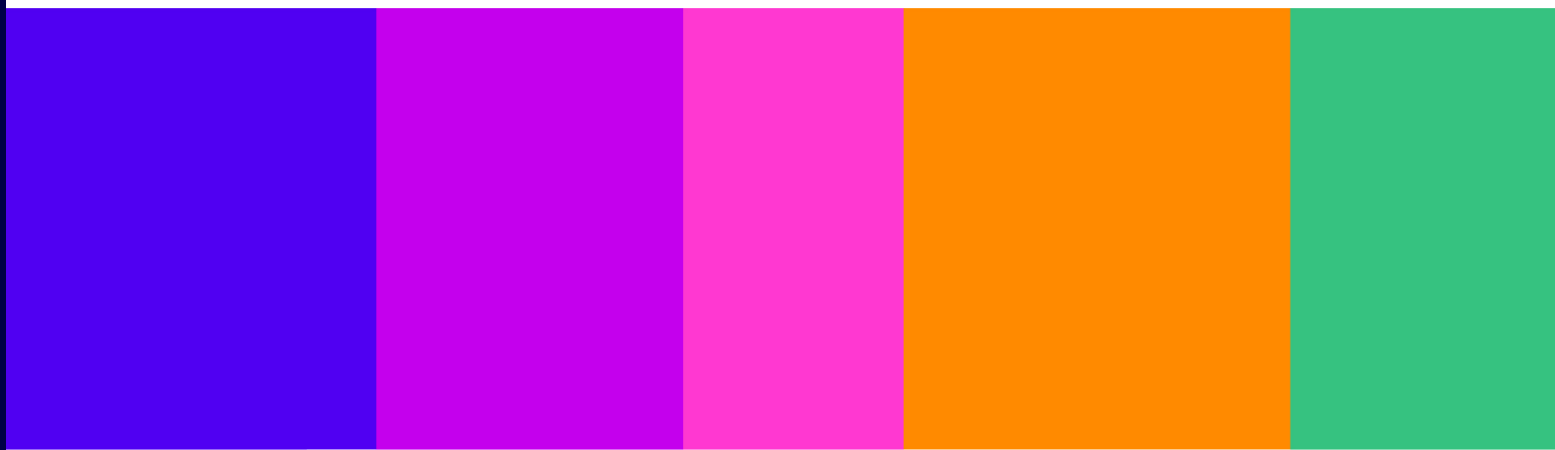


Statement: Kepler Communications Inc. application for a non- geostationary earth station network licence

Statement

Published 4 April 2025



Contents

Section

1. Overview.....	3
2. Introduction and background.....	4
3. Assessing the impact on NGSO coexistence	7
4. Assessing the impact on other services	15
5. Assessing the impact on competition	18
6. Additional comments	20
7. Our decision.....	21

Annex

A1. Impact assessments	23
------------------------------	----

1. Overview

- 1.1 This document sets out our decision on an application by Kepler Communications Inc. ('Kepler') for a UK wireless telegraphy satellite earth station network licence (an NGSO network licence). This licence would authorise Kepler to operate user terminals in the Ku band in the UK, by connecting to its non-geostationary orbit (NGSO) satellite system (known as its 'Angarium' constellation), to provide satellite connectivity services to businesses.
- 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 higher speeds and lower latency services to consumers, customers and citizens.
- 1.3 Our [initial assessment of Kepler's NGSO licence application](#) in our March 2024 consultation (the Kepler consultation) proposed that we grant Kepler an NGSO network licence. We have now carefully assessed stakeholder responses regarding Kepler'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. We have also considered further evidence from Kepler regarding its application.

What we have decided – in brief

We have decided to grant an NGSO network licence to Kepler.

This decision will enable Kepler to provide satellite connectivity services (such as IoT and data transfer services) to business customers in the UK, using Ku band frequencies between 14.0-14.5 GHz.

On coexistence, we consider that Kepler's NGSO system is capable of coexisting with both existing NGSO licensees and future NGSO systems operating in the Ku band. Kepler has provided evidence that coordination discussions with other NGSO licensees are underway, and we encourage all parties to engage in these discussions and progress plans to cooperate.

We also consider that Kepler's NGSO system is capable of coexisting with other services operating in the same (or adjacent) frequencies, including radio astronomy and geostationary orbit (GSO) satellite networks.

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

We will now proceed to issue Kepler with its new NGSO network licence to operate in Ku band frequencies 14-14.5 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 [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.^{1 2} It permits uplinks from UK user terminals to NGSO satellites. 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 licences are listed in the “Existing licences” section of our [NGSO licensing webpage](#).

