

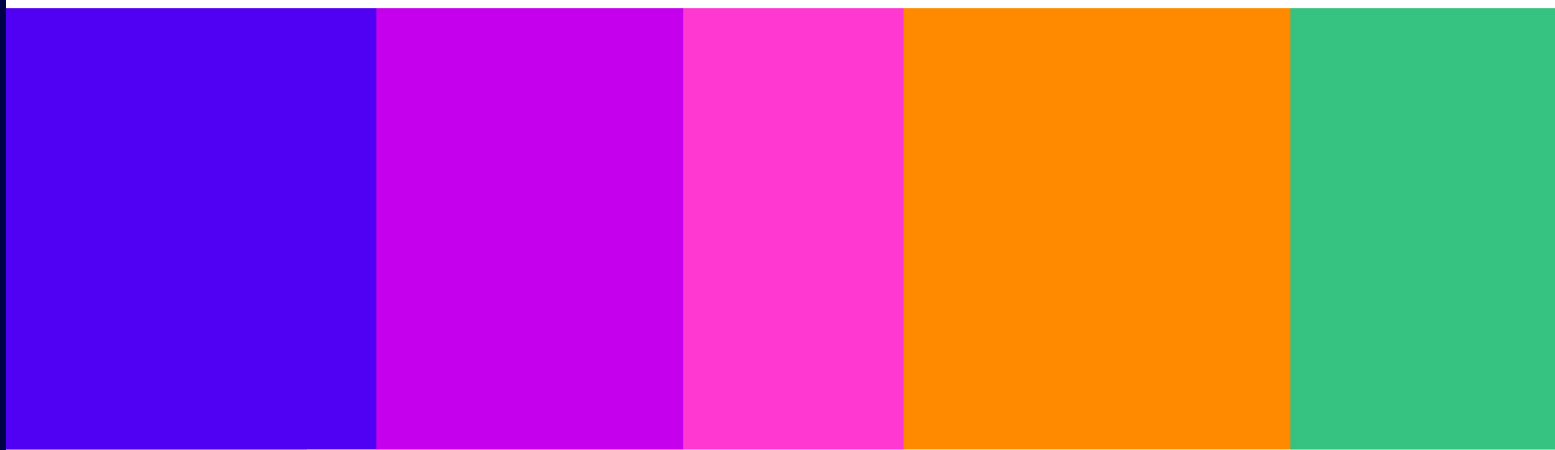
# **Amazon Kuiper Services Europe SARL application for a non- geostationary earth station network licence**

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Decision

**Statement**

Published: 3 February 2025



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# 1. Overview

- 1.1 This document sets out our decision on an application by Amazon Kuiper Services Europe SARL (referred to in this document as ‘Kuiper’) for a UK wireless telegraphy satellite earth station network licence (an NGSO network licence). This licence would enable Kuiper to offer satellite connectivity services in the UK by authorising it to operate user terminals in the Ka band, such as a customer’s satellite dish, which would link to its planned non-geostationary orbit (NGSO) satellite system (also known as Kuiper).
- 1.2 NGSO systems are a way of delivering broadband services from space using a constellation of satellites, usually in a low or medium orbit. They have the potential to deliver high speed and low latency services to consumers, governments, and businesses in the UK.
- 1.3 Our [initial assessment of Kuiper’s NGSO licence application](#) in our September 2024 consultation proposed that we grant Kuiper an NGSO network licence. We have now assessed stakeholder responses regarding Kuiper’s ability to coexist with other current and future NGSO licensees, as well as with other spectrum services, and considered the competition issues raised by stakeholders in their submissions.

## What we have decided – in brief

### **We have decided to grant an NGSO network licence to Kuiper.**

This decision will enable Kuiper to provide satellite connectivity services such as high speed, low latency broadband to a wide range of customers, and backhaul to businesses, using Ka band frequencies between 27.5-27.9405 GHz, 28.4545-28.9485 GHz, and 29.5-30 GHz. On coexistence, we consider that the Kuiper NGSO system is capable of coexisting with both existing NGSO licensees and future NGSO systems operating in the Ka band. Kuiper has provided evidence that coordination discussions with other NGSO licensees have commenced, and we encourage all parties to engage in these discussions and progress plans to cooperate ahead of the proposed launch of this service in 2025.

We also consider that Kuiper’s NGSO system is capable of coexisting with other services, including fixed links and geostationary orbit (GSO) satellite systems.

In addition, we assess that granting the licence will not create a material risk to competition, and that the proposed services would benefit UK consumers, customers, and citizens.

We will now proceed to issue Kuiper with an NGSO network licence to operate in Ka band frequencies 27.5-27.9405 GHz, 28.4545-28.9485 GHz, and 29.5-30 GHz, subject to payment of the licence fee. A copy of the licence will also be available under the “Existing licences” section of our [NGSO licensing webpage](#).

The overview section in this document is a simplified high-level summary only. Our decision and reasoning are set out in the full document.

## 2. Introduction and background

- 2.1 Our NGSO licensing process for considering applications for NGSO spectrum licences aims to enable citizen and consumer benefits such as improved connectivity. It was designed to encourage greater cooperation between NGSO licensees, enhance our ability to intervene if harmful interference arises, safeguard competition, and ensure greater transparency through a short consultation process. Our approach to NGSO licensing is set out in our [2021 statement on licensing NGSO satellite systems](#) (the 2021 NGSO statement), and in our [guidance for NGSO applicants on the licensing process](#).
- 2.2 Our NGSO licensing process covers two types of NGSO licences:
- *Satellite (earth station network) licence* – for NGSO use: authorises an unlimited number of user terminals, for example a satellite dish, to connect to the NGSO satellite system (the NGSO network licence).
  - *Satellite (non-geostationary earth station) licence*: authorises gateway earth stations connecting the NGSO satellite system to the internet or a private network (the NGSO gateway licence).
- 2.3 This decision document relates to the first of these licences: an **NGSO network licence**.
- 2.4 The NGSO network licence covers the use of all user terminals for a range of different services in the UK: fixed or static terminals (for home broadband services); land mobile (on trains or roads); or on aircraft and drones in UK airspace; and offshore platforms and ships in UK waters.<sup>1 2</sup> It permits uplinks from UK user terminals to NGSO satellites. We require an NGSO network licensee to have control of the whole satellite network, so it is typically held by the satellite operator. It also places other conditions on licensees (under condition 8 “Additional conditions for operation with non-geostationary satellites”), including to coordinate with other NGSO licensees to prevent harmful interference. All NGSO network licences are listed in the “Existing licences” section of our [NGSO licensing webpage](#).

### Kuiper’s NGSO licence application

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- 2.5 We received an [application from Amazon Kuiper Services Europe SARL](#) (an affiliate of Kuiper Systems LLC) on 12 July 2024 for an NGSO network licence to operate user terminals (including maritime, aeronautical and land-mobile) that will connect to its NGSO constellation, also known as ‘Kuiper’. It intends to use the Ka band frequencies 27.5-27.9405 GHz, 28.4545-28.9485 GHz, and 29.5-30 GHz. Note that following our [statement “Enabling access to 28GHz”](#) also published on 3 February 2025, additional Ka band frequencies for land terminals are now available in the UK (i.e. 27.8185-27.9405 GHz and 28.8265-28.9485 GHz) and will be added to new NGSO network licences from this date.

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<sup>1</sup> Use of the NGSO network licence also extends to the airspace and territorial seas of the Crown Dependencies (i.e. the Channel Islands and Isle of Man), as explained in paragraph 1.15 of the [NGSO licensing guidance](#) and condition 2.1 of the NGSO network licence.

<sup>2</sup> Some services also require an additional authorisation, and the relevant information can be found on our website as follows: [aircraft and drones](#), [offshore platforms](#), and [ships](#).

- 2.6 Kuiper is proposing to provide high speed, low latency broadband services to a variety of retail and wholesale customers in the UK<sup>3</sup> including households, government (schools, hospitals and offices), first responders and disaster relief operators, and other businesses. It also intends to provide backhaul connectivity to telecommunications carriers.
- 2.7 Kuiper’s planned NGSO constellation will consist of 3232 satellites operating at varying altitudes and orbital planes, as summarised in annex 1 to its NGSO licence application. Its NGSO system will use either electronically steered phased array antennas or mechanically steered parabolic antennas. Kuiper has not applied for any NGSO gateway licences in the UK at the time of writing. Further information about Kuiper’s NGSO constellation can be found in its [application on our website](#) (reference: KUIPER-NET-1).

