option 4 proposal (providing 2 x 224 MHz for land-based customer terminals) would offer the greatest amount of available spectrum for customer terminals communicating with the Kuiper System. This option offers twice the additional spectrum with the current design of Amazon’s customer terminals, while affording an additional 224 MHz of spectrum with which to deploy even higher performance next-generation terminals.



As explained above in response to Question 2.c, the current design of Amazon’s customer terminals will use 28.5-29.1 GHz as principal (meaning initial service deployment) customer uplinks. In other words, Amazon will be able to immediately use this spectrum to deliver service to customers upon commencing service in the UK. While Amazon’s first-generation terminals will not be capable of using spectrum in the 27.8285-28.0525 GHz frequencies, Amazon would nevertheless be able to use this spectrum to deliver improved service to customers in the UK with its next generation of customer terminals.

**Figure 1: Impact of Expanded Spectrum Availability on Amazon’s Customer Terminal Uplinks**



Both immediately and in the longer-term, this additional spectrum creates flexibility for how Kuiper manages its system and delivers service to customers within the UK. For Amazon’s customers, this would translate to a materially improved service in several ways: *First*, it would allow Amazon to provide higher quality service to individual customers. With more capacity, each customer can experience higher throughputs, which provides a better customer experience across a wider set of applications. *Second*, additional spectrum would allow Amazon to serve more customers. In some areas, limited spectrum availability will require Amazon to limit the number of customers its serves to preserve the speed and reliability of its service. Additional spectrum, therefore, would allow Amazon to deliver service to customers that it might otherwise be unable to serve because of capacity constraints. *Third*, expanded spectrum availability for customer terminal uplinks would expand the areas to which Amazon could deliver service. In particular, additional spectrum would ease capacity constraints in higher-density areas, where a larger number of customers communicating with a limited number of satellites in view might otherwise degrade service quality. *Finally*, additional spectrum would lower the costs for Amazon’s customers—by both lowering the costs of Amazon’s system design and allowing



Amazon to recover those costs over a larger group of customers. For these reasons, we respectfully urge Ofcom to allocate the entire 2 x 224 MHz of spectrum for satellite land-based terminals on a primary basis so that the above-mentioned benefits to customers can be realized.

Respectfully submitted,

/s/ Kalpak Gude

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