Kepler’s NGSO licence application

- 2.5 We received Kepler's completed application on 14 March 2024³ for an NGSO network licence to operate ground-based user terminals that will connect to its NGSO constellation (known as Angarium). Kepler has requested to use Ku band frequencies 14.0-14.5 GHz for its NGSO system in the UK. Kepler previously held an NGSO network licence for operating its NGSO system in the UK, but this licence lapsed in May 2022.
- 2.6 Kepler stated its system is designed to support a range of connectivity services for the benefit of UK consumers and businesses, including store and forward based IoT (the internet

¹ 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.

² 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](#).

³ We received an initial NGSO licence application from Kepler on 15 August 2022, however this application was incomplete. We invited Kepler to resubmit its application and this was deemed complete on 14 March 2024. Kepler’s NGSO licence application is published on our [website](#).

of things) and real-time data transfer services when the network reaches full deployment. Angarium will use inclined and sun-synchronous orbits to provide coverage over the whole of the UK. It will comprise 140 satellites operating at an altitude of 575 km, and currently operates 20 satellites in 7 orbital planes. Kepler does not currently plan to deploy gateways in the UK (and has not applied for any NGSO gateway licences in the UK). Further information about Kepler's NGSO system can be found in its [application on our website](#) (reference: KEPLER-NET-1).

Consultation and summary of responses

- 2.7 Taking account of the evidence presented by Kepler (submitted to us on various dates⁴), we published a [consultation](#) on 22 March 2024 setting out our preliminary view to grant it an NGSO network licence, and invited comments on Kepler's NGSO licence application and our views. We noted we were open to changing those views depending on responses and evidence submitted to us as part of the consultation process. The Kepler consultation closed on 29 April 2024.
- 2.8 We received four responses to this consultation- two confidential and two partially confidential. The non-confidential (partially redacted) versions of two responses from Network Access Associates Ltd (trading as Eutelsat OneWeb)⁵ and Starlink/ Space Exploration Technologies Corp.⁶ are now published alongside Kepler's NGSO licence application and consultation on our [website](#); the two other responses were wholly confidential. Respondents have agreed to us referencing the contents of confidential 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.
- 2.9 In response to issues raised by some respondents, we requested additional information from Kepler regarding how it will coexist with existing and future NGSO licensees, and also sought some further clarifications (including on the frequency band in which Kepler intends to operate its user terminals in the UK). We refer to these requests as 'the Kepler letters'⁷ in this document. We also held meetings with some respondents to better understand their specific technical concerns. Kepler's responses to the Kepler letters, alongside an update from Starlink in September 2024, are now published on our [website](#).
- 2.10 We have carefully considered all consultation responses in finalising our decision on Kepler's NGSO licence application. We have also considered Kepler's replies and any new information from stakeholders. This document summarises the main points made by stakeholders in their submissions and our assessment of those points, under headings prompted by the five questions we asked in the consultation. We have collated answers under the most

⁴ We received submissions forming part of Kepler's NGSO network licence application on 15 August 2022, 5 April 2023, and 7 February, 1 March and 14 March 2024.

⁵ Referred to in the rest of this document as Eutelsat OneWeb (its NGSO network licence in the UK is held under the name of Network Access Associates Ltd).

⁶ Referred to in the rest of this document as Starlink (as the holder of its NGSO licences in the UK).

⁷ We wrote letters to Kepler requesting additional information and/or clarifications on 26 June and 29 November 2024, and sent email correspondence on 14 and 22 January, and 21 March 2025. Kepler provided a confidential response on 18 July including a second technical study, and further responses on 16 December 2024, 22 January and 24 March 2025 that are published on our [website](#).

appropriate heading; in some cases, this means respondents' comments are addressed under different questions to those they used.

Structure of this document

2.11 The rest of this document is structured as follows:

- Section 3 assesses respondents' views on the capability of Kepler's NGSO system to coexist with other (current and future) NGSO systems.
- Section 4 assesses respondents' views on the capability of Kepler'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 Kepler's NGSO licence application.
- Section 6 covers any other comments provided on the Kepler consultation.
- 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

- 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 citizens and consumers 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 a satellite system or network 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 holding the satellite filing is responsible for ensuring that operators comply with these ITU obligations.

Coexistence with existing NGSO systems

- 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 in the UK (as well as any NGSO licence applicants' systems or gateways) that plan to operate in the same frequency bands. Applicants should also show how they are able to coexist with other specific co-frequency earth stations registered with the ITU⁸.
- 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. However, 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 cooperation agreement.
- 3.5 In summary, where no such agreements are 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.
- 3.6 An NGSO network licence should be held by someone who has control over the whole satellite system (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

⁸ These are listed at the bottom of our [NGSO licensing webpage](#).

the conditions in their licence, including the ability to act upon and mitigate against any interferer transmission/s at any time. Kepler has confirmed in its response to the Kepler letters that it has full control over its NGSO system payloads, and is consequently able to bear the responsibilities outlined under the NGSO network licence.

