
Non-geostationary satellite systems

Licensing updates

STATEMENT:

Publication date: 10 December 2021

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1. Overview

One of our major priorities is getting everyone connected. We want to make sure people and businesses can access key communications services and to improve access to broadband services in the hardest to reach areas. Playing a role in advancing this priority is the deployment of new satellite systems operating in non-geostationary orbit (NGSO). These systems are creating new high-capacity connections for people and businesses across a range of services including home broadband, Wi-Fi onboard aircraft, ships and trains; backhaul for mobile phone services and Internet of Things for enterprises in remote areas. In addition, these NGSO systems offer lower latency and greater capacity, enabling service improvements compared to previous broadband satellite solutions.

We support these innovative solutions and want to enable as many NGSO systems as possible, to provide services and increase choice for people and businesses in the UK. However, NGSO systems may also create new spectrum management challenges. To address these challenges, we set out our proposals earlier this year to update our approach to licensing NGSO systems.

What we have decided – in brief

The licences affected are:

- **Satellite (Earth Station Network):** These “network licences” allow the use of NGSO **user terminals**, for example the dish and equipment installed at a customer’s premises, and must be held by any satellite operator wishing to deliver services in the UK.
- **Satellite (Non-Geostationary Earth Station):** These “gateway licences” authorise **gateway** earth stations which are hubs that connect the satellite network to the internet and/or to private networks and cloud services.

We are introducing a new **application process** for these licences. We will:

- include a check to support our objective to authorise NGSO systems that are able to coexist without degrading user services;
- include a check to guard against any restriction of competition that may arise from granting the licence;
- publish licence applications and allow a period for comments where stakeholders can provide information regarding interference or competitive impact.

The new **licence conditions** in both future and existing network and gateway licences will:

- require technical cooperation between NGSO licensees;
- enable us, where required, to manage local cases of interference that are impacting services thereby protecting UK consumers;
- require gateways to only operate with an NGSO satellite system authorised under a network licence; and
- require gateways to commence and maintain transmissions within 12 months.

To ensure that all relevant satellite equipment will be subject to these updated rules we will begin the process to remove an existing licence exemption for user terminals operating in Ka band.

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- 1.1 Stakeholders generally agreed with our assessment of the challenges arising from new NGSO systems and the risk of interference between them. However, they expressed a range of views on how best to address these challenges through our new licence application process and licence conditions, including whether a new process is necessary and how the process would interact with ITU procedures. Many also requested additional detail about our proposals.
- 1.2 In response to stakeholder feedback, we have provided further guidance on the coexistence and competition checks that will be undertaken as part of the new process, and on relevant information that stakeholders should provide as part of this process.
- 1.3 We also reemphasise that the decisions in this document do not change or replace our international responsibilities, including those under the ITU Radio Regulations. In particular, we remain committed to its responsibilities for managing UK satellite filings. In addition, this new UK licensing process does not remove any other obligations that operators may have in relation to satellite filings made under the ITU Radio Regulations. For example, they do not remove the obligation that later filings have to make appropriate efforts in achieving coordination with earlier filings, and regardless of filing date, the importance of all operators working in good faith to reach coordination agreements.

Next steps

- 1.4 We had suspended the NGSO licensing process but following publication of this statement, will now resume issuing NGSO licences according to the process set out in this statement.
- 1.5 We will also take steps to vary the small number of existing NGSO network and gateway licences in accordance with the decisions in this statement.

Looking ahead

- 1.6 The nature of NGSO systems will continue to develop, with future generations already being planned with more satellites, new frequency bands, greater use of inter-satellite links etc. These changes could bring further benefits to people and businesses and/or introduce additional or different regulatory challenges. One such challenge, raised by a number of stakeholders is how NGSO satellite systems coexist with other spectrum users, including GSO satellites and radio astronomy users.
- 1.7 We will consider these wider and longer-term implications of NGSO systems as part of our forthcoming Space Spectrum Strategy. One specific area we expect to review in our future work is the availability of spectrum for satellite communications, including NGSO and GSO satellite services.

The overview section in this document is a simplified high-level summary only. The decisions we have taken and our reasoning are set out in the full document.

2. Introduction

- 2.1 Ofcom’s overall mission is to make communications work for everyone and one of our strategic priorities is getting everyone connected. We want to make sure people and businesses in the UK can access key communications services, including improving access to broadband services in the hardest-to-reach locations. This mission aligns with our duties to further the interests of citizens and consumers, where appropriate by promoting competition and securing the optimal use of the radio spectrum.
- 2.2 Playing a role in advancing this priority is the deployment of new satellite broadband systems operating in non-geostationary orbit (NGSO). NGSO satellite systems are creating new high-capacity connections for people and businesses across a range of services including consumer broadband, Wi-Fi on board aircraft, ships and trains; backhaul for mobile phone services and Internet of Things (IOT) for enterprises in remote areas. We support these innovative solutions and want to enable as many of these systems as possible, to provide services and increase choice for people and businesses in the UK. However, NGSO systems may also create new challenges which we need to address to ensure these benefits can be fully realised.
- 2.3 In light of this, in July we consulted on proposals to update our spectrum licensing processes and conditions for NGSO satellite systems in our consultation document, [Non-geostationary satellite systems: licensing updates](#) (‘the consultation’). These proposals were intended to manage the risk of radio interference between NGSO satellite systems, which can impact the quality and viability of satellite services, as well as to safeguard competition. We considered it important and necessary to make these changes now as NGSO systems begin rolling out.
- 2.4 Our consultation closed on 20 September and we received 29 responses from stakeholders. We published the 26 non-confidential responses on our website, and also received three confidential and one partially confidential response. Having fully considered stakeholders’ responses, this statement sets out our decisions on updating our licensing approach for NGSO systems.
- 2.5 In the rest of this section we explain satellite broadband systems and the significance of NGSO systems in particular; set out our role and how the decisions in this document relate to our international responsibilities; confirm the scope of our decisions; and outline the structure for the rest of this document.

Provision of satellite services is changing

- 2.6 Satellite broadband services have been available for many years and have so far had a relatively modest take-up in the UK.¹ They can offer near universal coverage in the UK so are particularly helpful for delivering high capacity connections to people and businesses in

¹ There were 28,000 home broadband connections delivered via satellite in the UK at the end of 2019. Source: [Communications Market 2020](#)

hard-to-reach places. Satellite connections can be direct-to-premises (e.g. consumer broadband services) or can extend the reach of terrestrial networks by providing backhaul to remote mobile base station sites or supporting enterprise IOT. The wide area coverage of satellite services makes them idea for delivering Wi-Fi on board ships, aircraft and trains, particularly in areas where terrestrial networks are not available.

- 2.7 Such services have traditionally been delivered by satellites in geostationary orbit (GSO), around 36,000 km above the earth’s equator. This means they remain in a stationary position relative to the earth (revolving at the same speed and direction), but because they are some distance away, the services experience some delay in round trip communications (higher latency) and have lower capacity.
- 2.8 We are now seeing the development of satellites in NGSO, which move in relation to the earth’s surface, and offer lower latency services because they are much closer to the earth (sometimes a few hundred kilometres). Additionally, as NGSO satellite systems comprise a constellation of many satellites (which could number hundreds or even tens of thousands of satellites) to ensure continuous connection, the total capacity of an NGSO satellite system can be higher than for a single GSO satellite. These factors lead to higher speeds and/or more users being served, which may improve the consumer experience.
- 2.9 However, the more dynamic nature of NGSO systems, the large number of satellites involved, along with the current lack of agreements between operators, all serve to increase the risk of interference between satellite systems. These factors have prompted our consideration of the NGSO licensing process and licence conditions.

Our regulatory role

- 2.10 Ofcom is the UK’s communications regulator and our duties are set out in statute. Our principal duty is to further the interests of citizens and consumers in relation to communications matters. We are also responsible for managing the UK’s radio spectrum to support a wide range of electronic communications services across the UK. This role includes authorising access to spectrum; managing and enforcing the rules under which people are permitted to use radio frequencies; as well as representing the UK’s interests in international forums on spectrum use. Further information about our legal framework is set out in Annex A1.
- 2.11 We note in Annex A1 that there are two levels to the regulation of spectrum use – radio interference that arises internationally and radio interference within the UK. We are active at both levels, but the decisions in this document only deal with the regulation of radio frequencies under the UK regulatory framework.

Relationship between the decisions in this document and our ITU role

- 2.12 The International Telecommunications Union (ITU) is a specialised agency of the United Nations which oversees the international allocation of spectrum, and the Radio Regulations are the rules that aim to achieve efficient use of the radio frequencies internationally. The ITU also has a satellite filing system for registering internationally (in its master register)

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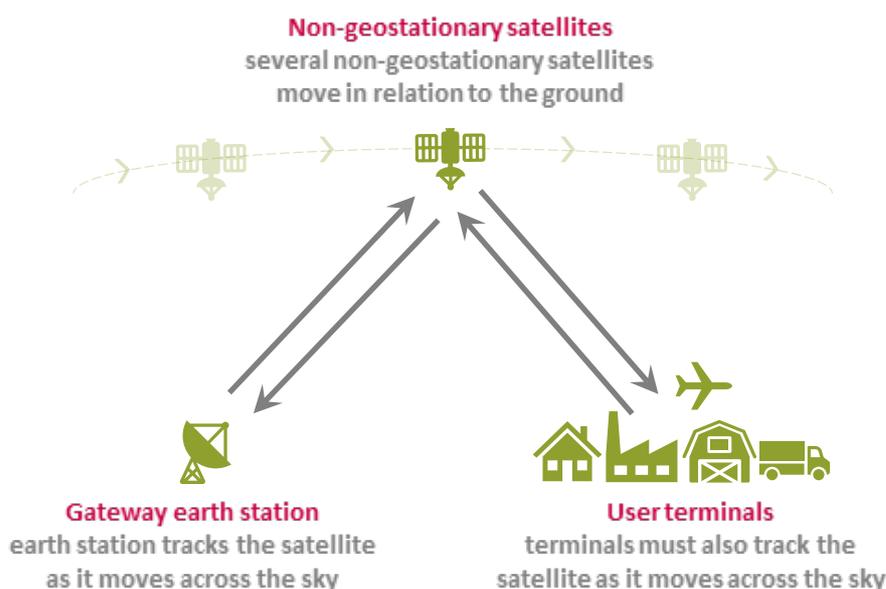
the orbital position and radio frequencies used by satellites. We represent the UK at the ITU and a specific aspect of our role is to manage filings for satellite orbital positions and radio frequencies on behalf of the UK (see Annex A1 for more details).

- 2.13 The decisions in this document on how we will license NGSO earth stations under the UK regulatory framework do not change or replace our international responsibilities, including those under the ITU Radio Regulations.
- 2.14 In particular, the decisions on licensing that we make in this document do not affect our role in managing UK satellite filings and our responsibility for a number of UK NGSO satellite filings with the ITU. In this role we support satellite operators with their ITU filings and take such action as may be necessary to protect UK filings. This can include assisting with coordinating their systems with other operators and administrations and helping to resolve disputes where necessary.
- 2.15 In addition, these licensing decisions do not remove any other obligations that any operators may have in relation to satellite filings made under the ITU Radio Regulations (regardless of the administration that the filing was made through). For example, they do not remove the obligation that later filings have to make appropriate efforts in achieving coordination with earlier filings, and the importance of all operators, regardless of their filing date, working in good faith to reach coordination agreements.

Scope of the decisions in this statement

- 2.16 For the purposes of clarification, we set out below which satellite licences, frequencies and services are affected by the decisions in this statement. This is to address various requests from respondents to clarify the scope of our consultation proposals.
- 2.17 The key elements of an NGSO system are shown in Figure 1 below.

Figure 1: Key elements of an NGSO satellite system



Relevant licences

2.18 We do not issue licences for radio transmissions by satellites in space. Spectrum use by satellites is coordinated by the ITU. The other elements – user terminals and gateway earth stations – are authorised in the UK by Ofcom using the following licences. These are the only licences affected by the changes outlined in this statement:

- Satellite (Earth Station Network) licence: these allow the use of NGSO user terminals, for example the dish and equipment installed at a customer’s premises and must be held by any satellite operator wishing to deliver services in the UK. We refer to this as the ‘**network licence**’ in this statement.
- Satellite (Non-Geostationary Earth Station) licence: these authorise gateway earth stations which are large hubs that connect the satellite network to the internet and/or to private networks and cloud services. We refer to this as the ‘**gateway licence**’ in this statement.

Relevant frequencies

2.19 The relevant frequencies for the decisions in this statement are as follows:

- **Network licence:** For land stations operating with NGSO satellites, the frequency ranges available for uplink (transmit) are: 14.0-14.25 GHz, 27.5-27.8185 GHz, 28.4545-28.8265 GHz, and 29.5-30 GHz. For aeronautical earth stations operating with NGSO satellites, the frequency range is 14.0-14.25 GHz.
- **Gateway licence:** The frequency bands available for uplink (transmit) are 14.0-14.5 GHz, 27.5-27.8285 GHz, 28.4445-28.8365 GHz, 29.4525-30 GHz. The corresponding downlink frequencies are 10.7-12.75 GHz and 17.3-20.2 GHz.² Where applications for gateway licences include receive frequencies for the earth stations, we generally only take into account and coordinate these in bands shared with fixed links if the total amount of receive bandwidth does not exceed the total amount of transmit bandwidth.

2.20 Other bands, including Q, V and X bands, are not currently in scope for the changes in this document, as further explained at Annex A2.11.

Relevant satellite services

2.21 The licences covered by the updates to our licensing framework only reference certain bands allocated to the Fixed Satellite Service (FSS). Therefore, other satellite services are not currently in scope, as explained at Annex A2.8.