## Consultation and summary of responses

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- 2.8 Taking account of the evidence presented by Kuiper, we published a [consultation](#) on 5 September 2024 setting out our preliminary view to grant Kuiper an NGSO network licence, and invited comments on Kuiper’s NGSO licence application and our views (“the Kuiper consultation”). We noted we were open to changing those views depending on responses and evidence submitted to us as part of the consultation process. The Kuiper consultation closed on 18 October 2024.
- 2.9 We received six responses to this consultation. The four non-confidential responses<sup>4</sup> are now published alongside Kuiper’s application and consultation on our [website](#); two responses were fully confidential. Confidential respondents have agreed to us referencing the contents of their responses as summarised in this statement. We have established through our routine industry engagement that other NGSO licensees and key stakeholders did not wish to raise particular issues over this application.
- 2.10 In response to issues raised by some respondents, we requested additional information from Kuiper (“the Kuiper letter”) to clarify the technical analysis and assumptions in its studies and its ability to coexist with GSO networks in Ka band. Kuiper’s response to our request for further information is now also published on our [website](#). We have taken Kuiper’s reply into account in reaching our decision.
- 2.11 We have carefully considered all relevant consultation responses in finalising our decision on Kuiper’s NGSO licence application. This document summarises the main points made by stakeholders in their submissions and our assessment of those points, under headings prompted by the seven questions we asked in the consultation. We have collated answers under the most appropriate heading; in some cases this means respondent’s comments are addressed under different questions to those they used.

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<sup>3</sup> Kuiper states the coverage limit of its first-generation NGSO system is 56 degrees latitude north (which we note crosses Scotland at Falkirk and the Firth of Forth), and that it plans to cover latitudes above 56 degrees in future generations of its NGSO system.

<sup>4</sup> From Eutelsat Group (Eutelsat), Methera Global Communications Limited (Methera), Rivada Space Networks GmbH (Rivada) and Viasat. We note Rivada’s response was partially confidential.

## Structure of this document

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2.12 The rest of this document is structured as follows:

- Section 3 assesses respondents' views on the capability of Kuiper's NGSO system to coexist with other (current and future) NGSO systems.
- Section 4 assesses respondents' views on the capability of Kuiper's NGSO system to coexist with other services (fixed links, radio astronomy and GSO networks).
- Section 5 assesses stakeholders' responses on the potential competition risks and benefits arising from Kuiper's NGSO licence application.
- Section 6 covers any other comments provided on the Kuiper consultation, as well as responses regarding our equality and Welsh language impact assessments.
- Section 7 summarises our decision and next steps.
- Annex 1 sets out our impact assessments, including on equality and the Welsh language.

# 3. Assessing the impact on NGSO coexistence

## Coexistence with existing NGSO systems

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- 3.1 Our [2022 Space Spectrum Strategy](#) sets out our aspiration to enable as many NGSO systems as possible, to provide services and increase choice for people and businesses in the UK. NGSO systems are dynamic by nature, creating a complex spectrum management environment, both in space and on the ground. We recognise the importance of ensuring that different NGSO systems are able to operate alongside each other without increasing the risk of harmful interference, and this is one of the aims of our NGSO licensing process.
- 3.2 The International Telecommunication Union (ITU) Radio Regulations mandate that NGSO satellite operators establish coordination agreements to prevent harmful interference. An order of precedence is assigned to satellite systems or networks based on its satellite filing submission date, and operators must seek an agreement with operators of earlier filed systems and networks. Ultimately, the notifying administration responsible for the satellite filing is responsible for ensuring that operators comply with these ITU obligations.

## Coexistence with existing NGSO systems

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- 3.3 When applying for an NGSO network licence, we ask applicants to demonstrate how coexistence is possible between their NGSO system and other NGSO systems or gateways already licensed (as well as any NGSO licence applicants' systems or gateways) that are operating in the same frequency bands in the UK. Applicants should also show how they are able to coexist with other specific co-frequency earth stations registered with the ITU<sup>5</sup>.
- 3.4 As explained in paragraph 2.9 of our [NGSO licensing guidance](#), we do not require applicants to have reached a coordination agreement as set out by the ITU, but in order to minimise the risk of harmful interference to services in the UK we do request evidence of:
- proactive engagement with other co-frequency NGSO network and gateway licensees (in accordance with licence condition 8.2); and
  - a willingness to reach coordination agreements (with an onus on licensees to ensure that their discussions and agreements comply with UK competition law), that:
    - > ideally result in an ITU coordination agreement;
    - > otherwise, a UK-based coordination agreement.
- 3.5 In summary, where coordination agreements are not reached, we request evidence (as we monitor the progress of discussions) that applicants have a plan, putting reasonable measures in place and demonstrating how it would be possible for their different systems to coexist with others' systems.

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<sup>5</sup> These are listed at the bottom of our [NGSO licensing webpage](#).

- 3.6 An NGSO network licence should be held by someone who has control over the whole satellite network (including associated user terminals and gateway earth stations), as explained in our [NGSO licensing guidance](#). This is so that licensees are able to comply with the conditions in their licence, including the ability to act upon and mitigate against any interferer transmissions at any time. Kuiper has confirmed that it will operate and control the Kuiper NGSO system.
- 3.7 In the Kuiper consultation, we set out the four existing NGSO network licensees in the UK who also plan to operate terminals using frequencies in the Ka band: these are Rivada, Mangata Edge Ltd, Telesat LEO Inc (Telesat), and NSLComm Ltd.<sup>6</sup>
- 3.8 Kuiper stated in its application that it has completed ITU coordination with the Telesat Lightspeed™ NGSO system.<sup>7</sup> In addition, Kuiper confirmed that it will operate its NGSO system in accordance with agreed coordination terms to protect co-frequency earth stations registered with the ITU under provisions No. 9.7A and No. 9.7B of the ITU Radio Regulations.
- 3.9 Although coordination agreements have been initiated, they have not yet been completed with other UK NGSO licensees in the Ka band. Kuiper therefore provided technical coexistence analysis as part of its NGSO licence application to demonstrate coexistence will be possible in realistic operational scenarios. Based on its analysis, Kuiper considered that its NGSO system (including its user terminals) would have a minimal impact on other NGSO licensees operating in the Ka band. Kuiper’s full analysis can be found in annex 1 of Kuiper’s NGSO licence application (see appendix A).
- 3.10 In addition to the four Ka band NGSO systems, there are seven existing NGSO gateway earth stations which all connect to the Starlink NGSO constellation, each individually licensed to operate in the Ka band in the UK. These are:
- five licences are held by Starlink (for Morn Hill, Fawley, Wherstead, Woodwalton, and the Isle of Man);
  - one licence is held by Arqiva Ltd (for Chalfont); and
  - one licence is held by Goonhilly Earth Station Limited (for Goonhilly).
- 3.11 Note, NGSO gateways are permitted to operate across a wider range of frequencies than user terminals in the UK. For the purposes of assessing whether Kuiper’s NGSO system can coexist with NGSO gateways, in this statement we have only considered the frequencies shared by both gateways and user terminals.
- 3.12 In the Kuiper consultation our preliminary view was that Kuiper’s NGSO system should be capable of coexisting with existing NGSO licensees. This is because under the conservative assumptions adopted by Kuiper in its coexistence analysis (i.e. assumptions that may overestimate to some extent the potential to cause interference), its NGSO system was shown to have a minimal impact on NGSO network and NGSO gateway licensees in the UK.

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<sup>6</sup> We have also authorised two NGSO network licensees to operate terminals using Ku band frequencies (14-14.5 GHz) in the UK. These are: Starlink Internet Services Limited, a subsidiary of SpaceX (Starlink), and Network Access Associates Ltd, trading as Eutelsat OneWeb and a subsidiary of Eutelsat Group. We are currently considering Kepler Communications Inc’s NGSO network licence application to use the Ku band.

<sup>7</sup> Kuiper also stated it has reached an ITU coordination agreement with Space Norway, though Space Norway is not currently an NGSO licensee in the UK.



We also welcomed Kuiper’s progress with coordination agreements. However, we reiterated that all parties should continue coordinating in good faith before the launch of Kuiper’s NGSO constellation, noting that our licence conditions require licensees to cooperate with each other so they can coexist. We asked stakeholders the following question:

**Consultation question 1**

Do you anticipate this NGSO system will pose coexistence challenges to existing NGSO systems?