- 3.7 In the Kepler consultation, we noted the two NGSO network licensees operating terminals using frequencies in the Ku band in the UK: Starlink, and Eutelsat OneWeb. We also stated there are no UK NGSO gateways operating in the Ku band. This remains the case.⁹
- 3.8 Our Kepler consultation noted Kepler’s assertions that its ability to coexist with other operators has not changed since its previous licence was granted, that it had actively engaged in coordination discussions with Starlink and Eutelsat OneWeb, and continues to do so to ensure its ability to coexist on a worldwide basis. In its NGSO licence application, Kepler submitted technical coexistence studies with the Starlink and Eutelsat OneWeb systems (which we refer to in the rest of this document as ‘Kepler’s initial technical studies’) to demonstrate the impact of its NGSO constellation on other Ku band NGSO network licensees would be minimal.
- 3.9 Our preliminary view was that Kepler’s NGSO system should be able to coexist with existing NGSO systems with the approach described. However, we reiterated that all parties should continue coordinating in good faith, noting that our licence conditions require licensees to cooperate with each other so they can coexist. We asked stakeholders:

Consultation question 1

Do you anticipate this satellite network will pose coexistence challenges to existing services?

Consultation responses

- 3.10 We received four responses to question 1 – from Starlink and three confidential respondents – who raised the following issues:

Progress of coordination discussions

- 3.11 One confidential respondent welcomed Kepler’s efforts to coordinate in good faith, recognising the importance of coordination discussions for sharing spectrum in the Ku band. It considered it was too early in the coordination process to confirm the impact of Kepler’s NGSO system on its NGSO system, and that further coordination was necessary.
- 3.12 In its response, Starlink noted the absence of a coordination agreement with Kepler, and raised concerns about the ability of Kepler’s system to coexist with its system, as well as Kepler’s ability to meet the obligation to cooperate under condition 8.2¹⁰ of the NGSO network licence, based on its experience in other jurisdictions.

⁹ Other NGSO network licensees licensed to operate terminals using frequencies in the Ka band are: Amazon Kuiper Service Europe SARL, Mangata Edge Ltd, NSLComm Ltd, Rivada Space Networks GmbH, and Telesat LEO Inc. In addition, there are seven existing NGSO gateway earth stations which all connect to the Starlink NGSO constellation, with each individually licensed to operate in the Ka band: five licences are held by Starlink Internet Services Limited (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).

¹⁰ Starlink refer to licence condition 2 in its response, which is a reference to the second sub-condition cited in our 2021 NGSO statement. This appears in the NGSO network licence as licence condition 8.2.

Kepler's technical studies did not examine scenarios demonstrating highest potential for interference

- 3.13 One confidential respondent operating in the Ka band did not foresee compatibility issues with Kepler's NGSO system (provided that this application is limited to the Ku band).
- 3.14 Starlink and a second confidential respondent raised concerns with Kepler's ability to coexist with their NGSO systems, based on the methodology used by Kepler in its initial technical studies. They considered Kepler had not demonstrated it is "fully capable of coexisting with current NGSO licensees in the UK...", as claimed in its NGSO network licence application.
- 3.15 This second confidential respondent considered Kepler's initial technical studies to be too simplistic, potentially providing a more favourable result for coexistence. For example, it noted the potential for some links in incumbent operators' satellite filings to be more sensitive to interference than the one link that was simulated (i.e. interference could be greater for victim links with smaller terminals and lower EIRP¹¹ densities). Therefore, the respondent considered more detailed analysis was needed to better understand the actual levels of interference and/or impact on other satellite operators (e.g. looking at specific beam, earth station type, and transmit power).
- 3.16 Starlink evidenced its concerns by completing its own study¹² (based on publicly available information) which found that Kepler's NGSO system has the potential to cause significant service degradation to Starlink's services (based on the link types and antenna sizes Starlink uses in the UK). For example, Starlink's study showed there was potential for some links or beam parameters in Kepler's KELYPSIS satellite filing to cause higher degradation (i.e. more short term and long term interference¹³) to incumbent satellite operators, because Kepler's satellite filing permits higher peak gain/power than for the one Kepler link simulated in its studies. It also showed higher degradation when considering Starlink's smaller terminals.
- 3.17 The second confidential respondent also highlighted the issue of increased risks of aggregate interference from both gateway and user terminals operating in close proximity to each other in the Ku band, since Kepler plans to operate both types of terminals in this band. It further noted that Kepler's initial technical studies failed to consider this issue, as they only examined a single interfering link rather than multiple user terminals in an area.