² We intend to reflect the applicable frequency bands in our [Spectrum Information System](#) and Limitations Order at the next opportunity.

Relevant orbits

- 2.22 Our consultation mentioned a number of NGSO satellite systems operating in Low Earth Orbit (LEO), as this is where we are seeing significant changes in the market. However, our licensing process is also relevant to any other type of NGSO system (e.g. Medium Earth Orbit (MEO) and Highly Elliptical Orbit (HEO)) and for other types of use where these fall under the authorised frequencies in the affected NGSO network and gateway licences.

Space spectrum strategy

- 2.23 We will be consulting on our spectrum strategy for the space sector early in 2022, which will discuss our proposed spectrum management work in the space sector over the coming years. As part of this we will be considering the wider and longer-term implications of NGSO satellite systems, looking beyond the immediate licensing changes introduced by this statement. This will include looking at where the international framework could be improved to support further growth of NGSO systems, and whether we should look at making additional bands available for satellite (including NGSO) use in the UK. We will also continue to engage with stakeholders to understand their plans for future generations of NGSO systems as part of this review.

Structure of this document

- 2.24 Section 3 describes the challenges raised by NGSO systems and explains why we are making changes to our licensing approach.
- 2.25 Sections 4 to 6 set out our decisions and reasoning, including responding to the points raised by stakeholders:
- Section 4 covers our new NGSO licence application process.
 - Section 5 discusses the new licence conditions for network and gateway licences.
 - Section 6 examines our proposal for removing Ka band exemptions for ESOMPs and HDFSS from the WT Act Regulations.
- 2.26 Section 7 sets out a summary of our decisions and next steps for implementing these decisions, including reopening our licence application process and the supporting documents we will make available.
- 2.27 The [statement annexes](#) have been published separately.
- Annex A1 explains our legal framework.
 - Annex A2 addresses stakeholder comments on issues beyond the scope of our consultation.
 - Annex A3 sets out our starting point for the competition check.
 - Annex A4 shows the NGSO network licence including the new licence conditions.
 - Annex A5 shows the NGSO gateway licence including the new licence conditions.
 - Annex A6 shows the general conditions which also apply to these licences, as set out in the Wireless Telegraphy licence conditions booklet OfW597.

3. New challenges raised by NGSO systems and our approach

- 3.1 This section sets out the approach to licensing NGSO satellite systems that we are adopting to manage risks to service quality and competition, with a particular focus on how we will review licence applications to manage interference and support competition.
- 3.2 Additional detail and responses to stakeholder comments about how this approach will be implemented in the licence application process and in the licence conditions of NGSO licences is dealt with in sections 4 and 5 respectively. Any comments out of scope of our NGSO licensing framework are addressed in Annex A2.

The challenges of NGSO systems

- 3.3 As we explain in the previous section, NGSO satellites are set much closer to the earth and move in relation to the earth's surface. Consequently, these networks require a constellation of satellites to ensure a continuous connection, with some NGSO satellite systems in LEO (300-2,000km from the earth's surface) proposing to use hundreds or thousands of satellites.³ These are spaced so that, from any point on the surface, at least one satellite is always visible on a direct line of sight. To achieve a continuous connection, gateway earth stations and user terminals are required to track these satellites as they move across the sky, transmitting and receiving information as they do so.
- 3.4 In the consultation we provided details of some of the commercial NGSO systems currently being deployed or planned (see Table 1 in Section 2 of the consultation).
- 3.5 Given the large number of NGSO satellites that are being deployed by operators, there is a risk of interference caused by satellites from two different operators appearing to be in the same part of the sky. This is referred to as an "in-line event", and the interference can arise on both the user links between the user terminals and the satellite, and the gateway links between the gateway earth station and the satellite, as illustrated in Figures 2 and 3 below. This interference can disrupt the connection between an earth station (i.e. a terminal or a gateway) and the satellite it connects with, impacting the service provided to users.

³ NGSO systems also include constellations operating in MEO (2000-36,000km) and HEO. The process outlined here applies to all NGSO systems wishing to operate in the UK.

Figure 2: Interference between two NGSO systems due to in-line events: user link

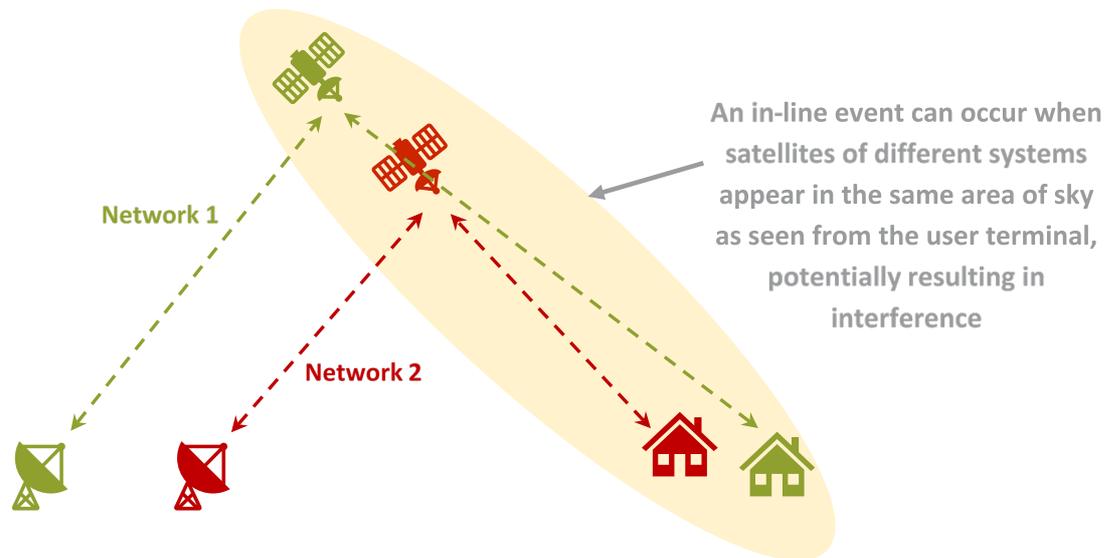
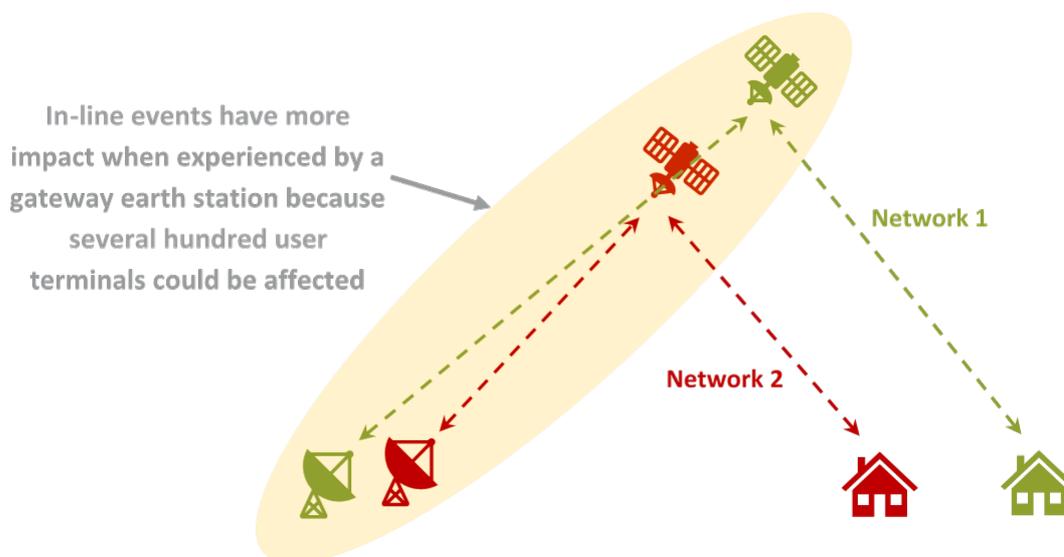


Figure 3: Interference between two NGSO systems due to in-line events: gateway link



Impact of interference on services

- 3.6 Although individual in-line events may only be brief (maybe even just a few seconds), if an in-line event causes interference it can take longer for the terminal to reconnect to the network. This interference could repeat over time, reoccurring in a regular pattern which will depend on the orbits of the respective systems.
- 3.7 The nature of the resulting disruption will depend on a number of factors, including the design of each system, the robustness of user equipment and the numbers of consumers connected to each terminal (interference into a terminal connecting an aircraft or a train may affect more people than a terminal on a house). The practical impact for users could

be on their ability to send and/or receive data, depending on the nature of the interference and the nature of the service being provided.

- 3.8 Because the provision of broadband internet service to users depends on both the user link and gateway link, interference arising on either of these links can disrupt or degrade users' internet connection. However, interference on gateway links would have a much greater impact across the network as each gateway provides connectivity for many users.
- 3.9 Investigation of interference for NGSO systems is also likely to be very challenging due to interference varying in time and geographic location.

Discussion of stakeholder comments on challenges of NGSO systems

- 3.10 We asked stakeholders whether they had comments on our assessment of the interference challenges raised by NGSO systems, and their potential impact. The majority of respondents agreed with our assessment that there was an increased risk of interference between NGSO systems.
- 3.11 However, some stakeholders (aql, Magic Space Dust and SpaceX) felt that we were imposing an unnecessary process to manage a risk of interference that has yet to materialise.
- 3.12 We acknowledge that NGSO systems are at an early stage of deployment. However, at the time of writing, three satellite operators hold network licences for NGSO systems, SpaceX has started offering services to users in the UK, OneWeb has announced plans for UK services in 2022 and Kepler Communications is operating a maritime service in the waters around the UK. Therefore, we consider our proposals for updating licensing conditions and a new process for NGSO applications have been timely. Moreover, it is appropriate that where there is a material risk of interference in the future that could negatively impact consumers, we act proactively to manage this risk.
- 3.13 A number of respondents were also concerned that we had focused on the risks between NGSO operators and had not discussed the risk of interference from NGSO operators to other systems – i.e. GSO systems and radio astronomy. Our response to these issues is discussed in Annex A2.

Mitigating risks to service quality and competition: our proposed approach

- 3.14 In the consultation we set out our proposed approach to mitigate the risk to service quality and competition. Our approach had four elements: encouraging cooperation, managing interference, supporting competition, and acting openly. A high-level summary of our proposals is set out in the table below, alongside where each proposal is addressed in this statement.

Table 1: Summary of our consultation proposals

<p>Encouraging cooperation: We proposed to introduce an explicit licence condition requiring NGSO licensees to cooperate so they can coexist and provide services within the UK without causing harmful radio interference to each other.</p> <p>We also proposed publishing applications for new licences before granting them to improve cooperation between operators in relation to the siting of gateway earth stations.</p>	<p>Section 6, 5.17-5.26</p> <p>Section 4, 4.35-4.43</p>
<p>Managing interference: We proposed two measures to manage the risk of interference adversely impacting NGSO broadband services. We said that we would:</p> <ul style="list-style-type: none"> • Introduce checks when we issue NGSO licences to provide reassurance that coexistence is possible between all systems (existing and new). • Introduce new conditions into NGSO licences enabling us to take action to resolve degradation to services if this were to occur at a particular location or locations in the UK. <p>We also proposed changes to ensure that operators with Ka band user terminals will need to hold a network licence, and so would be subject to the same conditions as those with Ku band user terminals (who already need to hold a network licence).</p>	<p>Section 3, 3.17-3.42</p> <p>Section 5, 5.33-5.44</p> <p>Section 6</p>
<p>Supporting competition: We proposed including a competition check in our process for issuing new licences for gateway and user terminals. We said that this check would need to take account of the technical constraints that the gateway or user terminals could create on future licensees.</p> <p>We also stated that the risk of scarcity of gateway sites can be reduced by introducing a requirement for gateway licensees to commence and maintain transmissions within 12 months.</p>	<p>Section 3, 3.43-3.60</p> <p>Section 5, 5.45-5.53</p>
<p>Acting openly: We also proposed a period for stakeholders to comment on new NGSO licence applications that we intend to grant, as they would have a legitimate interest in the ability for different NGSO satellite systems to coexist.</p>	<p>Section 4, 4.35-4.46</p>

3.15 A number of stakeholders (Arqiva, Inmarsat, Intelsat, Kepler Communications, Lacuna Space, Methera Global) felt there was insufficient information in our consultation around how we would carry out the technical assessment and competition assessment that we proposed. In the remainder of this section, we will address stakeholder comments on these checks, and set out our decisions.

- 3.16 We also provide more information in Section 4, where we explain our new application process, and in our [NGSO guidance document](#).

Managing interference: coexistence check

Our proposal

- 3.17 When issuing new licences, we want to be satisfied that all authorised systems are capable of coexisting (in bands they are using in common), such that they are all able to provide services to their users without experiencing harmful interference.
- 3.18 To that end, one of our proposals (as set out in Table 1 above) was to introduce a ‘check’ when we issue NGSO licences, for applicants to demonstrate that coexistence is possible between all systems (existing and new).
- 3.19 Our intention for the check was not to specify how this coexistence should be achieved. We believe that this is best determined by the companies involved, including through the ITU process for coordinating satellite systems.
- 3.20 Applicants could demonstrate coexistence is possible preferably by stating that an agreement with the other party already exists, or by providing technical evidence that it is possible for all systems to coexist.
- 3.21 When applying for a licence, we proposed that applicants would need to demonstrate:
- a) **Coexistence with other NGSO systems:** applicants would demonstrate how coexistence is possible between their networks and:
 - i) existing NGSO systems that are already licensed in the UK; and
 - ii) NGSO systems that have applied for a licence and whose application has been published for comment.
 - b) **Ability to coexist with future NGSO systems:** Applicants should state what flexibility their system has to achieve coexistence with future networks. This could include the measures they would be able to put in place if another network comes along in the future; it could also suggest measures future networks could reasonably be expected to put in place in order to coexist.