## Consultation responses

- 3.13 We received three non-confidential responses from Methera, Eutelsat and Viasat, and two confidential responses to question 1.
- 3.14 One of the confidential respondents raised no objections to Kuiper’s NGSO licence application, stating that although there may be some differences between parameters in Kuiper’s satellite filings and those used in coordination discussions, it is satisfied these issues can be resolved during such discussions. The other confidential respondent remained uncertain of the coexistence challenges posed by Kuiper’s NGSO system given Kuiper’s analysis was based on limited scenarios, and considered that some mitigations might be necessary, which it expects to assess during future coordination discussions.
- 3.15 Four respondents raised issues which we discuss below under the following headings:
- limitations of Kuiper’s technical assumptions and methodology; and
  - Kuiper’s technical analysis not examining the worst case scenario.

### Limitations of Kuiper’s technical assumptions and methodology

- 3.16 **Orbital assumptions not aligned to satellite filing data**– One confidential respondent raised concerns about the orbital assumptions used in Kuiper’s NGSO licence application (e.g. relating to the number of satellites, orbital planes, and altitude) being inconsistent with the three satellite filings linked to the Kuiper NGSO constellation. It believed incorrect assumptions would affect Kuiper’s coexistence assessment which could pose a serious challenge to other NGSO systems.
- 3.17 **Incomplete system configuration modelled** – One confidential respondent queried why Kuiper’s analysis was based on its system’s current configurations, not its second generation system (which has a wider coverage footprint, beyond 56 degrees north). It expected Kuiper to have assessed the impact of its future NGSO system, and also acknowledged the role of coordination discussions in managing mitigations.
- 3.18 **Flaws in methodology** - Viasat raised concerns with Kuiper using the “increase in availability metric” and “average throughput degradation methodology” in its analysis. Viasat stated that this methodology<sup>8</sup> is a partially implemented solution for the 37.5-51.4 GHz frequencies and had not been considered for the Ka band. Viasat also claimed that using average throughput degradation masks the impact of interference from NGSO systems.

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<sup>8</sup> Which Viasat noted is based on the framework set out in No. 22.5L, 22.5M, of Resolution 770 (Rev. WRC-23) and Resolution 769 (Rev. WRC-19). WRC refers to the World Radio Conference held in the year stated.

3.19 Additionally, Viasat identified significantly “higher than average” throughput degradation in the difference between C/N and C/(N+I)<sup>9</sup> distribution plots, in the time-weighted average methodology Kuiper used in its analysis. Viasat noted this has the potential to cause coexistence issues between NGSO systems, and that Resolution 769 (WRC-19) has invited further study of C/N/I parameters.

### Kuiper’s technical studies not examining the worst case scenario

3.20 **Assessing co-located terminals** - Viasat considered that user terminals from multiple NGSO systems are likely to be co-located in high demand areas without any material distance between them, and that failing to assess this means that Kuiper’s analysis underestimates the potential for interference.

3.21 Eutelsat flagged that Kuiper’s analysis (based on a single Kuiper terminal co-located with the victim earth station) did not address aggregate interference involving multiple Kuiper terminals. Further, Eutelsat considered that given the 3232 satellites in Kuiper’s NGSO constellation, using  $N_{co}=1$ <sup>10</sup> appeared to underutilise Kuiper resources, does not reflect the complexity of Ka band coexistence, and is not aligned to the large scale service deployment described in Kuiper’s NGSO licence application.

3.22 **Adopting more favourable assumptions** – Viasat disagreed that Kuiper’s analysis showed the worst case believing that the majority of Kuiper’s assumptions lead it to underestimate the potential for interference. It identified four other concerns:

- *Selection of satellites* – Viasat did not consider Kuiper’s coexistence analysis (which randomly selects satellites from the pool of eligible satellites) was representative because in operation, satellite selection would take account of many factors, including traffic demands and regulatory requirements. Viasat added that modelling both the interfering and victim NGSO systems with random satellite selection underestimates the expected interference, and invited Ofcom to consider measures that implement sharing of spectrum between NGSO systems (e.g. based on angular separation and the avoidance of inline events).
- *Rain attenuation* – Kuiper’s analysis showed no information on how rain attenuation was considered on the wanted and interfering NGSO system links<sup>11</sup>. Viasat considered that, if Kuiper used fully correlated rain attenuation in both links, then this would not be operationally representative. It stated this can have a material influence on the increase in unavailability of the NGSO system link, thereby underestimating expected interference.
- *Terminal peak gain* – Kuiper has not used the smallest planned customer terminal, with widest beamwidth and associated EIRP density from its NGSO system, in its analysis.

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<sup>9</sup>C, N and I parameters refer to carrier, noise and interference powers. C/(N+I) and C/N ratios are used to evaluate the quality of a signal with and without interference, respectively.

<sup>10</sup> In this context,  $N_{co}$  refers to the maximum number of satellites transmitting co-frequency and simultaneously (see C2.3.1 of ITU-R S.1503). A value of  $N_{co}=1$  assumes that only one satellite is transmitting at any one time at a given location, but a higher value (i.e.  $N_{co}>1$ ) could increase harmful interference into other operators’ systems.

<sup>11</sup> In this context, a wanted NGSO system link refers to an existing licensee’s NGSO communication link and an interfering NGSO system link refers to Kuiper’s NGSO communication link.

- *Satellite antenna radiation pattern* – Viasat considered that it is important to assess the impact of Kuiper’s satellite antenna radiation pattern<sup>12</sup> for co-located analysis of the downlink scenario, and queried Kuiper’s NGSO licence application statement that it was “not applicable”. At a minimum, Viasat requested that Kuiper assess sidelobe emissions<sup>13</sup> from all Kuiper satellites within the main beam, saying that they are a main driver in the increase of unavailability.

## Our assessment

- 3.23 Our NGSO licensing process seeks to confirm whether an applicant shows it is capable of coexisting with other NGSO licensees. Technical analysis is one element of this assessment and is provided to demonstrate this capability, rather than the precise expected impact on any specific NGSO system.
- 3.24 In our decision-making, we consider the technical analysis alongside other measures taken by an applicant to reduce its risk of harmful interference, such as coordination discussions with other NGSO systems. We note Kuiper’s existing coordination agreement with Telesat and that it continues to progress its coordination discussions with other satellite operators. We are therefore assured that Kuiper is taking reasonable measures to reduce its risk of harmful interference.
- 3.25 Further, we note the responsibility for ensuring that satellite operators comply with their ITU obligations, including managing coexistence between satellite filings, and shared use of space resources, ultimately rests with the notifying administration responsible for the NGSO system (see paragraphs 3.2 and 4.15 for an overview of the relevant elements of the ITU regulatory framework). For Kuiper’s NGSO system the notifying administration is the FCC (Federal Communications Commission).
- 3.26 As set out in paragraph 2.10, in view of the stakeholder responses to the Kuiper consultation we requested additional information from Kuiper to clarify the technical analysis and assumptions in its coexistence studies. We have considered stakeholder responses on Kuiper’s capability to technically coexist with other NGSO systems and Kuiper’s reply as discussed in relevant paragraphs below.

## Limitations in the technical assumptions and methodology

- 3.27 **Orbital assumptions not aligned to satellite filing data** – In the Kuiper letter, we asked Kuiper to clarify the information in table A-1 of the Kuiper application and how it relates to each of Kuiper’s satellite filings in order to explain any inconsistencies. For example, breaking down each orbital plane and its corresponding technical characteristics.

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<sup>12</sup> Satellite antenna radiation pattern is a graphical representation of the relative field strength transmitted from the satellite.

<sup>13</sup> Sidelobe emissions are emissions radiated in directions other than the main boresight of the antenna.