Our assessment

- 3.18 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.
- 3.19 In our decision-making, we consider technical analysis alongside other measures taken by an applicant to reduce its risk of harmful interference, such as coordination discussions with

¹¹ Equivalent isotropic radiated power (EIRP) is a measure of the strongest power emitted in a given direction from an antenna.

¹² See [Starlink's response](#) to the Kepler consultation. Starlink used the same parameters for Kepler's NGSO system as Kepler used in its initial technical studies.

¹³ These interference values can occur either regularly (when the percentage of time is 20% or more, referred to as long-term interference) or occasionally (when the percentage is between 0.001% and 1.0%, referred to as short-term interference), while showing a system still operates effectively.

other NGSO systems. As noted below, Kepler continues to progress its coordination discussions with other satellite operators. We are therefore assured that Kepler is taking reasonable measures to reduce its risk of harmful interference.

- 3.20 Further, we note the responsibility for ensuring that satellite operators comply with their ITU obligations, including managing coexistence between satellite filings, ultimately rests with the notifying administration responsible for the NGSO system (see paragraphs 3.2 and 4.12 for an overview of the relevant elements of the ITU regulatory framework). For Kepler's NGSO system the notifying administration is ISED (Innovation, Science and Economic Development Canada).
- 3.21 As set out in paragraph 2.9, in view of the stakeholder responses to the Kepler consultation, in the Kepler letters we asked for clarification of the assumptions in its initial technical studies. We have considered stakeholder responses on Kepler's capability to technically coexist with other NGSO systems and Kepler's replies to the Kepler letters as discussed in relevant paragraphs below. In addition, we note in paragraph 2.6 that Kepler has already launched satellites in space, so would be able to provide services in the UK immediately following this licensing decision. We have therefore also taken note of the potential for immediate impacts on other already operational NGSO systems in our assessment below.

Progress of coordination discussions

- 3.22 In light of the coexistence concerns raised by respondents, we requested an update from Kepler on its coordination discussions with existing NGSO licensees, noting that it can take some time to reach coordination agreements. Since the consultation, both Kepler and Starlink confirmed in their responses they have reached an ITU coordination agreement. Kepler confirmed it is also continuing its coordination efforts with Eutelsat OneWeb.
- 3.23 We also sought clarification on Kepler's coordination discussions for the specific co-frequency earth stations registered with the ITU to show it is able to coexist. Kepler confirmed in its response to the Kepler letters that it has initiated discussions and will continue efforts to meet licensing and coexistence obligations for the specific co-frequency earth stations falling under No. 9.7B of the ITU Radio Regulations.
- 3.24 We consider that an ITU coordination agreement provides sufficient evidence that coexistence is possible between two parties.¹⁴ In case of compliance issues with existing coordination agreements, the corresponding notifying administrations can use the ITU process to resolve them. Further, we may use our enforcement powers in cases where NGSO licensees fail to cooperate to achieve coexistence under licence condition 8.2. We encourage Kepler to continue engaging with other existing NGSO licensees to resolve outstanding coordination issues.

Kepler's technical studies did not examine scenarios demonstrating highest potential for interference

- 3.25 We note one confidential respondent raised no issues with Kepler's NGSO system given that it operates in a different band to Kepler.
- 3.26 We also note Starlink's residual concerns with the ability of Kepler's NGSO system to coexist with its system, as outlined in its updated response in September 2024, despite reaching a coordination agreement with Kepler. However, as noted at paragraph 3.24, we consider that

¹⁴ Section 2.7-2.9 of our [NGSO licensing guidance](#).

where compliance issues with that agreement arise, they can be raised through the relevant notifying administrations to be addressed under the ITU process, or where harmful interference arises in the UK we can step in to enforce NGSO network licence conditions.

- 3.27 To further address the coexistence concerns raised by respondents, in the Kepler letters we also asked Kepler to update its analysis to demonstrate:
- technical characteristics reflecting a range of parameters for the Kepler NGSO system which show the highest potential for interference in the UK (in other words the worst case interference scenario, through for example, combinations of antenna gains and power levels that Kepler proposes to use in its UK operations);
 - the impact of a wider range of earth station parameters showing how they might operate in practice in the UK; and
 - the impact on incumbent operators' links that are more sensitive to interference.
- 3.28 In its [responses to the Kepler letters](#), Kepler explained the difficulty in identifying the highest potential for interference with other NGSO operators without sharing information together, and so it has focussed its efforts on coordination discussions to date. It provided what Kepler considered to be a representative dynamic scenario in its initial technical studies, and noted that any additional interference analysis requires both parties to share the relevant technical parameters demonstrating how each system works.
- 3.29 To respond to our concerns, Kepler also provided a second technical study, which adjusted some of the parameters it modelled. Kepler considered its second technical study represents the maximum operational parameters of how it intends to operate its NGSO system in the UK. Kepler presented this as an overly conservative description of its NGSO system and stated that its satellites will never continuously operate at maximum emergency power for the five day duration used in its simulation. In its words, it "mostly describes how Kepler's second-generation satellites will operate in emergency and backup situations".
- 3.30 Kepler's different approaches to potential interference scenarios used in the initial and second technical studies (as it described in its responses), are summarised as follows:
- The first technical studies supporting its application used parameters taken directly from ITU satellite filings to characterise the Kepler system. Kepler noted that using the highest power levels permitted in their ITU filing would show the "absolute worst possible scenario ... but not consider actual operations".
 - The second technical study (provided in confidence) employed operational parameters for Kepler that fall within the envelope of its satellite filings, as well as parameters obtained from coordinating with the other NGSO operator to provide what Kepler considered "a more realistic outlook" as a "potential operational worst case".
- 3.31 Having assessed Kepler's second technical study, we observed that despite being asked to adopt more pessimistic assumptions¹⁵, the resulting impact of Kepler's NGSO system on other NGSO systems is smaller than the findings from its initial technical studies. Kepler's