Stakeholder responses

Interaction with ITU process

- 3.22 One of the strongest themes emerging from stakeholders’ responses was about how our proposals to manage interference relate to the rules and procedures in place at the ITU level. However, there were a range of views on this:
- One group of stakeholders said that the existing and developing ITU framework allows Ofcom to effectively deal with all concerns impacting NGSO services provided in the UK, and that UK-only proposals are unnecessary. Intelsat highlighted that it would be

detrimental to have individual administrations adopt inconsistent or contradictory rules, which could hamper the development of NGSO systems.

- Others agreed that there may be a role for a national process, but that any such process should complement and not replace or supersede the well-established, internationally-recognised ITU Coordination Procedures. In particular, there were concerns that our proposed process did not reflect the 'priority' of ITU satellite filings, and that networks with a later ITU filing should protect networks with an earlier filing even if they deploy first. It was suggested that obliging later-filed systems to be the ones to mitigate harmful interference (should it occur) encourages innovation and flexibility in the design for those later-filed systems.
- A smaller group (SpaceX, Amazon) agreed that relying solely on the ITU framework might not be sufficient. For example, SpaceX claimed that protection based on ITU submission date discourages cooperation, and that operators claiming protection based on ITU priority have a strong incentive not to invest in spectrally efficient systems.

3.23 Some stakeholders referenced ITU study groups working on developing methods to assess interference between NGSO systems. They did not think we should preempt the outcome of these discussions and should instead contribute to the international framework consulting again once ITU studies are complete.

Gateway separation distances

3.24 Several stakeholders challenged our view that gateways are likely to require large minimum separation distances. They requested that we provide additional information about the analysis used to reach this view. Stakeholders suggested that there are other mitigations than spatial separation that can be employed to limit interference – examples given included spectrum splitting, angular antenna discrimination, satellite diversity, orbital angle avoidance and information sharing. Stakeholders argued that these matters are best suited to private coordination amongst operators.

3.25 Some respondents noted the potential negative consequences of large separation distances. For example, Methera Global said that it may mean that some operators have to operate from less attractive locations (in terms of access, connectivity, security) than others. SpaceX argued that the need for ground equipment in the UK will scale with demand, and gateways that require large separation distances will limit competitors' ability to scale their systems to meet demand. SpaceX said our approach should not mandate minimum separation distances for gateways, which are often not necessary and could inhibit competition.

3.26 However, OneWeb said that a minimum separation distance is generally needed between the gateways of different NGSO systems, with the required distance dependent on the specific technical and operational characteristics of the concerned systems.

Demonstrating ability to coexist with future systems

3.27 Stakeholders (Eutelsat, OneWeb, techUK, Telesat and a confidential respondent) questioned how it would be possible for them to provide credible evidence about the

technical ability of their system to coexist with future (as yet undesigned) systems, and said the criteria used to assess flexibility needed further clarification. They argued that it is not reasonable for licensees to be asked to be flexible to accommodate future systems for which there might not be information available when they design their systems or apply for licences.

Alternative approaches

- 3.28 A small number of stakeholders proposed their own alternative methods for managing interference:
- a) SpaceX and Kepler Communications thought we should consider a spectrum-splitting backstop in the event operator-to-operator coordination is not completed by the time both operators have commenced service in the UK. They argued that no operator wants to have to operate with less than the full allotment of spectrum so this would encourage coordination. Others (Intelsat, Methera Global) thought band segmentation was a blunt tool, which would either mean a limited number of operators were able to access the band or repeated segmentation would reduce the economic viability of delivering a service for all parties.
 - b) Amazon proposed we introduce a new condition in the licence, which would apply to all licensees equally, under which each operator would commit to operate in such a way that no other operator would experience more than 3% increase in unavailability and a 3% allowance in the reduction of time-averaged weighted degraded throughput. They described this as a “baseline sharing threshold”.
 - c) Viasat said that we should require that an applicant demonstrate at the application phase how its NGSO system would be designed, built, and operated over its orbital life, detailing the assumptions that underlie that analysis. Viasat recommended that NGSO systems authorised to serve the UK be required to maintain the system’s “footprint” as was applied for (including, orbits; number of satellites; satellite mass, cross-sectional area, and other dimensions) and that we should only grant an extension of that authorisation in stages. This is to address the fact that second or third generations of satellite networks might be substantially different from earlier generations.

Our decision

- 3.29 Having considered stakeholders’ views, we have decided to proceed with implementing a coexistence check in our licensing process as proposed in the consultation. Our reasoning is set out below. Additional detail about how we will implement the check is set out in Section 4.

How our new approach interacts with the ITU framework

- 3.30 First, we agree that international coordination through the ITU is necessary to achieve an efficient use of spectrum by NGSO systems globally. We were clear in the consultation that our proposals complement, and do not change or replace, existing obligations that

licensees may have to coordinate under ITU coordination procedures. We have included a note in our licences to this effect – see Section 5.

- 3.31 This means that operators should fulfil their obligations and coordinate with earlier filed systems as per the relevant provisions of Article 9 of the ITU Radio Regulations. At the same time, all operators (including earlier filed ones) should negotiate in good faith in order to enable the most efficient use of spectrum. This means not making unreasonable demands of other operators.
- 3.32 Nonetheless, we are aware that it is challenging to complete coordination for NGSO systems in these bands. In addition:
- Operators are launching satellites at different speeds and, as a result, some operators may deploy their networks before coordination negotiations have concluded. This is permitted under the Radio Regulations, on a non-interference non-protection basis to earlier-filed systems (ITU Radio Regulations No. 11.41).
 - Although we facilitates ITU coordination where possible, we are unable to formally intervene in ITU coordination discussions if we are not the filing administration for one or both parties in the discussion.
- 3.33 For these reasons, we believe we need to introduce additional backstop measures in the UK (complementing ITU coordination processes) to deal with cases where coordination has not been completed and UK services risk being impacted by harmful interference. The UK is one of the first markets to receive NGSO services and we want to ensure that the services received by people and businesses in the UK are not disrupted and UK users can benefit from a number of different NGSO satellite systems.
- 3.34 Second, our national licensing process and licence terms are compatible with different filings having different ITU ‘priorities’ and with operators reaching ITU coordination agreements which reflect their relative priority. This is because our UK checks on coexistence do not prescribe which parties should implement measures or what these measures should be to achieve coexistence. Specifically:
- As part of the application process (discussed further in Section 4) applicants can state what reasonable measures can be put in place by either the applicant, the existing licensee, or by both, in order to demonstrate that coexistence is possible.
 - Under the new licence condition requiring cooperation between licensees (discussed in Section 5), licensees can reach agreements that involve measures being put in place by either the applicant, the existing licensee, or by both.
- 3.35 As a result, we are satisfied that our proposals are consistent with ITU coordination processes, including the concept of different filings having different ‘priorities’, and with the UK’s responsibilities for UK filed satellite systems.
- 3.36 Finally, we acknowledge the on-going international discussions, in particular under ITU-R WP 4A, regarding recommendations on coordination among NGSO systems. These discussions are at a very early stage and we cannot guarantee there will be an outcome, or when it will happen. Therefore, we will continue to follow and actively engage in these

discussions, and we will carefully evaluate any implications for our domestic authorisation regime. However, at this time we remain convinced that we need to put additional measures in place to mitigate the risk of services being disrupted in the UK.

Demonstrating ability to coexist with future systems

3.37 We do not expect licensees to foresee the characteristics or the number of future systems that will apply for a licence in the UK, or how other systems may evolve. Our intention is for licensees to:

- a) explain how their existing network design and operating model might facilitate coexistence with other NGSO satellite systems⁴ and any limits to that flexibility;
- b) outline any additional measures, which would allow improved coexistence with other systems (for example, planned roll out of ground equipment, future network designs); and
- c) be aware that they may be expected to take reasonable measures to accommodate such future applicants, in order to avoid material degradation to services in the UK.

Gateway separation distances

3.38 Our view that NGSO gateways may require large separation distances was informed by analysis submitted confidentially by stakeholders. For the avoidance of doubt, the consultation did not propose implementing a minimum separation distance (and we are not implementing one). However, in the absence of agreement between licensees / applicants about how to manage interference and come up with mitigation measures that are acceptable to both sides, separation distance may need to be used as a means to avoid harmful interference. We would prefer that stakeholders come to agreements themselves about alternative mitigation measures, as large separation distances have the potential to cause adverse impacts to competition (see paragraph 3.49 below).

Alternative approaches

3.39 We have considered the alternative approaches to managing interference that were suggested by stakeholders. However, we have decided that we will not implement their proposals for the following reasons.

3.40 We agree that spectrum splitting is one possible solution to resolving cases of harmful interference. However, there are several others including, but not limited to: angle avoidance, separation distances, satellite diversity, gateway diversity, reverse polarisation. We are not adopting spectrum splitting because of the inherent inefficiency in doing so.⁵ In addition, it may impact different systems to different degrees, and as a result may be

⁴ This could include use of specific technologies, aspects of network design, choice of commercial services or operational measures that might allow other NGSO operators to also serve UK people and businesses.

⁵ Spectrum splitting divides the available spectrum evenly among operators whereas, if operators manage to reach an agreement to manage mutual interference, they may be able to coexist and use a much larger proportion of the spectrum, or even all of it.

limited in how much it incentivises cooperation between systems. There are other ways of mitigating the possibility of harmful interference without limiting operators' access to spectrum, given that doing so may impact the quality of service received by users and the ability to support a competitive market.

- 3.41 Regarding Amazon's proposal for a 'baseline sharing threshold', we note that this resembles one of the proposals being discussed by ITU WP 4A as part of a recommendation to facilitate coordination among NGSO systems. As we noted above (see 3.30), there is no international agreement on this yet, and we prefer not to select one (or any) of the proposals at this stage. We also note that this proposal could be seen as contrary to the ITU rules for coordination.
- 3.42 We recognise that second or third generations of NGSO satellite systems might be substantially different from earlier generations. As discussed in Section 5, operators will have an ongoing requirement to cooperate with others to ensure their systems can coexist. Major modifications to a system might significantly change the interference environment for other operators. In such situations, operators will need to cooperate with other licensees ahead of that change in order to avoid causing harmful interference and impacting the services provided by other licensees.

Supporting competition: competition check

Our proposal

- 3.43 In the consultation, we described how there is the potential for the deployment of NGSO gateways and user terminals to introduce barriers for future systems. This could have implications for competition. We therefore proposed introducing a competition check into our process for issuing new NGSO licences. Our aim was to reduce the risk that issuing the licence(s) applied for would restrict competition.
- 3.44 To reduce the risk of scarcity of gateway sites, we also proposed that gateway licensees should commence and maintain transmissions within 12 months.

Stakeholder responses

- 3.45 Some stakeholders disagreed with the introduction of a competition check. One stakeholder (SpaceX) thought a competition check was unnecessary at this stage and would be difficult to administer, although it supported the general approach described in the consultation, i.e. to take into account the technical constraints that specific gateways and user terminals could create in future licences. As set out above, several stakeholders (Amazon, Arqiva, Methera Global, SpaceX, Telesat) questioned the requirement for large separation distances between gateway earth stations, and therefore the potential for gateway sites to be scarce.
- 3.46 Some stakeholders (aql, SpaceX) endorsed our checks on an operator's flexibility to accommodate future systems while others (OneWeb, Telesat, Intelsat) requested additional clarity about our statement that if systems "need too much protection or have

too little flexibility” then they would restrict competition from emerging (see paragraph 3.33 of the consultation). They argued that no information was provided on how we intend to assess whether systems would restrict competition.

Our decision

The potential implications of interference for competition

- 3.47 Stakeholders queried the need for a competition check. However, we consider that, in addition to the direct disruption caused to broadband services, the challenges of managing interference between NGSO systems could have implications for competition. These issues play out differently for gateways and user terminals.
- 3.48 As we discuss above (see paragraph 3.38), **NGSO gateways** might require large separation distances in order to avoid harmful interference.⁶ There are several techniques available to satellite operators to avoid in-line events. However, some of these techniques could increase the overall cost of the network; the design of the network may also limit some of the choices available to operators. Gateway separation distances may therefore be necessary for some networks.
- 3.49 As a result, granting an NGSO gateway licence, in certain circumstances, has the potential to reduce competition where:
- a) That licence prevents rival NGSO operators from using nearby sites for their gateways. Those rivals may need to use less attractive sites, making them less effective competitors, or they may even be prevented from operating in the UK altogether.
 - b) Without a coexistence check, granting a licence could also degrade existing rival operators’ systems, making them less effective competitors.
- 3.50 We also need to guard against the possibility of strategic behaviour, where an NGSO operator (or several operators) seeks to acquire gateway licences in order to limit the opportunities for rival gateways.
- 3.51 Finally, granting a licence could promote competition by supporting the UK entry of new NGSO operators or improving the attractiveness of operators that would otherwise exert a weak competitive constraint.
- 3.52 Regarding **user terminals**, once an operator starts deploying these, rival operators using the same frequencies may expect to experience harmful interference. In the worst case this could mean that the quality of rivals’ broadband services would not be sufficiently reliable for them to offer a commercially viable service.
- 3.53 If we were to grant an NGSO network licence without a suitable agreement over how user terminals of different systems can coexist in the same area and band then this could restrict competition, for example as a result of earlier deployed systems hindering later

⁶ In contrast, multiple GSO gateway earth stations can be located on a single site, each communicating with a different satellite system in a different orbital location, without causing harmful interference to each other. This means that GSO operators do not have to be concerned about where other GSO operators are locating their gateway earth stations.

ones. However, licensing could also offer an opportunity to promote competition, for example by supporting the UK entry of new NGSO operators.