- 3.28 In its response, Kuiper confirmed that the three satellite filings associated with its NGSO constellation are: USASAT-NGSO-8A, USASAT-NGSO-8B, USASAT-NGSO-8C, which it refers to in its additional information as sub-constellations 1, 2, and 3 respectively.<sup>14</sup> To clarify the orbital parameters in its application, Kuiper also provided an updated breakdown for each sub-constellation including orbital planes, satellites per plane, inclination angle, and altitudes. As a result of Kuiper's updated table, we are satisfied that the orbital assumptions it has used in its coexistence analysis are consistent with its satellite filings, and therefore our view on Kuiper's coexistence analysis remains unchanged.
- 3.29 **Incomplete system configuration modelled** - The analysis submitted by Kuiper was based on its system's current configurations, not its second generation system (which is expected to extend its coverage footprint). We understand that licensees' NGSO systems will develop over time and expect Kuiper to apply its mitigation techniques to ensure its NGSO system continues to be capable of coexisting with other NGSO systems as Kuiper's own constellation develops. To maintain coexistence, we also expect NGSO network licensees to inform us and other licensees of planned changes to their NGSO constellation, so that appropriate mitigations can be put in place where changes occur, as noted in paragraph 4.9 of our [NGSO licensing guidance](#).
- 3.30 **Flaws in methodology** - The two metrics Kuiper used in its analysis are examples provided in our NGSO licensing guidance. We expect applicants to determine how to best illustrate the impact of their NGSO system on other NGSO licensees; in its application Kuiper provided evidence comparing the unavailability and throughput for each NGSO licensee before and after mitigation measures had been put in place.<sup>15</sup> We note Viasat's concerns with this methodology but consider these metrics to be a reasonable proxy for demonstrating coexistence with others. This is because they have been widely used by the space sector in various spectrum bands as suitable for evaluating interference impact, including in international studies and recommendations by the ITU. We therefore remain satisfied that the evidence Kuiper have provided is sufficient to demonstrate the impact of its system on other existing NGSO licensees.
- 3.31 Regarding Kuiper's selection and use of C/N objectives, we are aware that Viasat has also raised these concerns in its [contribution document](#) to the ITU's WP4A<sup>16</sup>. As Viasat stated, this issue is subject to further study and discussion at future international meetings. In light of this, we do not consider it appropriate to determine a UK specific view before those discussions conclude and will consider the application of future international decisions to our NGSO licensing process as appropriate. Nevertheless, we are satisfied Kuiper has shown in its analysis that the throughput degradation between C/N and C/N+I would have a minimal impact for existing NGSO network licensees.

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<sup>14</sup> Kuiper also has a fourth satellite filing ATOZSAT (Kuiper's prototypes, referred to in its additional information as sub-constellation 4), which it stated will be deorbited and no longer in use by the start of service launch. It also states that this filing contains only two satellites which has no material impact on its coexistence study.

<sup>15</sup> Kuiper's coexistence analysis provided a comparison of the unavailability and throughput. Examples of the use of the unavailability and throughput metrics can be found among others in Recommendation ITU-R S.1323, and in Resolution 770 in the ITU's Radio Regulations.

<sup>16</sup> Working Party 4A of the ITU studies orbit/spectrum efficiency, interference and coordination, and related aspects for fixed satellite service (FSS) and broadcasting-satellite service (BSS). Its outputs have significant relevance to preparatory work on satellite services for WRC.

## Kuiper's technical studies not examining the worst case scenario

- 3.32 **Assessing co-located terminals** – On the need for Kuiper to consider multiple interfering or co-located links in its analysis, it is typical for applicants to submit analysis considering only one interferer to demonstrate their ability to coexist. However, we do expect such analysis to be based on conservative assumptions, to show that the applicant's NGSO system has a low likelihood of causing harmful interference to other NGSO systems. We consider that detailed system-specific coexistence analysis, including multiple co-located terminals in high demand areas or multiple interfering links, is best carried out as part of the coordination discussions all NGSO operators are expected to engage in with each other through the ITU process. Our NGSO licensing process is not seeking to replicate this ITU process, and we consider that remains the appropriate place to address such concerns.
- 3.33 Regarding Eutelsat's wider concern that the complexity of coexistence may be underestimated in Kuiper's analysis by using  $N_{co} = 1$  given the size of Kuiper's constellation, we understand this parameter aligns with the  $N_{co}$  in Kuiper's satellite filings. It is also typical for applicant's studies to use an  $N_{co}$  of one to demonstrate their ability to coexist. We therefore remain satisfied that it remains sufficient for the purposes of our NGSO licensing process. Further, we note that larger NGSO systems such as Kuiper's do not necessarily increase the risk of interference or in-line events; it could also mean a greater choice of satellites to connect to, making coexistence more, rather than less likely. We therefore remain satisfied that Kuiper's analysis shows it is capable of coexisting with other NGSO licensees in the UK.
- 3.34 **Adopting more favourable assumptions**
- *Selection of satellites and rain attenuation* – We are aware that Viasat has also raised concerns on both of these issues in ITU WP4A, and they remain under discussion at future international meetings. As noted above, we do not consider it appropriate to determine a UK specific view in advance of those discussions concluding but will consider the application of future international decisions to our NGSO licensing process as appropriate. Nevertheless, we are satisfied Kuiper has shown in its analysis that the impact of its NGSO system on other NGSO licensees would be minimal.
  - *Terminal peak gain* – To address Viasat's concern, in the Kuiper letter we asked Kuiper to explain how its standard (medium) terminals show the highest impact on other licensees, over its smallest terminal. From the additional information Kuiper provided, it confirmed that the medium customer terminal used in its analysis will have the largest EIRP density levels and therefore produce most interference. It stated this was because for the Kuiper NGSO system, interference at a receiver is primarily due to EIRP density levels in the off-axis angles of its transmissions. We therefore remain satisfied that the evidence Kuiper have provided is sufficient to demonstrate the impact of its system on other existing NGSO licensees would be minimal.
  - *Satellite antenna radiation pattern* – We also asked Kuiper in the Kuiper letter to explain why it did not consider satellite antenna radiation pattern to be applicable to its co-located analysis for the downlink scenario (as shown in table A-3 of its application). In its additional information, Kuiper confirmed that its analysis assumes a worst case conservative scenario (arising from both Kuiper and external systems directly pointing at the co-located terminals). It therefore adopted the satellite antenna radiation pattern with a peak gain value of 39 dBi in its analysis. Kuiper considered the full

satellite antenna radiation pattern (i.e. the gain vs off-axis angle) where sidelobe emissions from other Kuiper satellites impact other terminals, would only be necessary in a non-co-located terminals simulation (which Kuiper did not consider to be the worst case). We therefore remain satisfied Kuiper's analysis appropriately considers the impact of satellite antenna radiation patterns.

## Coexistence with future NGSO systems

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- 3.35 Our process for considering NGSO network licence applications recognises that it is not possible for an applicant to know the future plans of other operators. An applicant's proposed approach to coexistence cannot therefore be detailed and specific at this stage.
- 3.36 In summary, we request applicants to set out clear principles for appropriately mitigating interference issues, to demonstrate that their system has the flexibility to accommodate new entrants, if required. This will ensure they can meet the terms of their licence if and when additional NGSO operators apply to operate services in the UK. We therefore require applicants to:
- explain how their existing network design and operating model might facilitate coexistence with future NGSO systems, as well as any limitations;
  - outline any additional measures for improving coexistence with future NGSO systems; and
  - take reasonable measures to accommodate future NGSO systems, in order to avoid material degradation to services in the UK.
- 3.37 Kuiper described in its application how it could coordinate with any future NGSO system. To demonstrate how it will achieve compatibility, Kuiper explained it has designed its NGSO system with a number of flexible techniques, including:
- sophisticated frequency and beam planning algorithms;
  - adaptive coding and modulation techniques; and
  - use of redundant communication paths for unforeseen outages or interference.
- 3.38 Kuiper also noted that its NGSO system uses narrow beamwidths to ensure that energy transmitted is only received in areas near the intended receiver. As a result, other unintended receivers observe significantly reduced levels of interference, allowing other NGSO systems to use co-frequency spectrum in the same locations. Further, Kuiper's planning software has been designed so that it can target specific areas to implement:
- frequency stay-out zones<sup>17</sup>;
  - satellite avoidance angles; or
  - power reductions.

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<sup>17</sup> We understand Kuiper's frequency stay out zones refer to its capability to impose frequency constraints at a planning cell level of resolution, and could be created in a localised area (over a selected number of planning cells) to avoid potential interference in specific frequency channels. Kuiper also stated it will have geofencing capabilities to restrict the availability of service offerings to terminals based on their reported position.

3.39 After considering Kuiper’s proposed approach, we set out our initial view in the Kuiper consultation that the techniques described should be sufficient to ensure that its NGSO system will be capable of coexisting with future NGSO systems (including gateways and terminal operators). We asked the following question to gather input from stakeholders:

**Consultation question 2**

Are the measures set out by the applicant to enable coexistence with future NGSO systems reasonable?

## Consultation responses

3.40 We received three non-confidential responses from Methera, Eutelsat and Viasat<sup>18</sup> and one confidential response to question 2.

3.41 The confidential respondent expected Kuiper to use its NGSO system’s technical capabilities to mitigate future interference issues, which it anticipates will be identified in future coordination discussions.