¹⁵ Specifically, in its second technical study Kepler used a higher antenna gain for the interfering transmitter and victim receiver, which would reduce long term interference. Kepler adopted a more sensitive victim receiver, and also used lower interferer transmitter EIRP power.

different approaches to its studies as outlined above, provide an explanation as to why its second technical study resulted in increased compatibility.

- 3.32 We have considered the consultation response and Kepler's replies to the Kepler letters. The second technical study showed that coexistence is possible with the confidential respondent's NGSO system under what Kepler has described as worst case operational conditions in the UK. Given this, we accept Kepler has sufficiently demonstrated that its NGSO system should be capable of coexisting with existing NGSO systems where it follows the approach it has described. We consider that the precise impact on another NGSO system, as well as potential deviations from the approach described, is best addressed through coordination agreements and encourage parties to continue to engage in these discussions. Where NGSO licensees fail to cooperate to achieve coexistence under licence condition 8.2, we may use our enforcement powers.
- 3.33 Regarding the issue of aggregate interference from both gateway and user terminals operating in close proximity to each other, we note that Kepler does not currently operate gateway earth stations in the UK, and has stated it has no plans to do so. We are therefore satisfied that there is no current risk arising from Kepler terminals and gateways operating in close proximity to each other. Should Kepler's plans change, it would need to apply for an NGSO gateway licence and we would assess any future risk at that time.
- 3.34 On the need for Kepler to consider multiple interfering links in its analysis, we note it is typical for applicants to submit analysis considering only one interferer to demonstrate their ability to coexist. Detailed system-specific coexistence analysis is 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.

Coexistence with future NGSO systems

- 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 Kepler stated in its NGSO licence application that it integrates substantial flexibility into its system design and operations. It explained how each Kepler satellite is equipped with software-defined radio (SDR) enabling it the capability to dynamically adjust transmission

parameters on-orbit. This enables dynamic frequency channelisation, by rapidly and efficiently adjusting transmit power, channel centre frequencies and channel bandwidths.

- 3.38 After considering Kepler’s proposed approach, we set out our initial view in the Kepler consultation that its NGSO system as described should be capable of coexisting with future NGSO systems. 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 systems reasonable?

Consultation responses

- 3.39 A confidential respondent welcomed Kepler’s in-house SDR technique to facilitate flexible coexistence with future systems, but sought clarity on how it will be used and what plans (if any) Kepler has to modify its transmitting characteristics to accommodate other systems.

Our assessment

- 3.40 In the Kepler letters, we asked Kepler to further explain how Kepler’s system design and operating model shows it is technically capable of coexisting with future NGSO systems. We explained this might include any plans Kepler has to adapt its transmitting characteristics to facilitate flexibility or modify its current antenna design.
- 3.41 In its response, Kepler restated that its NGSO system uses SDR to optimise transmission parameters. Kepler explained that its NGSO system is designed to implement mitigation measures including the use of opposite polarisation and dynamic frequency adjustments. This means Kepler’s NGSO system may be capable of switching between polarisations to ensure efficient coexistence with other future NGSO operators, by isolating its signals from other systems operating within the same frequency band. In addition, Kepler detailed its NGSO system’s technical flexibility, including adaptive output power and beam steering, and use of frequency channelisation to avoid overlapping frequencies so that its NGSO system is able to adjust its operating frequencies if necessary.
- 3.42 Kepler acknowledged the expectation that it should reasonably accommodate new NGSO licensees and indicated its intention to comply with all such conditions in good faith. It stated that the exact techniques it would implement will be determined through coordination discussions with other operators, so that relevant operational parameters are considered.