- 3.54 In summary, some consultation respondents were effectively querying the magnitude of the competition risks. As explained below, our starting point is that we expect that granting a licence will not raise material competition risks. However, we cannot rule out the possibility of competition issues emerging, particularly as NGSO services are in their infancy. To guard against this risk, we thus consider that it is appropriate to introduce a competition check into our process for issuing new NGSO network and gateway licences.

How we will support competition

- 3.55 In response to stakeholders' concerns about a lack of clarity, we provide further details below on what we mean by conducting a competition check. We also provide further details in our description of the application process in Section 4. This provides an indication about relevant information that stakeholders could provide.
- 3.56 In addition to our checks outlined above, we will introduce a requirement for gateway licensees to **commence and maintain transmissions within 12 months**. This reduces the risk that spectrum will be used inefficiently (by remaining unused for a long period of time), as well as the risk that strategic behaviour by operators artificially exacerbates any scarcity of gateway sites. We discuss this licence condition further at paragraph 5.45.

Our starting point for the competition check

- 3.57 We have considered how we will approach the competition check for issuing new NGSO licences. In particular, we have considered the extent to which we can provide an indication of our likely stance, since this would provide more certainty to stakeholders and allow us to process applications more swiftly (at least in straightforward cases). In reaching a view, we have taken account of the following four factors and our reasoning is set out in further detail in Annex A3:
- a) the extent of the likely risks to competition;
 - b) the potential benefits from granting NGSO licence applications;
 - c) ensuring that the time and resources devoted to the licensing process are proportionate to the risks and benefits; and
 - d) that NGSO services are currently in their infancy.
- 3.58 In terms of NGSO licence applications:
- a) Our starting point is that we expect that granting a network licence will not raise material competition risks. Annex A3 sets out further detail on why we have adopted this starting point.
 - b) Our starting point is that we expect that granting a gateway licence will not raise material competition risks. Annex A3 sets out further detail on why we have adopted this starting point.

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- 3.59 We expect this stance will allow us to process most applications briskly while only carrying out a limited, light touch assessment of competition. However, particularly where a third party raises credible, reasoned competition concerns about an application then a more detailed competition check may be warranted.⁷ We describe our competition check in further detail in Section 4.
- 3.60 In the future we may revisit this approach, once the technical and commercial shape of the sector becomes clearer and in the light of our experience of how the new licensing system has been operating.

⁷ There may be situations where we depart from this position. For example, an application might be for such a large number of gateways and/or the coexistence challenges presented by those gateways might be so clear cut that we have competition concerns even without any third party objections.

4. NGSO licence application process

4.1 This section sets out the updated application process that we will implement for NGSO licences, including addressing points raised by stakeholders about the licence application process.

Overview of our decisions on the licence application process

4.2 In our consultation we proposed a new process for considering NGSO licence applications, which would include additional checks and provide an opportunity for stakeholders to comment. In summary, we proposed:

- a) Undertaking preliminary coexistence and competition checks upon receiving an application.
- b) Publishing details of the licence applications we intend to grant (as well as those where we require additional information) on our website to provide a short period for stakeholders to comment.
- c) Reviewing the comments, seeking further information, and undertaking our own analysis as appropriate, before deciding to issue the licence.

4.3 An overview of the process as proposed in the consultation is shown in Figure 4 below.

Figure 4: Overview of the application process (as proposed in our consultation)



Indicative timeline:



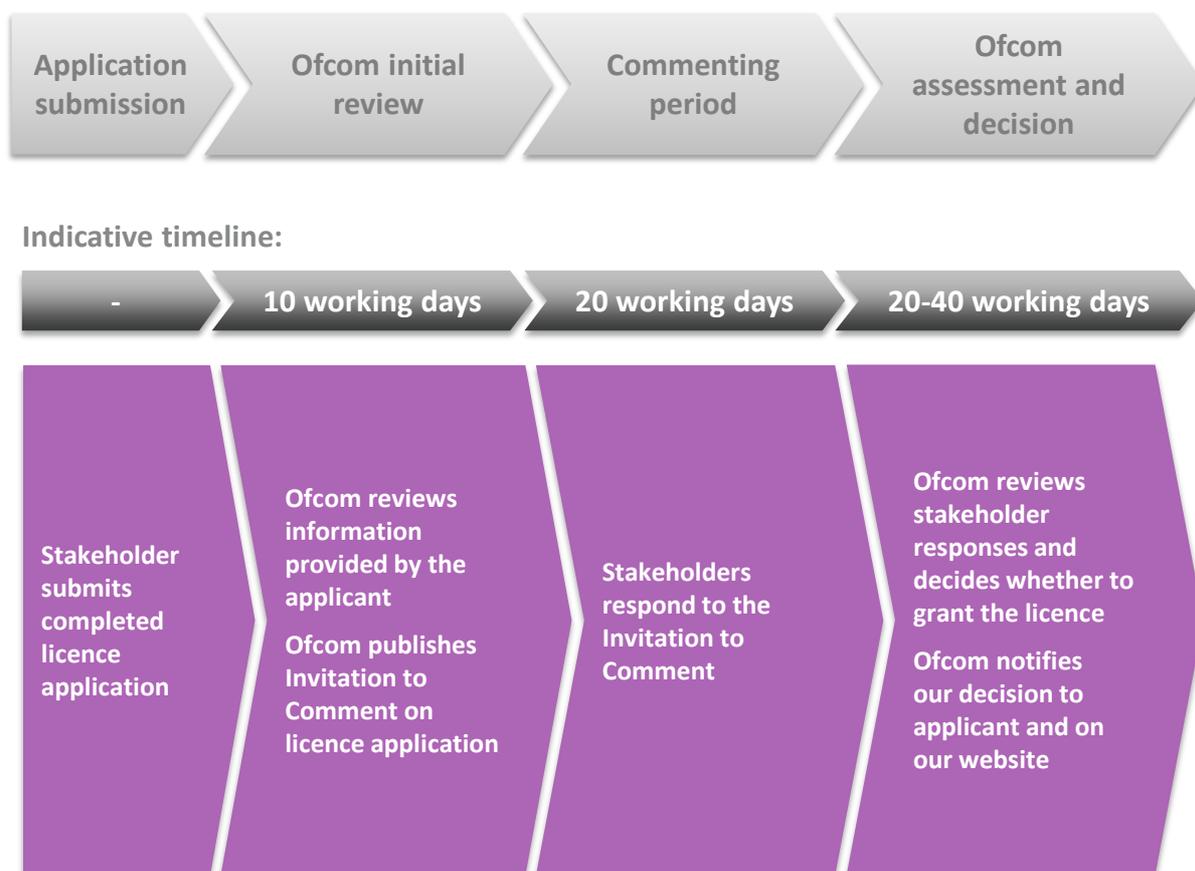
4.4 Having considered this process further, including in the light of stakeholder responses, we have decided to adopt a slightly amended application process. This is summarised in Figure 5 and described in further detail in the remainder of this section. The main changes or clarifications from what we proposed in the consultation are:

- clarifying the extent and purpose of our initial review of applications prior to the Invitation to Comment stage.
- amending timescales to take account of the potential for some applications to require additional analysis.
- setting out further detail on how we will decide whether to grant a licence application.

4.5 We have also made some minor changes to make the process clearer, for example specifying the timeframe in working days rather than weeks.

4.6 Given the potential benefits that new NGSO satellite services could provide to people and businesses in the UK, we are keen to enable these services. As a result (and in line with our approach to licensing in general), we are predisposed to grant licences wherever we can. The new licensing process as described below is aimed at providing reassurance that licences can be granted without creating significant risk to service quality experienced by consumers and the development of a competitive market.

Figure 5: Overview of the application process (our decision)



4.7 The steps in the application process we have decided to implement are set out below. We have provided some indicative timings for how long we expect each stage of the

application process to take. We will aim to meet these wherever possible, but in reality timelines may vary due to a variety of factors, for example if multiple applications are received at the same time, or the extent of the response that we receive to an Invitation to Comment.

- a) **Application submission:** The applicant completes the application form and provides required information to Ofcom.
- b) **Initial review:** we carry out an initial review. Assuming that the application is not rejected at this stage (e.g. because it is incomplete), we will then publish an Invitation to Comment. We will aim to do this within **10 working days** of receipt of the application. That Invitation to Comment will include the application and may indicate some topics that we would particularly welcome views on.
- c) **Commenting period:** Stakeholders will have **20 working days** to respond to the Invitation to Comment.
- d) **Assessment:** At the end of the commenting period, we will review stakeholder responses and decide whether to grant the licence or whether further assessment is needed. We will aim to complete our assessment within **20 working days** of the end of the commenting period. When applications are more complex, we will aim to complete any further assessment and make a decision within an additional 20 days (i.e. within **40 working days** of the end of the commenting period).
- e) **Issue decision:** We will notify the applicant of our decision. We will also publish our decision on our website, along with the responses received from stakeholders and a brief rationale for granting or refusing to grant the licence.

4.8 The stages in the application process are the essentially the same for NGSO network and gateway licence applications, but there are some differences in the detail of the process – for example the types of information that an applicant will need to submit, and the relevant factors we will take into account when assessing an application. In the remainder of this section we discuss the stages of the application process in greater detail, and we will explain these differences where relevant. How to apply for each type of licence is also set out in additional detail in our [NGSO guidance document](#).

Application and our initial review

Our proposal

Application submission

- 4.9 To apply for a licence, we said applicants need to submit the relevant application form(s), along with the following additional information:
- **Coexistence with other NGSO systems:** applicants should demonstrate how coexistence is possible between their networks and:
 - Existing NGSO systems already licensed in the UK; and

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- NGSO systems that have applied for a licence and whose application has been published for comment.
 - **The ability to coexist with future NGSO systems:** applicants should state what flexibility their system has to coexist with future networks.
 - **Competitive impact:** optionally, applicants would be able to provide information on the competitive impact of issuing the licence (combined with other licences held or applied for by the applicant).
 - **Ability to comply with NGSO conditions:** applicants would state that they have the ability to comply with the terms of the licence, including the new NGSO licensing conditions we proposed. In particular:
 - those applying for a **network licence** – we would expect them to have control over the whole satellite network (including associated user terminals and gateway earth stations) and the ability to negotiate and agree coexistence arrangements with other licensees, so that they are able to comply with the conditions in the licence.
 - those applying for a **gateway licence** – we would expect them to have control over the gateway earth station. In addition, applicants for gateway licences would need to state that they are operating with a satellite system for which we have issued a network licence. This would be to ensure that there is an entity with the responsibility and ability to agree coexistence for the whole satellite system (including the gateway).
- 4.10 We said that we would process licence applications in the order in which we receive them. As a result, we would consider each (complete) application in the context of existing issued licences and earlier applications.
- 4.11 If the application is not completed correctly, or if the information set out above was not submitted, we said that we would ask the applicant to provide additional information where appropriate and to re-submit their application.

Our initial assessment

- 4.12 Once we have confirmed that the application is complete, we proposed that we would make an initial assessment of the material submitted, to consider the ability of existing licensees and the new applicant to coexist, and whether issuing the licence could restrict competition. We proposed that:
- a) If we considered that coexistence between existing licensees and the applicant is likely to be possible and there does not appear to be a risk of restriction of competition, we would publish the application and our intention to grant a licence.
 - b) If we have concerns or uncertainties about the application, we may also decide to publish it so we can seek further information from stakeholders before taking a decision.
 - c) Alternatively, if we had concerns, we may seek further information from the applicant and / or ask them to modify and re-submit their application. This may result in the application not progressing beyond the initial assessment.

Stakeholder responses

- 4.13 Several stakeholders requested more clarity and guidance on the criteria we will use in the assessment of licence applications. It was noted that this would also help applicants know what information they should submit.
- 4.14 One stakeholder said that, given the complex nature of NGSO systems, we must ensure that the licence application is designed to capture all the required information that would allow stakeholders to comment in a meaningful way. Two respondents also asked us to clarify how we will verify the accuracy of the information provided to us by stakeholders about whether systems can coexist or not.
- 4.15 Two stakeholders (SES, Lacuna Space) questioned our proposal that network licence applicants should have control over the whole satellite network. SES said that some NGSO service customers prefer to control their own earth station networks, and suggested our objectives could still be met if NGSO service customers were to hold network licences in addition to the NGSO system operator, who would have responsibility for coordinating with other operators.

Our decision

Information to be provided by the applicant

Information about technical coexistence

- 4.16 To provide reassurance that the quality of service of existing UK services will not be adversely affected by a licence application, we will require applicants to demonstrate that coexistence is possible between their system and:
- a) existing NGSO licensees; and
 - b) NGSO satellite systems for which an application has been made and which has been published for comment on our website.
- 4.17 The preferred way that applicants can demonstrate this is for there to be an agreement with the relevant licensee(s) already. This would ideally be an ITU coordination agreement, but it could also be a local cooperation agreement allowing the systems to coexist in the UK.⁸
- 4.18 If no such agreement exists, applicants should specify in detail how it would be possible for the different systems to coexist. They should provide evidence that reasonable measures can be put in place - **by either the applicant, the existing licensee, or by both** - to achieve coexistence. Specifically, applicants should provide enough evidence to demonstrate that the impact to existing licensees in terms of increased unavailability and of reduction in throughput would be modest.

⁸ In either case, we will check with the other party that the agreement does exist.