3.42 Two concerns about Kuiper’s approach to coexistence with future NGSO systems were also raised:

- **Lack of coexistence analysis for medium earth orbit (MEO) systems** – Methera acknowledged the coexistence analysis Kuiper has carried out, including some assessment of gateway information. However, it raised concerns that our view of Kuiper’s coexistence with future NGSO systems is principally based on modelling with other low earth orbit (LEO) systems and lacks detail on how MEO systems (such as Methera’s proposed NGSO system) will be able to coexist. Methera identified several technical differences between LEO and MEO systems to support its view.
- **Completeness of interference analysis** – As noted in paragraph 3.21 above, Eutelsat considered that further work to assess the interference environment was needed, so it was unable to properly evaluate the effectiveness of Kuiper’s mitigation measures.

## Our assessment

3.43 We agree with the confidential respondent that future coordination discussions are important to identify specific mitigation requirements between NGSO operators.

3.44 **Lack of coexistence analysis for MEO systems** – Our NGSO licensing process only requires applicants to provide analysis for existing licensees and applicants, as it would be disproportionate to require licensees to consider all potential possibilities (we explain this in paragraphs 3.35 and 3.36 above). In any case, our view on coexistence with future NGSO systems is based on the techniques Kuiper’s NGSO system is capable of deploying in order to accommodate new entrants, not Kuiper’s modelling (which relates to our view on coexistence with *existing* NGSO licensees). Our view therefore remains unchanged that the techniques Kuiper has described should be sufficient to ensure that its NGSO system will be capable of coexisting with future NGSO systems, including MEO systems and gateways. We

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<sup>18</sup> Viasat combined its response to questions 1 and 2, and the issues Viasat raised have been addressed in our assessment under question 1 above, though we acknowledge Viasat’s intention for those issues to apply to coexistence with future NGSO systems also.



would also expect that the detail on how Kuiper's proposed and Methera's future NGSO systems will coexist would form part of future coordination discussions.

- 3.45 **Completeness of interference analysis** – We note Eutelsat's concerns with its ability to evaluate Kuiper's mitigation measures in the absence of an aggregate interference study. However, we do not consider it necessary for Kuiper to carry out further analysis in order to assess whether the range of mitigation measures it is able to use will provide it sufficient flexibility in the future to accommodate new entrants. Eutelsat's concerns have therefore not altered our view that Kuiper's mitigation techniques are sufficiently flexible to ensure its NGSO system will be capable of coexisting with future NGSO systems.

## Conclusion on NGSO coexistence

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- 3.46 Having taken account of all consultation responses, Kuiper's approach to coexistence set out in annex 1 to its NGSO licence application, and the further information Kuiper has provided, we maintain the view that Kuiper's NGSO system is technically capable of coexisting with current and future NGSO licensees, and that granting the NGSO network licence is unlikely to degrade consumer services. We are also satisfied that Kuiper can meet the conditions in our NGSO network licence (including those summarised in paragraph 2.4) and that these conditions provide us with the necessary powers to intervene to resolve harmful interference if required.
- 3.47 We remind licensees of their obligation to discuss cooperation arrangements in detail prior to deploying systems and encourage all parties to engage proactively in ITU coordination discussions in good faith to ensure coexistence with other NGSO licensees. We will be monitoring the progress of these coordination discussions, as we do for all our NGSO licensees.



## 4. Assessing the impact on other services

- 4.1 There is also the potential for harmful interference between NGSO systems and other services using the same frequencies. It is reasonable for us to expect satellite operators to comply with international regulations, specifically the ITU's Radio Regulations which set out how different services may coexist.
- 4.2 In addition, conditions in our NGSO network licence are intended to prevent harmful interference into co-channel and adjacent band spectrum users and give us powers to address any coexistence issues should they arise. In particular, we updated our NGSO network licences to better protect existing services, with an explicit licence condition requiring compliance with Article 22 of the ITU Radio Regulations.<sup>19</sup> For this reason, we ask applicants for NGSO network licences to demonstrate, where relevant, how their NGSO system will protect the following users of spectrum in the UK:
- GSO networks;
  - radio astronomy in 10.6-10.7 GHz band and 14.47-14.5 GHz; and
  - fixed links in the 17.7-19.7 GHz band.
- 4.3 Kuiper outlined in its application how its NGSO system would protect these other services:
- **GSO systems** – Kuiper stated that its NGSO system meets the equivalent power flux density (EPFD) limits in the 17.7-18.6 GHz and 19.7-20.2 GHz bands to protect GSO services operating in those bands, as outlined in Article 22 of the ITU Radio Regulations. In the 18.8-19.3 GHz band, Kuiper is coordinating with GSO systems to determine how each satellite system will operate.
  - **Radio astronomy** - Kuiper noted that its system will not operate in frequency bands that are allocated, or adjacent, to the radio astronomy service, ensuring coexistence with UK radio astronomy services.
  - **Fixed links** - Kuiper confirmed that its NGSO system complies with the PFD limits in Article 21 of the ITU Radio Regulations, ensuring that fixed links in the 17.7-19.7 GHz band will be protected.
- 4.4 In the consultation we set out our initial view that Kuiper's NGSO licence application provided sufficient comfort that its NGSO system will be capable of protecting GSO services and fixed links and will not operate in bands within or adjacent to radio astronomy. In addition, should any harmful interference occur, conditions in the NGSO network licence enable us to intervene to protect these services. We asked the following question to gather stakeholders' views.

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<sup>19</sup> We updated our [NGSO network licences in September 2023](#) to include condition 3.7(p) which requires NGSO satellites and gateway earth stations to comply with the relevant EPFD limits in Article 22 of the ITU Radio Regulations. A similar condition was included in NGSO gateway licences (condition 3.1(d)).

### Consultation question 3

Do you assess that the measures put forward will allow this NGSO system to coexist with other services?

## Consultation responses

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- 4.5 We received three non-confidential responses from Methera, Eutelsat and Viasat, and one confidential response to question 3.
- 4.6 Methera agreed with our view that coexistence should be possible between Kuiper and other services (e.g. GSO networks, fixed links and radio astronomy).

### Demonstrating compliance with Article 22

- 4.7 Viasat, Eutelsat and one confidential respondent queried whether Kuiper's confirmation it will comply with the Article 22 EPFD limits had sufficiently shown *how* Kuiper will comply to protect GSO networks (as the NGSO licensing guidance requests), especially given the scale of Kuiper's NGSO system. Viasat and the confidential respondent also considered the number of current NGSO licensees in the UK could put GSO operators at risk if applicants do not provide evidence on how GSO services will be protected under Article 22.

### Representing GSO issues at ITU consultation meetings

- 4.8 A confidential respondent highlighted the importance of Ofcom participating in ITU consultation meetings to protect GSO interests and maintain a predictable interference environment for GSO services.

### Assessing aggregate interference

- 4.9 Viasat raised concerns with the growing number of NGSO licensees in the UK (Kuiper would be the fifth NGSO network licensee authorised to operate in the Ka band, alongside Starlink's NGSO gateways). To protect GSO operations, it emphasised the importance of NGSO licensees collectively assessing the potential for their systems to exceed aggregate EPFD limits in the UK.
- 4.10 In addition, Viasat considered that given the risks<sup>20</sup>, it was unreasonable to wait for multilateral consultation meetings under Resolution 76 (which it stated are scheduled to start after 2027), as it would mean adapting NGSO systems to meet the agreed requirements at a later date. Viasat therefore deemed it was necessary for Ofcom to define a methodology to assess aggregate interference, how it would be shared among all NGSO systems, and how NGSO operators would reduce EPFD levels where issues arise. However, it acknowledged the challenges of identifying, and later enforcing, the EPFD contributions of every NGSO system toward the aggregate. Viasat offered to work with us on defining a methodology, identifying the types of information on each NGSO system the methodology would require (e.g. EPFD input files where NGSO systems operate under multiple filings).

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<sup>20</sup> Including an inability to identify the EPFD contributions of every NGSO system toward the aggregate EPFD, and the risk of unequitable sharing of the aggregate EPFD budget among NGSO systems, both of which it considered might hinder opportunities for other parties including new entrants.

## Initiating coordination discussions with GSOs

- 4.11 Referencing Kuiper's claim that it is coordinating with other GSO networks, Eutelsat informed us that it had not yet received any proposal from Kuiper to protect its UK licensed GSO services and has no coordination agreement in place for the Ka band.