Conclusion on NGSO coexistence

- 3.43 We consider that Kepler’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. In reaching this conclusion, we have taken account of all consultation responses, Kepler’s approach to coexistence set out in [annex 1](#) and [annex 3](#) to its NGSO licence application, the additional information Kepler has provided in response to the Kepler letters, and the status and/or progress of its coordination agreements and discussions. We are also satisfied that Kepler can meet the conditions in our NGSO network licence (including those summarised in paragraph 2.4 above) and that these conditions provide us with the necessary powers to intervene to resolve harmful interference if required.
- 3.44 Noting Kepler has already deployed 20 satellites, we remind it of its obligation to cooperate with other NGSO licensees to ensure its ability to coexist prior to deploying terminals in the UK. We believe ITU coordination agreements are the best route to achieve this. Where ITU coordination discussions are still ongoing, we encourage all parties to engage proactively 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, and may use our enforcement powers in cases where NGSO licensees fail to cooperate to achieve coexistence under licence condition 8.2.

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 (or adjacent) frequencies. To demonstrate coexistence, 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.¹⁶ 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 and 14.47-14.5 GHz; and
- fixed links in the 17.7-19.7 GHz band.

4.3 Kepler outlined in its NGSO application how its system would protect these other services:

- **GSO systems** – Kepler stated it will protect GSO services “by avoiding transmissions from its system in predetermined NGSO-centric azimuth and elevations as a function of sub-satellite latitudes”, and will coordinate with GSO earth stations in the applicable bands where threshold conditions are met. It considered there is a mutually beneficial effect of avoiding inline and near-inline event for both Kepler and the ‘victim’ GSO earth stations.
- **Radio astronomy** – Kepler noted that it will take all practicable steps to protect radio astronomy stations from harmful interference, by operating its system in compliance with the requirements set out by Ofcom and working cooperatively with the radio astronomy community to resolve any potential interference concerns.
- **Fixed links** – Kepler confirmed that it is not currently seeking to provide services in the Ka band.

4.4 Our initial view was that Kepler’s NGSO system would be capable of protecting GSO services and radio astronomy (as Kepler does not operate in the Ka band it would not affect fixed links operating in 17.7-19.7 GHz). We asked stakeholders the following question:

Consultation question 3

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

¹⁶ We updated our [NGSO network licences in September 2023](#) to include condition 3.7(p) which requires NGSO satellites to comply with the relevant equivalent power flux density (EPFD) limits in Article 22 of the ITU Radio Regulations. A similar condition was included in NGSO gateway licences (condition 3.1(d)).

Consultation responses

- 4.5 Two respondents provided comments on question 3 - both responses were confidential. One respondent welcomed Kepler's efforts to coordinate in good faith and noted that further clarity may be needed on how coexistence with other services will be achieved.
- 4.6 The second respondent raised issues about both international ITU obligations and national licence conditions. It considered that Kepler's NGSO licence application poses coexistence challenges for existing GSO operators, particularly in relation to single-entry and aggregate interference. It further sought commitments on how Kepler will adhere to Article 22 power limits, and on how Kepler proposes to protect GSO networks in the parts of Ka band not included in Article 22.
- 4.7 This respondent also raised concerns about the growing number of NGSO network licences being granted and the impact this may have on GSO operators. Specifically, it expressed concern that the growing number of licences increases the risk of relying on the international regulatory framework (under Resolution 76 of the ITU Radio Regulations) to protect GSO operators. It noted the ITU's plans to initiate bilateral meetings among NGSO operators to manage aggregate interference matters, but is concerned that this process will not include GSO operators and is not yet operating, so its effectiveness remains unproven. It therefore sought clarification on how we intend to safeguard GSO operators in the UK from potential aggregate interference, and requested we use our right to participate in these bilateral meetings as one way of doing so.
- 4.8 Lastly, it asked about the status of our proposed independent measurement facility, for monitoring both single-entry and aggregate EPFD from multiple, co-frequency NGSOs.

Our assessment

- 4.9 We note the first confidential respondent's uncertain position on Kepler's ability to coexist with other services, though it did not provide any evidence to demonstrate Kepler was unable to coexist with GSO networks or radio astronomy operating in Ku band. We did not receive any other comments on Kepler's ability to coexist with radio astronomy, so continue to remain satisfied that Kepler is capable of protecting those services.
- 4.10 Kepler has also confirmed in response to the Kepler letters that it will only be operating services in Ku band in the UK. The concerns raised about other Ka band frequencies not covered by Article 22 are therefore outside the scope of our assessment of Kepler's NGSO licence application so are not considered here.
- 4.11 In relation to protecting GSO networks, Kepler flagged in its responses to the Kepler letters that it has received a favourable finding from the ITU for coordination with other GSO networks subject to EPFD regulations. We are aware that the growing number of NGSO systems operating in the UK has the potential to increase the risk of harmful interference, and note GSO operators' concerns. However, we consider that our national NGSO licensing process, together with the relevant international rules and obligations, provide a framework for managing this risk and addressing any issues should they arise. We address the international and national issues that the second confidential respondent raised below.