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- 4.19 Applicants should provide sufficient evidence to support the claim that such measures are reasonable, and that they make coexistence possible. If measures are to be put in place by an existing licensee, these should be reasonable, taking into account the relative position of both systems within the ITU process. However, earlier filed systems should not seek to place unreasonable restrictions on the provision of services to people and businesses in the UK by later filed systems, especially if their own systems are relatively early in their development.
- 4.20 Applicants are encouraged to choose the evidence that best illustrates their impact on existing licensees on a case by case basis. Parts of this evidence could be provided on a confidential basis if necessary. However, we strongly encourage applicants to make information publicly available as far as possible, so that stakeholders are able to understand the impact of an application and make informed responses to the Invitation to Comment.

Information about competitive impact

- 4.21 Optionally, applicants can provide information on the competitive impact of issuing the licence (combined with other NGSO licences held or applied for by the applicant). While providing this information at the application stage is optional, doing so may allow us to reach a decision more swiftly (e.g. because we would not need to seek this information if it was needed during the Assessment phase). In particular, applicants can provide information on:
- **The benefits that their NGSO system can bring to UK customers, end consumers and/or citizens.** Possible benefits might include improvements to their services, greater choice and/or allowing the applicant to compete more effectively in the UK. An applicant's NGSO system may benefit its customers (e.g. a communications provider that uses the NGSO system for backhaul) as well as end consumers (e.g. the ultimate users of that communication provider's services) and possibly citizens more generally (e.g. if that communication provider's services are of wider benefit to society); and
 - **Any risks to competition in the UK.** This may refer to how the applicant intends to mitigate any risks to competition, including their ability to coexist with other NGSO satellite systems and/or giving a sense of the scale of any costs of coexistence for other operator's systems.
- 4.22 Paragraphs 4.58-4.63 below provide further details on how we will carry out the competition check for NGSO network and gateway licences. These paragraphs also provide an indication of topics that an applicant could provide information about.
- 4.23 As above, the applicant may indicate that some of the information requested is commercially confidential if they do not wish us to publish this alongside the application.

Scope of the initial review

- 4.24 Having further considered our process, including in the light of stakeholder comments, we have clarified the scope of our proposed initial assessment (which we are now referring to as the 'initial review').

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- 4.25 In the interest of expediting the process (which some stakeholders were keen for us to do), and taking into account the importance of the information that we will receive in response to the Invitation to Comment for making our final decision on whether to grant the licence, we are simplifying the checks that we will make at this stage.
- 4.26 As proposed in the consultation, we will check if the application form is correct and complete. We will also review the additional material submitted by the applicant on coexistence and (optionally) competition, taking account of our knowledge of the NGSO sector. Where an applicant has said that an agreement with another party exists, we will check with the other party to confirm this. The main aim at this stage is to identify whether the applicant has fully considered how coexistence can be achieved and has provided information about that plan such that other parties (including Ofcom and other licensees) can take a view as to its credibility. We may also identify any aspects of the application that are of particular interest (or concern) in relation to a) coexistence or b) competition so that they can be set out in the Invitation to Comment.
- 4.27 If necessary, we would then have the ability to request clarifications or additional information from the applicant prior to publishing the Invitation to Comment. If we have significant concerns at this stage which are not able to be resolved through clarifications and additional information then we may not progress the application.
- 4.28 We expect the initial review to take ten working days. Additional time may elapse prior to publication if additional information or clarification is required from applicants.
- 4.29 Regarding the requests to clarify how we will verify the information provided to us by applicants, as noted above we will use our judgment and knowledge of the sector to identify any aspects of the application that are of immediate concern (and, later in the process, the evidence provided by other stakeholders). In addition, while the information requested in the licence application process is intended to demonstrate that coexistence is possible (and reduce the risk of harmful interference), operators will also have an ongoing requirement to cooperate with others to ensure their systems can coexist (see condition 2 for network licences discussed in Section 5).

Who can apply for a licence

- 4.30 While we do allow service customers or resellers to hold a network licence for terminals operating to GSO systems, we do not think it is appropriate for NGSO systems. GSO terminals and gateways of different operators can coexist more easily than for NGSO systems. Where there is a risk of interference (e.g. where two GSO satellites are in close proximity on the geostationary arc) operators typically have agreements in place to dictate how they will avoid causing interference to each other. The reseller uses the satellite service within the rules of these agreements.
- 4.31 We will require NGSO network licensees to have control over the whole of the satellite system, including satellite(s), user terminals and gateway earth stations, and the ability to cooperate with other systems so they are able to coexist (see Section 5 on licence conditions). This means the satellite operator is the most appropriate entity to hold that

licence. We note that in principle some NGSO gateways in the UK might operate with an NGSO satellite system that does not, and does not intend to, provide services in the UK at all, and therefore would not normally apply for a UK network licence. In these cases, we encourage such gateway applicants to discuss this with us prior to application.

Order of processing

- 4.32 As proposed in the consultation, we will process applications in the order that we receive them. We will consider each (complete) application in the context of existing issued licences and earlier applications.
- 4.33 This process may be slightly more complex for gateway licence applications if the satellite network the gateway will communicate with has not yet been issued with a network licence. This is because condition two of the gateway licence stipulates that a gateway is required to only communicate with a satellite system that is authorised to transmit under a network licence (see Section 5).
- a) In the interests of not unnecessarily delaying deployment of gateways, we will accept applications for gateway licences that are submitted at the same time as the application for the relevant network licence, or while the network licence is still in the application process.
 - b) However, to prevent the authorisation of gateways which cannot be used, we will not **grant** the gateway licence until the relevant network licence has been granted. This is because they cannot meet their licence conditions and they may cause a constraint on others.
 - c) If the application for the relevant network licence is unsuccessful, we will not progress the gateway licence application.
- 4.34 We note that there are a small number of existing network licences that we will propose to vary following the publication of this statement. We explain how we will manage new applications for gateways planning to communicate with those networks at 7.15.

Commenting period

Our proposal

- 4.35 The ability for different NGSO satellite systems to coexist and the impact on competition are matters on which stakeholders other than the applicant would legitimately have an interest and relevant information. Therefore, we proposed a short commenting period for stakeholders to make representations on matters related to granting the licence.
- 4.36 We said we would notify stakeholders when we publish a licence application, and the commenting period would normally run for four weeks. Each licence application would have its own separate commenting period, so it is possible there could be multiple commenting periods running in parallel.

Stakeholder responses

- 4.37 Stakeholders generally supported the proposal to have a short commenting period. However, several respondents (aql, Community Fibre Partnership, SpaceX, techUK) were concerned about the delay that this might create for processing applications and others (Arqiva, OneWeb and a confidential respondent) said that the commenting period must be time limited.
- 4.38 SES asked us to clarify whether the comment window will be opened for every network and gateway licence application, as well as for substantive modifications to each.

Our decision

- 4.39 Considering that we received generally supportive views from stakeholders, we have decided to proceed with implementing a commenting period in the licensing process. We may state in the Invitation to Comment if we intend to grant the licence and may identify any specific aspects of the application that are of particular interest or concern in relation to coexistence or competition.
- 4.40 The commenting period will run for 20 working days.⁹ Each licence application will have its own separate commenting period, so it is possible there may be multiple commenting periods running in parallel.
- 4.41 We will notify licensees and any other applicants when we commence the commenting period for a new application. We will do this by emailing a notified point of contact.¹⁰
- 4.42 We will hold a commenting period for all complete network and gateway licence applications. We discuss when we would have a commenting period for a variation to a licence later in this section, from 4.69.
- 4.43 We will publish non-confidential responses received to the Invitation to Comment on our website.

Guidance on information that respondents may wish to provide

- 4.44 In relation to the **coexistence check**, if a stakeholder has concerns then we would encourage their response to:
- a) Provide evidence as to why the coexistence measures provided by the applicant will not succeed in limiting the impact to existing licensees.
 - b) Explain if the coexistence measures provided by the applicant can be regarded as insufficient or unreasonable and why.
- 4.45 In relation to the **competition check**, if a stakeholder has concerns then we would encourage it to cover the following material in its response:

⁹ We may extend timelines where necessary, see 4.68 below.

¹⁰ Other interested parties can who wish to be notified when we publish a new application for comment can sign up to receive notifications – see paragraph 7.23 for details.

- a) A description of its NGSO system and details of its UK commercial strategy. For example, what services it offers and details of any plans to expand in its UK operation (or when it intends to start providing services in the UK if it is not doing so already).
 - b) An explanation of why granting the licence application would affect rival operators and ultimately weaken the competitive constraint they would otherwise exert. This may refer to the evidence provided in relation to the coexistence check.
 - c) Describe what decision it thinks Ofcom should take. For example, whether we should refuse the licence application or approve it provided that certain modifications are made.
- 4.46 Paragraphs 4.58-4.63 below provide further details on how we will carry out the competition check for network and gateway licences. These paragraphs also provide an indication of topics that a respondent could provide information about.

Assessment and our decision on whether to grant a licence application

Our proposal

- 4.47 In the consultation we said that, following the end of the proposed commenting period, we would review the responses and publish a decision on whether or not to grant a licence. As part of this process, we may wish to make additional assessments on matters related to technical coexistence and competition.
- 4.48 We would then notify the applicant of our decision, and publish our decision setting out whether or not we will grant a licence and the reasons for making the decision.

Stakeholder responses

- 4.49 As noted at 4.13 above, some stakeholders did not think we provided sufficient detail about how we would carry out our assessment of whether or not to grant a licence.
- 4.50 Two respondents said that if we were to need longer than the proposed four week period to make a decision, we must keep the applicant and other stakeholders informed of the new timetable, as well as provide reasons.

Our decision

- 4.51 At the end of the commenting period, and taking account of stakeholder responses, we will decide if there is any reason not to grant a licence, or whether a further assessment is needed.
- 4.52 Whether a more detailed assessment is warranted will depend on the circumstances of each particular application. Circumstances where a further assessment may be needed include:

- a) **Technical check:** Where we receive one or more credible, reasoned responses to the Invitation to Comment that call into question the ability of systems to coexist without causing harmful interference.
- b) **Competition check:** Where we receive one or more credible, reasoned responses to the Invitation to Comment that approving the licence application may pose a material risk to competition (although as noted in footnote 7 there may be situations where we depart from this position). For the avoidance of doubt, this threshold is not met if some stakeholders simply object to the licence application. Rather, those objections need to be credible and reasoned. Issues unrelated to competition will not pass this threshold.
- 4.53 In contrast, we will proceed straight to a decision where we: (i) have sufficient evidence at this stage to do so; and (ii) can do so with limited further analysis.
- 4.54 If further assessment is warranted, we may obtain further information from the applicant and/or other stakeholders. In order to reach a decision, we may carry out additional assessments on matters related to technical coexistence and competition. We will update the applicant if we expect that it will take more than 20 working days to complete our assessment.
- 4.55 Having completed our assessment (and potentially also a further assessment), we will reach a decision on whether or not to grant the licence. We will then publish our decision, which will briefly set out the reasons for making that decision.

How we will decide whether to grant a licence application

- 4.56 We have statutory duties (as set out Annex A1), with our principal duty being to further the interests of citizens and consumers in relation to communications matters. In accordance with these statutory duties, when deciding whether to grant a licence application, we will be mindful that our objective is to enable citizen and consumer benefits arising from innovative satellite services, such as improved connectivity, and will take all relevant factors into account including in particular:
- (in the case of gateway licence applications) the availability of gateway sites within the UK;
 - any risks to competition for UK consumers; and
 - the ability of networks to coexist in terms of radio interference management.
- 4.57 In reaching our decision we will thus take account of both our technical check, our competition check, and our statutory duties and objectives. In achieving our aim, we will also take account of the available relevant evidence, including responses to the Invitation to Comment.

Further details about how we will carry out a competition check

- 4.58 We already carry out competition assessments for other communications sectors. However, such an assessment is not common in our activities for the space sector. Below we set out some additional detail about the factors that are likely to be relevant to the competition checks for network and gateway licences.

- 4.59 In carrying out the competition check, our ultimate focus is the impact of approving the licence application on consumers, customers and citizens in the UK. In carrying out that check, we will need to exercise our judgment. The outcome of that competition check will depend on the facts associated with the particular licence application at hand.
- 4.60 As set out in Section 3, our starting point is that we expect that granting a licence will not raise material competition risks. Furthermore, since NGSO services are in their infancy, the issues that are most relevant to the competition check may evolve over time.
- 4.61 Examples of factors that may be relevant to the competition check for NGSO gateway licence applications include:
- a) The **magnitude of the impact on rival operators**. For example: (i) to what extent would approving the licence application limit the gateway sites available to rivals;¹¹ (ii) are alternative gateway sites available to rivals;¹² and/or (iii) to what extent would using an alternative gateway site reduce the attractiveness of rival operators' services to UK customers.¹³
 - b) The **implications for competition of that impact on rivals**. Even where approving the licence application would have an impact on some rivals, this does not necessarily imply there would be a material impact on overall competition— the applicant may continue to face competitive pressure from other, unaffected rivals. Example of relevant factors might include: (i) how likely were those rivals to start supplying NGSO services in the UK absent the licence application in question; (ii) are some rival operators unaffected by the licence application (for example, because they already have enough gateways to serve the UK); and/or (iii) how effective will competition be in the UK if the application is approved.¹⁴
 - c) The **positive impacts of approving the licence application on competition**. For example: (i) would the gateway licence allow the applicant to begin supplying NGSO services in the UK; or (ii) is the applicant currently a smaller UK NGSO operator and to what extent would the gateway licence allow it to improve its services and compete more effectively. Assessment of this impact may overlap with factors set out in the preceding bullet point.¹⁵
- 4.62 We are likely pay particular attention to potential competition concerns where the applicant would have a large number of NGSO gateways if its application were approved.

¹¹ This, in turn, depends on issues such as the extent to which the applicant's satellite system has the flexibility to accommodate other operators deploying gateways nearby.