## Our assessment

### Demonstrating compliance with Article 22

- 4.12 As evidence of Kuiper's ability to comply with Article 22 of the Radio Regulations, we asked Kuiper in the Kuiper letter to confirm whether it has received favourable outcomes from the ITU Radiocommunication Sector's (ITU-R's) examination of its satellite filings (for complying with the relevant EPFD single-entry limits in Article 22). Alternatively, we asked Kuiper to share its underlying calculations to show how its satellite filings will comply.
- 4.13 In its additional information, Kuiper confirmed that it had received favourable EPFD findings for the original orbital configuration of its three satellite filings, though explained that it is still waiting for the ITU-R to examine its modification to align these filings with its new orbital configuration. It also stated that the EPFD findings for the modification will be published once the ITU-R has performed its examination. We are therefore satisfied there is sufficient evidence that Kuiper's original satellite filings complies with Article 22, and Kuiper is taking the necessary steps to update the finding for its new configuration.

### Representing GSO issues at ITU consultation meetings

- 4.14 We agree that our participation in ITU consultation meetings under Resolution 76 will play an important role in addressing aggregate interference and protecting GSO networks from harmful interference. Where the UK is involved in such meetings as a relevant notifying administration, we will represent the views of both GSO and NGSO licensees to ensure their views are represented.

### Assessing aggregate interference

- 4.15 As set out in previous NGSO licensing statements<sup>21</sup>, it is reasonable for us to expect Kuiper will comply with the ITU Radio Regulations and protect GSO networks under the relevant provisions (specifically Article 22 and Resolution 76), with the notifying administration responsible for the NGSO system ultimately responsible to ensure such compliance.
- 4.16 We agree with stakeholders that it is important that a methodology to assess aggregate interference is developed as a priority; the ITU's process for doing so (under Resolution 76) is already being developed in ITU WP4A as a matter of urgency, and we are part of those ongoing discussions. Although we acknowledge the risks Viasat has raised with delays to evaluating aggregate interference levels for NGSO systems in the UK, we do not consider it necessary to constrain NGSO licensing in the short term given limited NGSO deployment in Ka band to date, and all notifying administrations will face the same implementation issue once a solution is agreed.
- 4.17 Further, our NGSO licensing process is intended to reinforce ITU processes and does not seek to replace them, so we do not consider it to be proportionate to develop a national approach separate to the international process already underway. ITU WP4A is already

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<sup>21</sup> As listed under the "Applications received" section of our [NGSO licensing webpage](#).

considering the types of information that Viasat identified for the methodology. It is also clear that international obligations to comply with aggregate interference limits apply regardless of the outcome of ITU WP4A's ongoing work. We therefore consider that our NGSO licensing process and licence conditions requiring NGSO licensees to protect UK GSO operators, together with the relevant international rules and obligations, provide a framework for managing the risk of aggregate interference and addressing any issues should they arise in the short term.

- 4.18 With reference to the growing number of NGSO licensees authorised to operate in the Ka band in the UK, we acknowledge that granting Kuiper's NGSO network licence brings us to five licensed NGSO systems in this band. Although this number is higher than the number assumed to derive the single-entry limit thresholds in Article 22 from the aggregate ones in Resolution 76 (which is 3.5), we do not think this currently creates a material risk of harmful interference in the UK. This is because, to the best of our knowledge, only Starlink's NGSO gateways are operational in Ka band in the UK. In addition, it is not guaranteed that five active systems would exceed the existing aggregate limits, as it will depend on the exact way in which they are operated and coordinated. Therefore, we consider granting Kuiper's NGSO network licence still presents a low risk of interference for GSO networks operating in the Ka band, since our NGSO network licence requires that NGSO systems respect both single-entry and aggregate limits and allows us to take action if required.

#### **Initiating coordination discussions with GSOs**

- 4.19 In the Kuiper letter, we queried Kuiper's engagement with other GSO operators, asking it to confirm which co-frequency GSO operators it had contacted. In its additional information, Kuiper confirmed that it has now initiated coordination with known GSO operators operating in the Ka band.

### **Conclusion on coexistence with other services**

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- 4.20 Having assessed Kuiper's NGSO licence application and stakeholder responses, we remain of the view that Kuiper's NGSO system is capable of protecting other services, including GSO networks and fixed links.

# 5. Assessing the impact on competition

5.1 Our NGSO licensing process explains that our starting position for assessing competition is to authorise applications where possible. This reflects the extent of the likely risks to competition, and our view that, because the NGSO industry is still emerging and characterised by uncertainty, the benefits of enabling systems is in general likely to exceed the risks.

## Risks to competition

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5.2 Competition concerns can arise where an NGSO applicant's system imposes technical constraints on current and future NGSO licensees (e.g. due to a lack of flexibility in the design of the applicant's systems to respond to, or avoid altogether, potential harmful interference). If the applicant's NGSO system is less able to technically coexist with current and future NGSO systems, then this could lead to weakened competition and worse outcomes for consumers, such as higher prices or lower quality of service.

5.3 In the Kuiper consultation we identified three potential and general risks to competition that could be relevant to our assessment of Kuiper's NGSO licence application for an NGSO network licence:

- **Potential risk 1:** User terminals create harmful interference into existing NGSO user terminals and/or gateway earth stations, resulting in weakened competition and worse outcomes for consumers.
- **Potential risk 2:** User terminals are unable to coexist with future NGSO systems, creating a barrier to entry and in turn restricting competition.
- **Potential risk 3:** Operators not coordinating in good faith could hinder the ability of current and future satellite operators to provide their services.

5.4 In the consultation, our initial assessment of potential risks 1 and 2 was that coexistence was possible between Kuiper's proposed NGSO system and both current and future NGSO systems operated by other licensees. Therefore, our provisional view was that these risks were unlikely to develop.

5.5 With respect to potential risk 3, our initial assessment was that we are equipped through our licence conditions and enforcement powers to remedy situations in which one or more NGSO operators failed to coordinate in good faith. In addition, we noted that Kuiper had already demonstrated that it was able to reach agreements with other NGSO operators. This should alleviate any concerns over the potential for this risk to materialise.

5.6 We also considered a fourth risk to competition, which related to the possibility of Kuiper – through its presence in other products and services – bundling (or tying) satellite broadband with products such as Amazon Web Services. These are normal commercial practices which often benefit customers. However, depending on the conditions in the relevant markets they can give rise to competition concerns. Since Kuiper has not begun services in the UK yet, we did not conclude on this risk. We considered that, should this risk

materialise in future, there may be alternative policy tools, other than an NGSO network licence, to address the concern.

- 5.7 Overall, our initial view was that there would not be a material risk to competition.

## Benefits

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- 5.8 In the Kuiper consultation our general view was that granting NGSO network licences is likely to benefit UK customers, consumers, and citizens, and supports Ofcom’s strategic priority to get everyone connected. Since issuing a new NGSO network licence allows market entry, it also has the potential, if a service is deployed, to promote greater competition (assuming that the NGSO system can coexist with other authorised systems).
- 5.9 Our preliminary view was that the Kuiper NGSO system has the potential to provide services that improve connectivity options for UK consumers, customers and citizens. We asked stakeholders the following question in the Kuiper’s consultation:

### Consultation question 4

Do you believe the NGSO system in the application would benefit or harm future competition between NGSO services in the UK? Please provide details.

## Consultation responses

- 5.10 We received three non-confidential responses from Methera, Viasat and Rivada to question 4. No respondents raised any concerns specific to Kuiper’s NGSO licence application with respect to competition between NGSO systems in the UK, or the fourth risk to competition (bundling or tying of services).
- 5.11 Methera supported a market based on the principles of choice and competition. Rivada suggested that Kuiper’s NGSO system will have a beneficial impact on competition, noting the benefit of consumers being offered a choice amongst different satellite operators and services.
- 5.12 As noted in section 4, Viasat flagged several risks which it saw as arising from delays to evaluating the aggregate interference levels of NGSO systems, including an inability to identify the EPFD contributions of every NGSO system toward the aggregate EPFD, and the risk of unequitable sharing of the aggregate EPFD budget on NGSO systems. It considered these risks could hinder opportunities for other operators and new entrants.
- 5.13 Methera also expressed a general concern not specific to the Kuiper application about spectrum limitations and congestion, which we address in section 6 below.
- 5.14 In addition, some respondents provided views on coexistence between current and future NGSO systems and protecting GSO services. These responses are also relevant to our competition assessment and are summarised in previous sections.