International obligations

- 4.12 As set out in previous NGSO licensing statements, it is reasonable for us to expect Kepler will comply with the ITU Radio Regulations and protect GSO networks under the relevant provisions, specifically Article 22 and Resolution 76. The notifying administration responsible for the NGSO system is ultimately responsible to ensure such compliance. Our NGSO licensing process is intended to reinforce the ITU process and does not seek to replace it; we include conditions in UK licences where appropriate. The ITU process under Resolution 76 is being determined internationally, including the methodology for calculating aggregate interference. We are part of those ongoing discussions, and our licence conditions require NGSO licensees to protect UK GSO operators.
- 4.13 With regard to safeguarding the rights of GSO operators in international meetings convened to address aggregate NGSO interference, we agree it is important for notifying administrations to cooperate to address this issue. Under Resolution 76, the proposed consultation meetings are multilateral meetings between the relevant notifying administrations, rather than NGSO operators. Where the UK is involved in such meetings as a relevant notifying administration, we will represent the views of relevant GSO and NGSO operators.
- 4.14 We also note that granting Kepler's NGSO network licence brings us to three NGSO systems licensed to operate terminals in the Ku band in the UK. This remains below the number assumed to derive the single-entry limit thresholds in Article 22 from the aggregate ones in Resolution 76, which is 3.5. Further, Kepler has no plans to deploy NGSO gateways in the UK. Therefore, we consider granting Kepler's NGSO network licence presents a low risk of interference for GSO networks operating in the Ku band, since NGSO network licensees are required to respect both single-entry limits and aggregate limits and our NGSO licences provide a basis for us to take direct action if required.

National licence conditions and enforcement

- 4.15 As explained in paragraph 4.2 above we expect all NGSO network licensees to comply with Article 22 under licence condition 3.7(p) to protect existing services including GSO networks when operating within the UK. We are satisfied that this gives us sufficient power to act should coexistence concerns arise and enforcement be necessary. Under our general licence conditions (in [Ofw 597](#)), we may use our powers to access and inspect sites, revoke licences, or we may modify, restrict, or closedown services. Where NGSO network licence conditions are breached, we can impose financial penalties, or licensees may also face criminal prosecution. Further, harmful interference into licensed networks can be reported to our [Spectrum Monitoring Centre](#).
- 4.16 Lastly, we are developing the UK's capabilities to detect and manage harmful interference into receiving earth stations at our Baldock monitoring site, in collaboration with satellite operators. Our work is ongoing and will be used to support investigations when required.

Conclusion on coexistence with other services

- 4.17 Having assessed Kepler's NGSO application and stakeholder responses, our view remains that Kepler's NGSO system is capable of protecting GSO networks and radio astronomy.

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 given 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

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 services.

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

- **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 Kepler'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 enforcement powers to remedy situations in which one or more UK licensed NGSO operators failed to coordinate in good faith (through our NGSO licence conditions requiring licensees to cooperate with each other so they can coexist). Our preliminary view was that this should alleviate any concerns over the potential for this risk to materialise from Kepler's NGSO licence application.

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

Benefits

5.7 In the Kepler consultation our general view was that granting NGSO network licences is likely to benefit UK customers and consumers, 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).

- 5.8 Our preliminary view was that the Kepler NGSO system has the potential to provide services that provide further connectivity options for UK consumers. We asked stakeholders the following question:

Consultation question 4

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

Consultation responses

- 5.9 We received two responses to question 4 – one confidential, and a non-confidential response from Starlink. The confidential respondent generally welcomed an open and competitive market where users have access to a wide range of services. However, Starlink noted that the coexistence and cooperation challenges discussed under its response to question 1 have the potential to harm competition.
- 5.10 In addition, respondents provided views on coexistence between current and future NGSO systems, and protecting GSO services under questions 1, 2 and 3. These responses are also relevant to our competition assessment and are summarised in previous sections.

Our assessment

- 5.11 As set out in section 3 where we assess coexistence of NGSO systems, we consider Kepler’s NGSO system is capable of coexisting with both existing and future NGSO licensees. In addition, our assessment in section 4 concludes that Kepler’s NGSO system is also capable of protecting other services such as GSO networks and radio astronomy.
- 5.12 Starlink raised a specific concern about Kepler’s ability to meet our licence condition to cooperate, based on Starlink’s experience with Kepler in other jurisdictions (see paragraph 3.12). Given that a coordination agreement between Starlink and Kepler has since been implemented, the relevant notifying administrations can use the ITU process to resolve compliance issues with existing coordination agreements. We are also equipped through our enforcement powers to remedy situations in which one or more NGSO licensees fail to cooperate with other NGSO licensees. We encourage Kepler to continue engaging with other existing NGSO licensees to resolve outstanding coordination issues.
- 5.13 We also maintain our view that Kepler’s NGSO system has the potential to offer services that provide further connectivity options for UK customers, consumers and citizens.