¹² This depends on issues such as whether rival operators could use sites that are available elsewhere in the UK or overseas.

¹³ This, in turn, depends on the extent of the drawbacks and/or costs of using an alternative site, taking into account the context of the rivals' UK business plans.

¹⁴ This, in turn, depends on issues such as the number of NGSO operators who would be present in the UK and the extent to which other forms of connectivity exert a constraint on NGSO services

¹⁵ For example, the number of NGSO operators who would be present in the UK and the extent to which other forms of connectivity exert a constraint on NGSO services.

- 4.63 At a high level, similar factors may be relevant to the competition check for NGSO network licence applications, namely the magnitude of the impact on rival operators, the implications for competition of that impact on rivals and the positive impacts of approving the licence application on competition.

Timeline for processing applications

Our proposal

- 4.64 We said that we would aim to follow the indicative timeline shown in Figure 4 above. However, we noted that we might need to extend these timings in certain situations, for example if the coexistence and competition assessment is particularly complex or if we were to receive multiple licence applications in quick succession. If we need to allow a longer commenting period, we said that we would do this by setting an appropriate closing date when we publish the application for responses.

Stakeholder responses

- 4.65 There was some concern that the new licensing process could slow down or hinder the deployment of NGSO services to UK customers. There were also some requests to streamline the process where possible.

Our decision

- 4.66 We acknowledge that introducing this new process will slow down the granting of applications for network and gateway licences, because of the new steps we have added. However, we consider this delay is proportionate to the outcomes we are trying to achieve.
- 4.67 We expect that as the process becomes more familiar over time, potential applicants will account for the timescales of the new process in their project plans. To assist stakeholders in doing so, we have set out an indicative timeline for the licensing process – as set out in Figure 5. This timeline is broadly in line with what we published in the consultation (although for additional clarity we have amended these to show working days rather than weeks). We hope that in most cases, 10 weeks would be an upper limit, with most being expected to take less than this (subject to required information being submitted). However, as we set out earlier, additional time may be needed for further assessment.
- 4.68 We may also extend timelines for other reasons where we consider it is beneficial to do so, for example where licence applications are running over holiday periods. In these cases, we will publish an updated timetable alongside the Invitation to Comment.

Applications to vary licences

Our proposal

- 4.69 We said that if a licensee requests to vary a gateway licence, we would assess whether the changes would increase the interference environment that is already imposed by the gateway site. For example, if the application adds additional antennas operating within the frequencies already authorised by the licence, we may decide there is no impact and therefore issue the licence without inviting public comments. If we decide that an application to vary an existing gateway licence changes the interference environment, for example if there are additional frequencies or increased transmit power, then we would proceed with the proposed new licensing process, including the commenting period.

Stakeholder responses

- 4.70 SES requested that we clarify that the comment window will open for substantive modifications to network and gateway licence applications. SpaceX said that modification, e.g. applications to increase the number of antennas at a gateway site, should not be subject to the commenting period. SpaceX thought it would be unnecessary to reconsult if there was an increase in the number of antennas at a gateway earth station; Lacuna Space queried why we should not reconsult if changes increased the risk of harmful interference.

Our decision

- 4.71 We will need to review applications to vary gateway licences on a case by case basis. While there are some variations which may not materially impact the interference environment for other operators, we reserve the right to request operators to publish their modifications both for transparency and for us to gather further evidence regarding the potential impact of this change to their network. Early engagement with us (and affected parties) will ensure this will not hinder deployment plans.
- 4.72 Operators are less likely to need to submit requests to vary their network licence because this is a light licence which authorises a wide range of frequencies. However, they should note that network licences will be subject to an ongoing obligation (condition 2, discussed in Section 5) to cooperate and coexist with other NGSO licensees. Therefore if an operator intends to make significant changes to their system (for example to operate with a larger satellite constellation), which could materially impact the interference environment for other NGSO licensees, they will need to cooperate with other licensees ahead of doing that, in order to ensure they can continue to coexist.

5. New licence conditions authorising NGSO systems: user terminals (network licences) and gateway earth stations (gateway licences)

- 5.1 In this section, we provide an overview of our proposals to update the network and gateway licences below, alongside stakeholder responses to the proposed licence conditions and our decisions to update NGSO network and gateway licences.
- 5.2 We received comments from 19 (of the 29) respondents on our proposal to update new and existing NGSO licences – covering both network and gateway licences. Responses covered both the general principle of updating licence conditions, as well as comments on specific licence conditions.
- 5.3 Many of the conditions are common (or very similar) in both types of licences and recognising this, stakeholders provided very similar responses for both licences. Therefore, we address comments together below under each licence condition in turn, and only deal with comments separately where the licence conditions differ – e.g. condition 2 for both network and gateway licences, and condition 6 for gateway licences only. We begin by discussing stakeholders’ views on the general principle of updating licence conditions for both new and existing NGSO licences, before considering each new condition in turn.

Updating new and existing NGSO licences

Our proposal

- 5.4 We proposed to update NGSO licences with new conditions and stated our intention to vary the three existing NGSO network licences¹⁶ and three existing NGSO gateway licences¹⁷ to include the updated terms, as set out in this section.

Stakeholder responses

- 5.5 Most stakeholders (14)¹⁸ broadly agreed with the general principle of updating NGSO licences with new conditions and varying the existing NGSO licences, and thought that at least some measures were appropriate. No one objected to the principle of updating existing licences to reflect the same terms as for new licences, and it was considered by those who commented to be essential to ensure future cooperation with existing systems.

¹⁶ These are held by Network Access Associates Ltd (UK) (trading as OneWeb), Kepler Communications Inc., and Starlink Internet Services UK Ltd (provided by SpaceX).

¹⁷ These are held by Arqiva Ltd, Goonhilly Earth Station Ltd, and Starlink Internet Services UK Ltd (provided by SpaceX).

¹⁸ The 14 respondents broadly supportive of our approach were Methera Global, SES, Lacuna Space, Hughes Europe, Eutelsat, techUK, Intelsat, Viasat, Kepler Communications, Amazon, Arqiva, OneWeb, Mangata Networks and one confidential respondent.

Statement: non-geostationary satellite systems

- 5.6 Comments received were predominantly linked to drafting suggestions and requests for clarification on specific conditions (these are discussed under relevant conditions below). However, a number of general comments were also raised.
- 5.7 A common theme raised by many respondents was how we would enforce the various new licence conditions. Another common theme was applying similar conditions to GSO licensees.
- 5.8 Of the five respondents who disagreed with our proposed licence conditions, the reasons given were because they considered there was insufficient clarity in our proposals to respond (Inmarsat), or that the current arrangements were working sufficiently well and therefore the new conditions were premature and unnecessary without evidence of how interference will inhibit future gateways (SpaceX and Telesat). Two respondents (Gary Hunt and Electrosensitivity UK) cited health and/or environmental effects as grounds for not supporting the proposals, but these issues are beyond the scope of our NGSO proposals for licence conditions as explained in Annex A2.2-A2.3.

Our decision

- 5.9 On the general point of compliance and enforcement, we note the general licence conditions which also apply to these licences, as set out in the [Wireless Telegraphy Licence Conditions Booklet](#) (the general conditions booklet). It stipulates a number of general licence conditions that also apply to satellite licensees and give general enforcement powers for Ofcom to act where it is deemed appropriate. This includes the power to revoke (condition 1), access and inspect (condition 5), and modify, restrict and closedown (condition 6) services (see Annex A6). Furthermore, we have the legal power to take enforcement action in relation to breaches of conditions in wireless telegraphy licences through criminal law prosecution. It also has power in section 42 of the Wireless Telegraphy Act 2006 to fine companies which are in breach of the conditions in wireless telegraphy licences. Enforcement action would need to be appropriate and proportionate.
- 5.10 As we said at paragraph 3.12, it is appropriate that where there is a material risk of interference in the future that could negatively impact people and businesses in the UK, we act proactively to manage this risk. Therefore, we have decided to proceed with our plans to update NGSO licences, including existing licences, with new conditions to support our objective to enable as many NGSO systems as possible to provide services and get everyone in the UK connected.
- 5.11 The paragraphs below address specific concerns raised on each licence condition and whether we have decided to amend that condition based on the issues raised.

Requirement to use frequencies in common with other licensees – condition 1 for network and gateway licences

1. The radio frequencies authorised by this Licence must be used in common with other non-GSO satellite systems authorised under wireless telegraphy licences granted by OFCOM. The names of these licensees shall be notified by Ofcom to the Licensee from time to time, and together with the Licensee are described as the “NGSO Licensees”.

Our proposal

- 5.12 Condition 1 acknowledges that NGSO satellite systems licensed in the UK may overlap in some or all of the frequencies that they operate in, including in the bands used for links between satellites and gateway earth stations, and/or the bands used for links between satellites and user terminals. This condition makes clear that we will notify NGSO licensees (and by NGSO licensees we mean **both** network and gateway licensees) of the names of other relevant NGSO network and gateway licensees operating on common frequencies; that is overlapping frequencies.
- 5.13 We note a small correction to the list of NGSO licensees that would be notified. Paragraph 5.12 of the consultation reflected only NGSO network licensees, but under condition 1 we would additionally notify any NGSO gateway licensees authorised in the common frequencies, i.e. also the three existing gateway licensees at footnote 17 on page 37.

Stakeholder responses

- 5.14 We did not receive any specific comments on this condition. However, the MOD who when acting as a Crown user is not required to apply for earth station licences, noted its earth stations may also need to be coordinated under our NGSO licensing framework.

Our decision

- 5.15 We will implement condition 1 unchanged. However, we are making a small correction to the process set out in the consultation. Rather than us reviewing licences to “establish whether the frequencies *used* overlap with any of the other NGSO licensees”, we will simply identify the licences with overlapping *authorisations*. This remains consistent with the drafting of condition 2. Licensees, as part of their cooperation with other licensees, are likely to need to establish whether all the frequencies authorised are actually used (this is particularly the case for the network licence where multiple bands are authorised).
- 5.16 We hold the details of a number of MOD sites on our databases and expect all operators to take account of these when planning operations in the UK. Where these are already in the public domain (i.e. they have been notified to the ITU) we will additionally publish these on our NGSO website and highlight these when notifying operators under condition 1.

Requirement to cooperate with other licensees - condition 2 for network licences

2. The Licensee shall cooperate with all NGSO Licensees such that each satellite system (comprising the satellites, earth stations and user terminals) can co-exist and operate within the United Kingdom without causing harmful radio interference to each other, such that network services can be provided to end users.

Our proposal

- 5.17 Condition 2 imposes a requirement for NGSO licensees to cooperate with other NGSO licensees to enable their satellite systems to coexist, so that each system is able to offer services to end users. We noted that the network licence authorises only the use of the user terminal to satellite links, however the proposed requirement to cooperate under condition 2 applies to the **whole satellite system** - comprising the satellites, earth stations and user terminals - so that should harmful interference arise in any part of the system, it can be satisfactorily addressed by NGSO licensees.
- 5.18 We also noted that we may ask to see evidence that coordination discussions are progressing and that both parties are participating constructively, and we may facilitate discussions between operators if necessary. Failure to cooperate under condition 2 “such that network services can be provided to end users” will increase the likelihood that user services will be disrupted and hence could trigger conditions 3-5 (discussed below). In assessing compliance under this condition, we would take account of the practical feasibility of licensees cooperating¹⁹, and whether and when services are intended to be provided by other NGSO licensees.

Stakeholder responses

- 5.19 Stakeholders reaction to this condition was mixed. Although nearly all respondents agreed with the general intent of the provision and that the cooperation of licensees was the most important focus for licences, there were contrasting views on how it should be implemented in network licences. SES did not consider that the condition went far enough to encourage the licensee to work towards a coordination agreement, and that as drafted it may only lead to action on individual issues. Mangata Networks and Amazon requested that we include an information sharing requirement to share system information with other licensees to facilitate coordination, e.g. ephemeris data, the characteristics of the actual operational system, and whether a coordination agreement has been entered into.
- 5.20 A number of respondents (Kepler Communications, SES, OneWeb and a confidential respondent) wanted clarification on the consequences if a licensee fails to engage in good

¹⁹ For example, it may not be feasible to complete coordination until the design of the system is stable.

faith coordination discussions. Viasat asked how we would verify constructive engagement had occurred.

- 5.21 Several stakeholders provided support for the cooperation provision extending to the whole satellite system and noted that this was consistent with existing ITU rules. Respondents (techUK, Telesat, OneWeb and a confidential respondent) also suggested that condition 2 be extended to incorporate the obligations on operators under the ITU Radio Regulations, as they did not consider that a note in the licence gave sufficient weight to the provision. Eutelsat recommended requiring licensees complete their coordination obligations at ITU level (or that significant efforts were underway) as a licence condition.

Our decision

- 5.22 As we noted at paragraph 5.13 of the consultation, we may step in situations where there are no coordination agreements, or we become aware that cooperation is not progressing constructively. We do not believe it is necessary to specify in the condition when we might instigate action but for clarification, we note it could be triggered by request or complaint from one of the parties. This could lead to us facilitating discussions between operators in order to ensure sufficient and timely progress is made (a process we already undertake to facilitate ITU coordination with UK filings). We may also request that licensees provide evidence they are not impeding progress. As a backstop, we have powers to close down, vary or revoke licences under terms in the general conditions' booklet, where licensees are in breach of their licence conditions (see Annex A6).
- 5.23 We agree that the sharing of *operational* information between parties is an integral part of this process and consider it to be a key component of 'cooperation' (notwithstanding that there may be limitations to some sharing required under Competition law). However, we are not seeking to limit or define the scope of cooperation that is necessary under this condition. Further, we do not agree that the condition as drafted will result in fewer coordination agreements, given that that the cooperation required under this condition is consistent with, and supportive of, parties reaching ITU coordination agreements.
- 5.24 We do not consider it necessary to extend condition 2 to include the ITU obligations on licensees and address this issue in the ITU licence note section below.
- 5.25 We have therefore decided to implement condition 2 in network licences unchanged.
- 5.26 An important aspect of this condition (like all others) is that it is an ongoing requirement, and so the licensee has to continue to fulfil its obligations to cooperate as and when the design of their system evolves. For example, the licensee may have reached coordination agreements with other licensees on how their systems can coexist, but later plan to change their system to such an extent that the original agreement(s) would no longer ensure coexistence. In that case the licensee would need to again cooperate with others to agree new coexistence arrangements.