## Our assessment

- 5.15 As set out in section 3, where we assess coexistence of NGSO systems, we consider the Kuiper NGSO system is capable of coexisting with both existing and future NGSO licensees. In addition, our assessment in section 4 concludes that Kuiper’s NGSO system is also capable of protecting other services such as GSO networks and fixed links.

- 5.16 Since no respondents provided any comments on the competition risk arising from Kuiper potentially bundling (or tying) its satellite services with other products, our position remains the same as at consultation stage.
- 5.17 We acknowledge Viasat’s point about measuring EPFD contributions of individual NGSO operators and its potential impact on competition, but as explained in paragraph 4.17, we are currently working with the ITU to determine an international solution. In light of this, we do not consider it appropriate to determine a UK-specific view in advance of those discussions concluding, but will consider the application of future international decisions to our NGSO licensing process as appropriate.
- 5.18 Although no respondents raised this point, we note that Amazon Kuiper Services Europe SARL is a separate entity to Blue Origin Enterprises, L.P. (Blue Origin) – an aerospace manufacturer and spaceflight services company, which is active in rocket launches. This means that these two companies are not vertically integrated. Therefore, in this statement we do not examine vertical theories of harm, such as input foreclosure.<sup>22</sup> Even if the two firms were vertically integrated, Blue Origin does not yet have a significant presence in the satellite launch market, which explains our decision not to consider this theory of harm at this stage.

## Conclusion on competition

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- 5.19 We consider the proposed arrangements for coexistence and coordination are appropriate in this case. Therefore, we determine there is no material risk to competition relating to NGSO systems and other users (including GSO networks) from granting this NGSO network licence, and that the proposed services may benefit consumers, customers, and citizens in the UK.

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<sup>22</sup> Input foreclosure refers to a situation where an upstream division of a vertically integrated firm either stops supplying inputs to rivals of its own downstream division, or continues to supply the inputs but at higher prices. This strategy could affect third party access to launch services.

# 6. Additional comments and impact assessments

## Additional comments

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- 6.1 We gave respondents the opportunity to offer any other comments they may have in relation to Kuiper's NGSO licence application, and asked:

**Consultation question 5**

Do you have any additional concerns or comments regarding the application?

## Consultation responses

- 6.2 As explained in section 2, a number of respondents raised issues throughout their responses which were not specific to Kuiper's NGSO licence application. These are summarised below:

### Making more 28 GHz spectrum available for satellites in Ka band

- 6.3 Rivada viewed Kuiper's NGSO licence application as evidence that demand is increasing for satellite spectrum, particularly in Ka band. Rivada therefore supported making more of the Ka band available in the UK, noting that there are fewer frequencies available for terminals in Ka band than in the rest of Europe.

### Telesat's application and satellite filing information

- 6.4 As part of its response, Viasat queried a different satellite operator's NGSO network licence application (Telesat), based on three satellite filings, which we have already approved. Specifically, that it considered it was necessary to base an EPFD assessment on a single satellite filing representing Telesat's whole NGSO system. Viasat also stated that the technical characteristics in Telesat's technical annex do not match its ITU satellite filings.

### New NGSO licence condition for Resolution 76 meetings

- 6.5 Viasat considered that NGSO licences should include a new licence condition requiring that NGSO licensees in the UK are bound by any decisions taken in Resolution 76 meetings.

### Satellite monitoring capability

- 6.6 A confidential respondent queried the status of the satellite measurement facility we intend to establish, which is intended to assist us in ensuring NGSO networks comply with the EPFD limits set out in relevant NGSO network licences and satellite filings. It suggested that the facility should be capable of monitoring both single entry and aggregate EPFD interference from multiple co-frequency NGSO systems.

### Mismatch between requested uplink and downlink frequencies

- 6.7 Methera identified a mismatch between the bandwidth requested for uplink (1189 MHz) and downlink (900 MHz) and suggested that Kuiper justify its request for higher uplink bandwidth for terminals, as it increases the range of frequencies requiring coordination with fixed wireless access (FWA) and NGSO operators in the UK.



## General comments about the NGSO licensing process

- 6.8 Methera raised three general concerns relating to **NGSO system design and efficiency** which it considers may affect spectrum sharing and access, given NGSO coexistence requires mutually agreeable stay-out zones:
- *Effect of greater separation angles* – which it expected will become the “norm” for NGSO to NGSO coexistence. However, Methera claimed greater separation angles could contribute to spectrum shortages and sterilised skies when compared to GSO operations (which can use very small separation angles of two degrees).
  - *Increasing use of small aperture antennas* – which create broader beams with lower sidelobe discrimination. Methera noted the simpler, low-cost nature of these antennas but given the compromises to performance with large stay-out angles, considered they should not be permitted.
  - *Replacing C/N with C/I ratios in coexistence analysis* – Methera proposed a technical shift from using C/N to C/I ratios, to address the wide variations that arise in modelling (in avoidance angles, between best and worst case entry assumptions) where the number of entries are not known. Methera recognised that NGSO operators currently address this problem by building “slack” into their constellations with a spare satellite for handover where interference causing events occur, however Methera believes this is less efficient than its own MEO system design which does not require spare satellites.
- 6.9 Lastly, Methera gave its support for a market based on choice and competition, raising a general concern about **spectrum access and sharing spectrum resources**. Methera asked us to ensure that our process does not favour early entrants, and that current NGSO licensees and applicants do not sterilise excessive or unfair proportions of spectrum. It considered this should help ensure all satellite operators, including future entrants, have the opportunity to provide services on a level playing field.

## Our assessment

### Making more 28 GHz spectrum available for satellites in Ka band

- 6.10 Following a consultation process in 2024, we have today also published our [decision](#) to authorise a wider range of frequencies in the Ka band for satellite land terminals in our “Enabling access to 28GHz” statement. As noted in paragraph 2.5, frequencies in the ranges 27.8185-27.9405 GHz and 28.8265-28.9485 GHz are now also available in the UK. We also plan to consider increasing access to Ka band for air and maritime terminals in 2025 (as set out in our [Proposed plan of work 2025-26](#)).

### Telesat’s application and satellite filing information

- 6.11 This licensing decision is for Kuiper’s NGSO system, so queries about other NGSO licensees (including past applicants who have since been licensed, such as Telesat) are outside the scope of this statement, and are not considered further.

### New NGSO licence condition for Resolution 76 meetings

- 6.12 We do not consider it proportionate to impose a new condition as Viasat requests, given the protection of GSO satellite services is already a condition of the NGSO network licence. As noted at paragraph 4.2 above, condition 3.7(p) requires licensees to comply with the relevant EPFD limits specified in Article 22, and we also highlight the specific reference to

Resolution 76 in Article 22.5K<sup>23</sup>. Should harmful interference occur, condition 8.3(b) of our NGSO network licence gives us the power to require licensees to cease or change the way the licensee operates.

### Satellite monitoring capability

- 6.13 Harmful interference into licensed networks can already be reported to our [Spectrum Monitoring Centre](#). At our Baldock monitoring station, we are developing the UK's capabilities to detect and manage such harmful interference into receiving earth stations, in collaboration with satellite operators. Our work is ongoing and will be used to support investigations when required.

### Mismatch between requested uplink and downlink frequencies

- 6.14 Under an NGSO network licence in the UK, all licensees are authorised to use the entire range of frequencies available. For this reason, we do not consider that any difference in uplink and downlink bandwidth is relevant to our assessment of Kuiper's NGSO licence application.

### General comments about the NGSO licensing process

- 6.15 We thank Methera for their general observations on NGSO system design and efficiency. As these are not specific to the Kuiper application on which we consulted, these matters fall outside the scope of this statement so are not addressed further.
- 6.16 However, as a general point, we recognise the benefits of NGSO systems being spectrally efficient, and that an NGSO system's ability to coexist with current and future NGSO licensees is one such indicator of efficiency. As stated earlier in section 3, we are satisfied that Kuiper's NGSO licence application has demonstrated this (and reiterate that our NGSO licensing process does not seek to specify how NGSO systems are designed or operate, or the evidence applicants choose to provide to us).
- 6.17 Regarding spectrum access and sharing spectrum resources, we expect all NGSO licensees to work together to accommodate future NGSO systems, in accordance with licence condition 8.2 to coordinate with other NGSO licensees to prevent harmful interference. When reviewing NGSO licence applications, we require applicants to satisfy us that their NGSO system has the technical capabilities to coexist with future NGSO systems.