Conclusion on competition

- 5.14 We consider the 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 UK customers, consumers and citizens.

6. Additional comments

Additional comments

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

Consultation question 5

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

Consultation responses

- 6.2 We received one confidential response to question 5 relating to the scope of Kepler's NGSO licence application, having noted Kepler's previous licence included both Ku and Ka band frequencies, and that [annex 1](#) referred to continuing to operate in both Ku and Ka bands. It requested that if both frequency bands are in scope, we ensure Kepler coordinates with it and that Kepler updates its technical studies with relevant Ka band analysis (the respondent also specified some of the technical parameters it would wish to see analysed).

Our assessment

- 6.3 The technical studies in Kepler's NGSO licence application only focussed on the Ku band. We asked Kepler to clarify this issue in the Kepler letters, and it confirmed that it only intends to operate in the Ku band in the UK. We have therefore assessed this application and Kepler's ability to coexist with other NGSO systems and other services on this basis, and consider coordinating with Ka band NGSO licensees out of scope.
- 6.4 Should Kepler wish to use Ka band frequencies for its NGSO system in the future, it would need to request a licence variation through our NGSO licensing process. We would expect to repeat this process, assessing Kepler's relevant supporting documents to demonstrate it is capable of coexisting with other NGSO systems and services in the Ka band.

7. Our decision

How we decide whether to grant an NGSO network licence

- 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;
 - 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.¹⁷

Equality and Welsh language impact assessments

- 7.3 In April 2024, we adjusted our NGSO licensing process to include our equality and Welsh language impact assessments as part of our consultations. Our consultation on Kepler’s NGSO network licence was published before this change was implemented on 22 March 2024 and therefore it did not contain our equality and Welsh language impact assessment. We have now set out our assessment in annex 1 of this statement.
- 7.4 We have assessed the likely impacts and benefits of granting Kepler’s NGSO network licence on specific groups of persons, including those sharing protected characteristics, and on the Welsh language. In our assessment, we considered it was likely to have an overall positive impact for citizens and consumers, by enabling a range of connectivity services in the UK which will help to improve equality of opportunity in those areas. We did not identify any adverse impact on either our Welsh language obligations or persons sharing protected characteristics, that are likely to be affected in a different way to the general population. We set out our full reasoning in annex 1 of this statement.

¹⁷ 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).”

Our decision and next steps

- 7.5 In light of the evidence presented in Kepler’s NGSO licence application, additional information provided in response to the Kepler letters, and our careful consideration of potential coexistence and competition issues, impact assessments and consultation responses, we have decided to grant Kepler an NGSO network licence to operate its NGSO system in the Ku band in the UK.
- 7.6 We will now proceed to issue Kepler its new NGSO network licence to operate in Ku band frequencies 14-14.5 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 webpage](#).

A1. Impact assessments

Impact assessment

- 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 Kepler throughout the consultation and decision process. We assessed the benefits of Kepler'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 section 2 of the [Kepler consultation](#). We set out our assessment and final decision in sections 3-7 of this statement, taking into account Kepler's NGSO licence application, comments we received in response to our consultation, and additional information from Kepler.
- A1.4 As outlined in sections 3, 4 and 7 above, we have concluded that our decision to grant Kepler an NGSO network licence is likely to have an overall positive impact for consumers, customers and citizens by enabling a range of connectivity services for businesses in the UK, including for IoT and data transfer (see [annex 1](#) of Kepler's NGSO licence application). We do not consider that our decision will have a detrimental impact on stakeholders. We also consider that Kepler is unlikely to cause harmful interference to other services in the frequencies it intends to use, our NGSO licence conditions require licensees to cooperate with each other so they can coexist, and we are able to use our enforcement powers to remedy any issues that arise.

Equality impact assessment

- 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 view this more broadly than persons that share protected characteristics identified in equalities legislation, to include 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 We have assessed the impacts and benefits of granting Kepler’s NGSO network licence on specific groups of persons, including those sharing protected characteristics. We consider that our decision to grant Kepler’s 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 (given Kepler’s constellation will provide coverage over the whole of the UK). 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.

Welsh language impact assessment

- 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).¹⁸
- 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 Kepler an NGSO network licence will not have any negative impacts 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. The proposal has the potential to increase connectivity which may provide more Welsh language opportunities.

¹⁸ 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.