Requirement to only operate with a system that is covered by a network licence – condition 2 in gateway licences

2. The radio frequencies authorised by this Licence must only be used to communicate with a satellite system which has transmissions authorised under a Satellite (Earth Station Network) wireless telegraphy licence granted by Ofcom.

Our proposal

- 5.27 Gateway licences are typically held by teleport operators, so the cooperation requirement of the network licences for the whole satellite system did not apply here. However, we noted there will still be a need for cooperation to ensure the gateway can coexist, which will be undertaken by the holder of the relevant network licence. Therefore, under condition 2 for gateway licences, we proposed that the gateway be required to only communicate with a satellite system that is authorised under a network licence, to ensure that there is appropriate cooperation.

Stakeholder responses

- 5.28 Although a number of stakeholders agreed with the requirement that a gateway licence be associated with a network licence as proposed, others raised concerns about how this provision would work in practice. Amazon, Telesat and a confidential respondent saw the provision as an unnecessary link to network licences and worried that it could have unintended consequences, creating a barrier to entry for gateway operators (as it was believed that the provision set an order to licensing that could constrain gateway deployment). They considered that a cooperation condition similar to that proposed for the network licence would be more appropriate.
- 5.29 Mangata Networks noted that it may be necessary for gateway operators to put legally binding agreements in place, where they are different legal entities to the network licensee to ensure that: a) any licence conditions imposed on the gateway operator could also be made binding on the satellite operator; and b) any directions issued by us to the gateway operator (for example to mitigate any national or international interference situations) be communicated to the satellite operator, requiring the satellite operator to act on such directions without delay.

Our decision

- 5.30 In response to stakeholder concerns, we note that this provision does not require that a network licence be **held before** the gateway licence can be applied for, merely that licensees cannot use the gateway to communicate (i.e. transmit) until a corresponding network licence is held. The link between the two licences is intended, as gateways should not be operated without an appropriate entity who is responsible for the whole satellite system holding a network licence. Therefore in practice, we would not issue a gateway

licence until the corresponding network licence had been issued, although this does not stop the network and gateway licence from being applied for at the same time.

- 5.31 We agree that third party gateway operators may need to consider appropriate commercial arrangements where they provide gateways to support network licensees, but this remains a matter for those gateway operators.
- 5.32 Considering the above, we do not consider it necessary for gateway licences to contain a cooperation condition and have decided to implement condition 2 of the gateway licence unchanged.

Requirement to comply with notice if services are degraded: conditions 3-5 for network and gateway licences

3. In the event that –
 - one (or more than one) of the NGSO Licensees suffers a material and recurring degradation of services to its users at a specific region or location in the United Kingdom; and
 - the degradation of services is resulting from radio transmissions from the earth stations, **the satellite or any other part of the satellite system** operated by **another of the NGSO Licensees, including** the Licensee;

Ofcom may instruct the Licensee to cease or change the use of particular equipment or particular radio frequencies which are **authorised under a wireless telegraphy licence (including but not limited to radio frequencies authorised under this Licence) and are used by any part of the satellite system.**
4. Any such cessation or change must be for the purposes of ensuring that such interference is avoided and the degradation of services to users at the particular regions or locations is resolved.
5. Following receipt of such notice, for such period of time as may be specified in the notice, the Licensee may only operate in accordance with the terms and conditions of the notice.

Our proposal

- 5.33 Conditions 3-5 were proposed to enable us to require operators to act in cases of interference between NGSO systems which materially degrades the provision of services to users in specific location(s) in the UK. We said that we would take into account the timing of degradations to user services and the correlation of that timing with (predicted) in-line events between NGSO systems and whether operators have attempted to resolve issues between themselves when it is possible. We stated that the specific action we will require would depend on the situation but could include changing frequencies or switching off equipment.

- 5.34 For gateway licences, condition 3 was simplified to reflect that the licensee may be a teleport operator and, if so, will not (unlike a satellite operator holding a network licence) have control over other elements of the satellite system beyond the specific link authorised under this licence. This is reflected in the **yellow highlighted text** and for the purposes of gateway licences, condition 3 should be read with the highlighted text deleted.

Stakeholder responses

- 5.35 Most stakeholders generally supported the principle behind conditions 3-5, though we received a number of minor drafting suggestions to revise the terms, in particular to the wording in condition 3 and whether it should only apply to the licensee itself rather than to all NGSO licensees more broadly. Stakeholders also restated the importance of retaining private coordination between satellite operators in the first instance, before imposing regulatory action triggered by this condition.
- 5.36 A number of respondents (Lacuna Space, Kepler Communications, Inmarsat, Intelsat, SpaceX and Amazon) thought we needed clearer guidance for determining when material and recurring degradation of services occurs, and what remedies would apply. Viasat suggested we impose additional conditions or modify the licence where non-compliance or elevated risk is identified.
- 5.37 The other theme which emerged involved recognising ITU priority under condition 3 and taking account of it when addressing interference (Telesat, Kepler Communications, OneWeb and a confidential respondent). OneWeb specifically noted that we should require the later filed system to take action to mitigate harmful interference against the priority system.

Our decision

- 5.38 As explained in paragraph 5.18 of the consultation and consistent with our regulatory principles, we support operators attempting to resolve issues between themselves before we resort to regulatory action. Any action we do take would be evidence-based and proportionate.
- 5.39 We note stakeholders' requests to further define terms relating to harmful interference and/or material degradation of services. While we note that harmful interference is defined in [section 115\(5\) of the Wireless Telegraphy Act](#), we do not believe it is helpful to explicitly define these terms any further, particularly in licence conditions, because the impact of interference experienced will differ from case to case.
- 5.40 Furthermore, adding new licence conditions to include specific procedures to follow, or actions for non-compliance can remove flexibility and fetter our discretion to act when required.
- 5.41 With respect to condition 3 and proposed amendments, we specifically worded the provision so that it included any licensee who may be required to make changes, including taking measures to protect themselves, and therefore we do not support this change.

- 5.42 We also note the request to take account of ITU priority under condition 3. In the consultation (paragraph 5.19) we said that one of the factors we would take account of in acting under condition 3 would be the UK's responsibilities under the ITU Radio Regulations including, where appropriate, the status of the filings supporting those systems. Our responsibilities include taking such action as may be necessary to protect UK filings, and taking appropriate action if we are informed by another administration that UK filed systems are causing harmful interference to a system filed with another administration. However, as explained in paragraph 5.59, we see no need to create a further licence condition to make this obligation more explicit given it is an obligation that already applies. We also discuss in Section 3 how our new licensing process relates to the ITU Framework.
- 5.43 While many drafting suggestions were considered helpful, most suggestions did not alter the meaning or in our view improve the working of the condition. Given the need to seek general consensus on the licence conditions, we have decided to only to make necessary editorial changes. These relate to:
- amending the first bullet of condition 3 so that it captures cases where the interference is ongoing rather than recurring, so the provision now refers to 'material and recurring (or ongoing) degradation of services';
 - amending the second bullet of condition 3 to replace 'another' with 'any' to improve readability; and
 - making clear that any instruction given by us would come in the form of a notice.
- 5.44 We have therefore decided to implement conditions 3-5 in network and gateway licences as follows (drafting changes are in italics; highlighted text applies to network licences only):

3. In the event that –
- one (or more than one) of the NGSO Licensees suffers a material and recurring (*or ongoing*) degradation of services to its users at a specific region or location in the United Kingdom; and
 - the degradation of services is resulting from radio transmissions from the earth stations, **the satellite or any other part of the satellite system** operated by **any of the NGSO Licensees, including** the Licensee;
- Ofcom may *by notice* instruct the Licensee to cease or change the use of particular equipment or particular radio frequencies which are **authorised under a wireless telegraphy licence (including but not limited to radio frequencies)** authorised under this Licence) and are used by any part of the satellite system.
4. Any such cessation or change must be for the purposes of ensuring that such interference is avoided and the degradation of services to users at the particular regions or locations is resolved.

5. Following receipt of such notice, for such period of time as may be specified in the notice, the Licensee may only operate in accordance with the terms and conditions of the notice.

Requirement to commence and maintain transmissions within 12 months – condition 6 in gateway licence

6. The Licensee must establish, install and use the Radio Equipment to commence regular wireless telegraphy transmissions in accordance with the provisions of this Licence within twelve months of the date that this Licence is issued, and maintain such transmissions thereafter.

Our proposal

- 5.45 We proposed a requirement for gateway licensees to commence and maintain transmissions within 12 months of being issued a licence to mitigate the risk of artificial scarcity (i.e. if operators apply for licences far in advance of a potential need and never actually deploy). We stated that the consequences of spectrum not being used within this timeframe, or subsequently no longer being used, may be revocation of the licence with one month's notice. Alternatively, we may no longer take the licence into account when assessing the interference that may be caused by a new site when considering a new licence application.

Stakeholder responses

- 5.46 Only four respondents specifically commented on this element of the licence condition – SES, Telesat, OneWeb and one confidential respondent. The principle objection was that 12 months would not be flexible enough for operators, and a confidential respondent suggested at least 24 months might be more appropriate. Alternatively, SES suggested that no time limit would create a more stable regulatory environment, and in order to prevent 'warehousing' that a limit of one unbuilt gateway per operator be adopted instead.
- 5.47 OneWeb and the confidential respondent requested that the condition be amended to account for exceptional circumstances e.g. those outside the control of the licensee.
- 5.48 Lastly, Telesat noted ITU Radio Regulation No. 11.49 which permits the suspension of satellite networks for up to three years, and which could lead to interruptions to transmission for gateways, making the 12-month rule difficult to adhere to.

Our decision

- 5.49 Our starting point for including this term in gateway licences is as set out under condition 2, that the gateway supports the rest of the satellite system and does not of itself control the satellite service being provided. It only operates when connected with a wider satellite system, as licensed under a network licence. Therefore, it will remain a commercial

decision for the network licensee (i.e. the satellite operator) as controller of its satellite system to determine how and what it deploys for its network to operate effectively, including its use of gateways in the UK.

- 5.50 In light of this view, we consider that 12 months is a sufficiently long period for network and gateway licensees to work together to commence operations and are not persuaded that permitting one unbuilt gateway per operator meets our objectives, as explained here. Regarding accounting for exceptional circumstance in licences, we draw stakeholders' attention to our duty to act reasonably, fairly and proportionately, so do not consider an additional provision in licences is necessary.
- 5.51 Where a network licensee has decided to no longer provide a service, i.e. not to bring a gateway into use in its system, or to no longer operate one of its gateways (including where ITU Radio Regulation No. 11.49 to suspend transmission has been invoked²⁰), it is therefore right that the gateway licence may be lost. We may then take steps to revoke that licence exercising our judgement reasonably, fairly and proportionately in doing so.
- 5.52 Where a licence is revoked, and the network operator wishes to recommence operations at that gateway, the gateway licensee would need to reapply for a licence following the application process for new applicants.
- 5.53 We have therefore decided to implement condition 6 in gateway licences unchanged.

ITU obligations – Note for network and gateway licences

This Licence does not affect any obligations that the licensee may have under the ITU Radio Regulations.

Our proposal

- 5.54 Our Wireless Telegraphy Act licences, including the network and gateway licences discussed here, are national obligations for the regulation of radio frequencies within the UK and are not trying to replicate or replace ITU regulations. However, for the avoidance of doubt, we included a note in both draft licences to reflect that licensees may separately have obligations stemming from the ITU Radio Regulations, and that the conditions in our licences do not affect these obligations.

Stakeholder responses

- 5.55 Stakeholders supported the reference to the ITU Radio Regulations in licences, but several did not believe that our proposed draft note went far enough. Six respondents (techUK, Telesat, OneWeb, Eutelsat, Hughes Europe, and a confidential respondent) requested it be made a condition of each licence and attached to condition 2 (the requirement to

²⁰ In any case, we note that operators need only notify the ITU of a suspension after six months has passed.

cooperate). Several respondents also queried how our proposals fitted with the ITU priority system which requires later systems to protect systems which are filed earlier.

- 5.56 OneWeb and a confidential respondent thought it more accurate to replace the word 'affect' with 'supersede'. Mangata Networks noted the possibility of NGSO gateways in the UK causing interference to user terminals located outside the UK, including those in international waters/airspace, and noted the need for gateway licensees to engage in coordination with affected system operators (or other national administrations) to resolve any potential interference situations.

Our decision

- 5.57 We noted at paragraph 5.21 of the consultation that the licensees holding Wireless Telegraphy Act licences may separately have obligations that flow from the ITU Radio Regulations. As discussed in Section 2, obligations in national licences do not override any of these obligations with our licence conditions, and the existing priority that applies within the ITU process will continue to apply.
- 5.58 With regard to UK licensed gateways causing interference internationally, we note that the existing ITU process provides rules and procedures for resolving interference which crosses national boundaries.
- 5.59 We see no need to create a new licence condition to make this obligation more explicit, given it is an obligation that already applies. However, we have decided to clarify the wording slightly to better reflect where the obligation lies - replacing 'affect' with 'remove', inserting 'other' before obligations, and referencing the satellite filings process. We have therefore decided to implement the following note in both network and gateway licences (drafting changes are in italics):

This Licence does not *remove* any *other* obligations that the Licensee may have *in relation to satellite filings* made under the ITU Radio Regulations.