## Equality impact assessment and Welsh language impact assessment

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- 6.18 We also assessed the likely impacts and benefits of granting Kuiper's NGSO network licence on persons sharing protected characteristics, and on the Welsh language, as set out in annex 1 of the Kuiper consultation. We did not identify any adverse impacts on persons sharing protected characteristics that meant they are likely to be affected in a different way to the general population, nor did we consider that our proposals had any impact on our Welsh language obligations.

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<sup>23</sup> See page 297 of volume I for Article 22, and page 93 of volume III for Resolution 76 of the [ITU-Radio Regulations](#).

- 6.19 Further, we considered that our proposal to grant the NGSO network licence and thereby facilitate further access to broadband and backhaul connectivity via satellite, was likely to have positive impacts on households, businesses, government and other potential customers in the UK, improving equality of opportunity in more rural or remote areas, and improving access to Welsh language opportunities in Wales.
- 6.20 We asked stakeholders the following questions:

**Consultation question 6**

Do you agree with our assessment of the potential impact on specific groups?

**Consultation question 7**

Do you agree with our assessment of the potential impact of our proposal on the Welsh language?

## Consultation responses

- 6.21 Only one respondent responded to questions 6 and 7, Rivada, who agreed with both impact assessments.

## Our assessment

- 6.22 We remain of the view that granting this NGSO network licence will not have any adverse impact on persons sharing protected characteristics, reduce opportunities for persons to use the Welsh language, nor does it treat the Welsh language any less favourably than the English language. Our full reasoning is set out in annex 1 of this statement.

# 7. Our decision

## How we decide whether to grant an NGSO network licence

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- 7.1 Our [2021 NGSO statement](#) explains the considerations we would take into account when deciding whether to grant an NGSO licence:
- a) our technical coexistence checks;
  - b) our competition check;
  - c) our impact assessments;<sup>24</sup>
  - d) our statutory duties, as set out in section 3 of the Wireless Telegraphy Act 2006 and section 3 of the Communications Act 2003, with our principal duty being to further the interests of citizens and consumers in relation to communications matters, where appropriate by promoting competition;
  - e) our NGSO licensing objectives, including to enable citizen and consumer benefits arising from innovative satellite services, such as improved connectivity; and
  - f) any other available relevant evidence, including the application, consultation responses and any further information provided by the applicant.
- 7.2 In exercising our regulatory functions, we are also required to have regard to the desirability of promoting economic growth.<sup>25</sup>

## Our decision and next steps

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- 7.3 In light of the evidence presented in Kuiper’s NGSO licence application and additional information, and our careful consideration of potential coexistence and competition issues, impact assessments and consultation responses, we have decided to grant Kuiper an NGSO network licence to operate its NGSO system in the Ka band in the UK, ahead of the launch of this service in 2025.
- 7.4 We will now proceed to issue Kuiper its new NGSO network licence to operate in Ka band frequencies 27.5-27.9405 GHz, 28.4545-28.9485 GHz, and 29.5-30 GHz, subject to payment of the licence fee. A copy of the NGSO network licence will also be made available under the “Existing licences” section of our [NGSO licensing website](#).

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<sup>24</sup> See annex 1 for full details of the impact assessments carried out.

<sup>25</sup> Section 110(3) of the Deregulation Act 2015 requires us to have regard to the “[Growth Duty: Statutory Guidance](#) (revised by the Government in May 2024).

# A1. Impact assessments

## Impact assessment

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- A1.1 Section 7 of the Communications Act 2003 (the Act) requires us to carry out and publish an assessment of the likely impact of implementing a proposal which would be likely to have a significant impact on businesses or the general public, or when there is a major change in Ofcom’s activities.
- A1.2 Impact assessments form part of good policy making and we therefore expect to carry them out in relation to a large majority of our proposals. We use impact assessments to help us understand and assess the potential impact of our policy decisions before we make them. They also help us explain the policy decisions we have decided to take and why we consider those decisions best fulfil our applicable duties and objectives in the least intrusive way. Our [impact assessment guidance](#) sets out our general approach to how we assess and present the impact of our proposed decisions and section 4 of our [2021 NGSO statement](#) sets out how we assess the impact of applications for NGSO network licences.
- A1.3 We have carefully considered the potential impact of granting an NGSO network licence to Kuiper throughout the consultation and decision process. We assessed the benefits of Kuiper’s application for an NGSO network licence on citizens and consumers, as well as the risks posed to coexistence with other services and competition in sections 3 and 4 of the Kuiper consultation. We set out our assessment and final decision in sections 3-7 of this statement, taking into account Kuiper’s NGSO licence application, additional information from Kuiper, and comments we received in response to our Kuiper [consultation](#).
- A1.4 As outlined in sections 3-7 of this document, we have concluded that our decision to grant an NGSO network licence to Kuiper is likely to have an overall positive impact for citizens, consumer and businesses, by enabling high speed, low latency broadband in the UK. We do not consider that our decision will have a detrimental impact on stakeholders. We also consider that Kuiper is unlikely to cause harmful interference to other services in the frequencies it intends to use; further, our NGSO licence conditions are designed to achieve coordination in good faith, and we are able use our enforcement powers to remedy any issues that arise.

## Equality impact assessment

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- A1.5 We have given careful consideration to whether our proposals will have a particular impact on persons sharing protected characteristics (broadly including race, age, disability, sex, sexual orientation, gender reassignment, pregnancy and maternity, marriage and civil partnership, and religion or belief in the UK, and also dependents and political opinion in Northern Ireland), and in particular if they may discriminate against such persons or impact on equality of opportunity or good relations. This assessment helps us comply with our duties under the Equality Act 2010 and the Northern Ireland Act 1998.
- A1.6 When thinking about equality we think more broadly than persons that share protected characteristics identified in equalities legislation and think about potential impacts on various groups of persons (see paragraph 4.7 of our [impact assessment guidance](#)).

- A1.7 In particular, section 3(4) of the Act requires us to have regard to the needs and interests of specific groups of persons when performing our duties, as appear to us to be relevant in the circumstances. These include:
- the vulnerability of children and of others whose circumstances appear to us to put them in need of special protection;
  - the needs of persons with disabilities, older persons and persons on low incomes; and
  - the different interests of persons in the different parts of the UK, of the different ethnic communities within the UK and of persons living in rural and in urban areas.
- A1.8 We also examine the potential impact our policy is likely to have on people, depending on their personal circumstances. This assists us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers, regardless of their background and identity.
- A1.9 Kuiper intends to provide high speed, low latency broadband to a wide range of customers, and backhaul to businesses using Ka band in the UK (details can be found in annex 1 to Kuiper’s NGSO licence application). Taking account of stakeholder responses, we can confirm our view set out in the Kuiper consultation that our decision to grant Kuiper an NGSO network licence is likely to have positive impacts on groups of persons living and working in rural or remote areas of the UK, improving connectivity which will help to improve equality of opportunity in those areas (though we note UK coverage will only extend to the 56 parallel north (which crosses Scotland at Falkirk and the Firth of Forth ) under Kuiper’s first generation NGSO system, as explained in paragraph 2.7). We have not identified any adverse impacts on specific groups of persons, including those sharing protected characteristics, that are likely to be affected in a different way to the general population through the granting of this NGSO network licence.

## Welsh language impact assessment

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- A1.10 We are required to take Welsh language considerations into account when formulating, reviewing, or revising policies which are relevant to Wales (including proposals which are not targeted at Wales specifically but are of interest across the UK).<sup>26</sup>
- A1.11 Where the Welsh Language Standards are engaged, we consider the potential impact of a policy proposal on (i) opportunities for persons to use the Welsh language; and (ii) treating the Welsh language no less favourably than the English language. We also consider how a proposal could be formulated to have or to increase, a positive impact, or not to have or to decrease any adverse effects.
- A1.12 We consider our decision to grant Kuiper an NGSO network licence will not have any impact on our Welsh language obligations, as it relates to a nationwide licensing regime and the relevant licence products are available for anyone within the UK to apply. We consider our decision also has the potential to increase Welsh language opportunities as a result of improved connectivity in Wales.

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<sup>26</sup> See Standards 84-89 of [Hysbysiad cydymffurfio](#) (in Welsh) and [compliance notice](#) (in English). Section 7 of the Welsh Language Commissioner’s [Good Practice Advice Document](#) provides further advice and information on how bodies must comply with the Welsh Language Standards.

A1.13 Our current practice is to produce spectrum licences in Welsh when requested, in accordance with our obligations set by the Welsh Language Commissioner. We will continue to take this approach in relation to NGSO licences.