Summary of our decisions

- 5.60 We have decided to proceed with our plans to update NGSO network and gateway licences, including existing licences, with new conditions to support our objective to enable as many NGSO systems as possible to provide services and get everyone in the UK connected.
- 5.61 We will implement unchanged the following conditions:
- Requirement to use frequencies in common with other licensees –condition 1 for network and gateway licences.
 - Requirement to cooperate with other licensees - condition 2 for network licences.
 - Requirement to only operate with a system that is covered by a network licence – condition 2 in gateway licences.

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d) Requirement to commence and maintain transmissions within 12 months – condition 6 in gateway licences.

5.62 We have made some minor drafting changes to clarify the following conditions:

a) Proposed requirement to comply with notice if services are degraded - conditions 3-5 for network and gateway licences.

b) ITU obligations – note for network and gateway licences.

5.63 The full licences including the updated conditions are shown in Annex A4 for network licences, and Annex A5 for gateway licences. These should be read together with the general conditions' booklet (at Annex A6).

6. NGSO user terminals operating in Ka band

Our proposal

- 6.1 Our consultation proposed to remove some existing exemptions for NGSO systems user terminals in Ka band (i.e. for earth stations on moving platforms (ESOMPs) now referred to as ESIMs²¹, and high density fixed satellite services (HDFSSs)) to ensure that all NGSO systems operate under a network licence (Question 6). The result of the proposal is that all NGSO systems (no matter whether operating under Ka band or Ku band) would have the same licence conditions, and specifically that NGSO land terminals in Ka band for ESOMPs/ESIMs or HDFSS would no longer be exempt from licensing.
- 6.2 We noted that if we proceeded with our proposal, we would need to amend the [Wireless Telegraphy \(Exemption\) Regulations 2021](#) (the Exemption Regulations) and relevant [Interface Requirements](#) to give effect to it.

Stakeholder responses

- 6.3 Most stakeholders who responded to this question (14 of the 21 responses) agreed with our proposal. We received limited additional comments, and the majority of stakeholders simply agreed that the exemption for ESIMs/ESOMPs and HDFSS in Ka band should be removed to bring the licensing regime for terminals in both bands in line, and to support our overall objective for managing the competition and interference risks for NGSO systems (including to user terminals and gateways).
- 6.4 Two respondents did not support our proposals (Telesat and one confidential respondent). They viewed our proposal (and its benefits) as unclear²², and considered that any risk of interference from ESIMs/ESOMPs is satisfactorily mitigated by the ITU Radio Regulations and the ITU procedures for notification and coordination of satellite space stations. They therefore advocated for a more general exemption from the requirement to hold a network licence for all terminal types subject to ECC Decisions, based on their view that CEPT had determined (under various ECC decisions²³) that land based ESIMs/ESOMPs could operate on a licence exempt basis, as permitted for uncoordinated earth stations.
- 6.5 Furthermore, our proposal was opposed due to the potential imbalance it could create for GSO systems in the same band (where an exemption from licensing for land terminals remains). Telesat raised a specific query about how our proposal sits alongside existing licensing arrangements for aeronautical and maritime ESIMs/ESOMPs and the requirement to hold a network licence in those sectors, including those operating with GSO systems.

²¹ We note that the term ESOMP was changed to ESIM (Earth Station in Motion) during discussions at WRC-15, and some of our documentation still refers to them historically as ESOMP. Our decision relates to both terms interchangeably.

²² There was also a request by these respondents to clarify which terminals the proposal related to, however we consider this was made clear in the consultation as set out in the summary above.

²³ Telesat response referred to ECC Decisions (13)01 and (15)04.

- 6.6 For the three remaining respondents who did not support our proposal, it was not made clear by how their comments related to removing Ka band exemptions. Lastly, several respondents raised issues beyond the scope of the current proposals (i.e. on high altitude platform systems (HAPS) and the safety and sustainability of NGSO constellations) and these are not addressed here (however, an explanation is briefly provided in Annex A2).

Our decision

- 6.7 Our proposal aims to have all licensees operating under the same terms, and the majority of respondents agreed with this approach. We disagree with the view that current arrangements sufficiently manage the risks of interference for the reasons set out in paragraph 3.7-3.9 of the consultation. We consider it important for successfully managing future coexistence that all parts of an NGSO system including its user terminals to be captured within the relevant network licence. We also note that the ECC decisions referred to by Telesat remain a matter of national policy as to how they are implemented in the UK, and simply permit national regulatory authorities to grant an exemption from individual licensing rather than stipulating bands as licence exempt.
- 6.8 We note Telesat's request for clarification on our plans for licensing aeronautical and maritime ESIMs/ESOMPs in Ka band. We recognise that our decision to remove the exemption creates a potential gap in the licensing framework for NGSO systems using Ka band user terminals. However, this gap is theoretical for the time being, because as we explained at paragraph 7.3 of the consultation, NGSO systems using Ka band terminals have not yet been deployed and we do not expect any to be operational before around 2024. Operators can deploy land terminals in the interim. We expect to revise the network licence to reset the frequencies and resolve this 'gap' so that aeronautical and maritime ESIMs/ESOMPs are captured in network licences in 2022/23.
- 6.9 With respect to concerns raised about our proposal creating an imbalance with exemptions which remain in place for GSO systems, the changes we proposed for authorising NGSO systems were driven by the need to introduce additional licence terms specifically for NGSO systems (i.e. the challenges that the new licence terms seek to address do not exist for GSO systems).
- 6.10 Although we have not sought to remove the exemptions for GSO systems as part of this process, there may be other benefits to taking a similar approach. If stakeholders believe we should consider changing how we authorise GSO systems for other reasons, they are encouraged to respond to our forthcoming space spectrum strategy consultation.

Summary of our decision

- 6.11 We have therefore decided to proceed with our plans to remove the exemption for ESIMs/ESOMPs and HDFSS for Ka band from the Exemptions Regulations, and will begin the process of making the necessary changes to our Exemption Regulations to implement our decision (see paragraphs 7.18-7.19 for next steps in this process).

7. Summary of our decisions and next steps

Our decisions

Licensing process

- 7.1 Effective from the date of this statement, we will adopt the application process set out in this statement, summarised in Figure 6
- 7.2 The stages in the process are the essentially the same for both network and gateway licence applications, although there are some slight differences as explained below.

Figure 6: Overview of the application process



Indicative timeline:



- 7.3 The steps in the application process are as follows (and set out in additional detail in our NGSO guidance document):
- Application submission:** The applicant completes the application form and provides required information to Ofcom.
 - Initial review:** We carry out an initial review. Assuming that the application is not rejected at this stage (e.g. because it is incomplete), we will then publish an Invitation to Comment. We will aim to do this within **10 working days** of receipt of the application. That Invitation to Comment will include the application and may indicate some topics that we would particularly welcome views on.

- c) **Commenting period:** Stakeholders will have **20 working days** to respond to the Invitation to Comment.
 - d) **Assessment:** At the end of the commenting period, we will review stakeholder responses and decide whether to grant the licence or whether further assessment is needed. We will aim to complete our assessment within **20 working days** of the end of the commenting period. When applications are more complex, we will aim to complete any further assessment and make a decision within an additional 20 days (i.e. within **40 working days** of the end of the commenting period).
 - e) **Issue decision:** We will notify the applicant of our decision. We will also publish our decision on our website, along with the responses received from stakeholders and a brief rationale for granting or refusing to grant the licence.
- 7.4 We will notify licensees and any other applicants when we commence the commenting period for a new application. Other interested parties can [subscribe to spectrum email updates](#) (selecting 'Radio spectrum' in the list of sectors) to be notified when we publish applications or decisions.

New NGSO licence conditions

- 7.5 We have decided to proceed with our plans to update NGSO network and gateway licences, including existing licences, with new conditions to support our objective to enable as many NGSO systems as possible to provide services and get everyone in the UK connected.
- 7.6 We will implement unchanged the following conditions:
- requirement to use frequencies in common with other licensees –condition 1 for network and gateway licences.
 - requirement to cooperate with other licensees - condition 2 for network licences.
 - requirement to only operate with a system that is covered by a network licence – condition 2 in gateway licences.
 - requirement to commence and maintain transmissions within 12 months – condition 6 in gateway licences.
- 7.7 We have made some minor drafting changes to clarify the following conditions:
- requirement to comply with notice if services are degraded – conditions 3-5 for network and gateway licences.
 - ITU obligations – note for network and gateway licences.
- 7.8 The full licences including the updated conditions are shown in Annex A4 for network licences, and Annex A5 for gateway licences. These should be read together with the general conditions' booklet (at Annex A6).

Removal of Ka band exemptions

- 7.9 We have decided to proceed with our plans to remove the exemption for ESIMs/ESOMPs and HDFSS for Ka band from the Exemptions Regulations, and will begin the process of making the necessary changes to our Exemption Regulations to implement our decision (as outlined below).

Resumption of NGSO licensing process

- 7.10 We will now resume issuing NGSO licences, following the suspension implemented during this consultation, and apply the licensing framework we have determined in this statement.
- 7.11 As we said at paragraph 4.68, timelines may be extended for applications running over holiday periods. Taking account of the upcoming Christmas holiday period, stakeholders should be aware that any applications submitted before 4 January 2022 may take up to two weeks extra to process. We will also extend the period for comment to allow other stakeholders sufficient time to respond, adding two weeks to any application published by 24th December 2021.

Process to vary existing licences

- 7.12 Following the publication of this statement, we will write to licensees to start the licence variation process to give effect to our proposal to vary existing NGSO network and gateway licences. This process is laid out in Schedule 1 of the Wireless Telegraphy Act 2006. The new conditions will be included in all Satellite (Earth Station Network) licences but will only apply to those operating NGSO systems (designated as “Non-Geostationary” in the licence). We will apply the same terms as determined under Section 5, and summarised at paragraphs 7.5-7.7 of this statement, and expect to complete the variation process in early 2022.
- 7.13 For NGSO network licences, this refers to the following licensees:
- Kepler Communications Inc;
 - Network Access Associated Ltd (trading as OneWeb);
 - Starlink Internet Services UK Ltd (provided by SpaceX).
- 7.14 For NGSO gateway licences, this refers to the following licensees:
- Arqiva Ltd;
 - Goonhilly Earth Station Ltd;
 - Starlink Internet Services UK Ltd (provided by SpaceX).
- 7.15 New applications for gateways planning to communicate with the satellite networks listed at paragraph 7.13 may be submitted for consideration while the variation process is underway. However, if applications are successful, the gateway licence will only be granted once the variation process has been completed.

- 7.16 For the avoidance of doubt, only the three operators listed 7.13 have NGSO network licences. This means that:
- a) GSO satellite operators who already hold a network licence will need to apply for a new NGSO network licence through the application process described in this document if they wish to operate an NGSO system alongside their GSO system.
 - b) As set out in 4.30, only satellite operators in control of the whole NGSO system can apply for an NGSO network licence. Resellers and service customers holding GSO network licences therefore cannot apply for an NGSO network licence unless they control the whole system and can only connect to systems authorised by an NGSO network licence.

Notification under condition 1

- 7.17 Once the process to vary existing licences is complete, we will write to licensees to fulfil our obligations to notify them under new licence condition 1. From time to time we will continue to notify additional licensees as they are authorised. We will also publish the full list of NGSO licensees on the NGSO licensing website, as explained below.

Ka band exemption removal process

- 7.18 Following this statement, and our decision to remove exemptions for ESIMs/ESOMPs and HDFSS in Ka band (as set out in paragraph 6.11), we will begin the process of making the necessary changes to our Exemption Regulations to implement our decision.
- 7.19 We will consult on our draft Exemption Regulations for four weeks after the notification period for the Interface Requirements has passed. The regulations will not come into force until we have considered any consultation responses. We expect this consultation process to be completed, and the Regulations to come into force in Summer 2022.

Website information and guidance notes

- 7.20 We will publish new information about NGSO networks and gateways on [our website](#). This page is designed with applicants in mind, but includes information that other stakeholders might find useful:
- the NGSO licences available: Satellite (Earth station network), “the NGSO network” licence and Satellite (Non-geostationary Earth Station), the “NGSO gateway licence”;
 - how to apply for an NGSO licence, with a link to the NGSO guidance document;
 - two tables detailing the NGSO networks and gateways licensed to operate in the UK;
 - two tables detailing NGSO network and gateway licence applications;
 - a list of other specific co-frequency earth stations registered with the ITU.
- 7.21 We will publish details of past and current applications, including:
- the name of the network or gateway applicant, including the name of the associated network for gateways;

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- the date of publication;
 - the application reference number;
 - our initial assessment;
 - the deadline for responding (and any changes to our timelines); and
 - our final decision (along with responses from stakeholders).
- 7.22 Response forms will be available from the same section of the website for stakeholders wishing to respond to applications with a live commenting period. You can [subscribe to spectrum email updates](#) (selecting 'Radio spectrum' in the list of sectors) to be notified when we publish applications or decisions.
- 7.23 If a licensing application is successful, we will publish a copy of the licence in the relevant table of existing NGSO network and gateway licences. The application will remain in the table of applications as a matter of record.

Space spectrum strategy next steps and timeline

- 7.24 As noted in Section 2 we are planning to publish a consultation on our spectrum strategy for the space sector early in 2022. This will include proposals for our spectrum management work in the space sector over the coming years. Where stakeholders have raised issues and questions which were beyond the scope of this current decision, they are encouraged to respond to that broader strategy consultation.