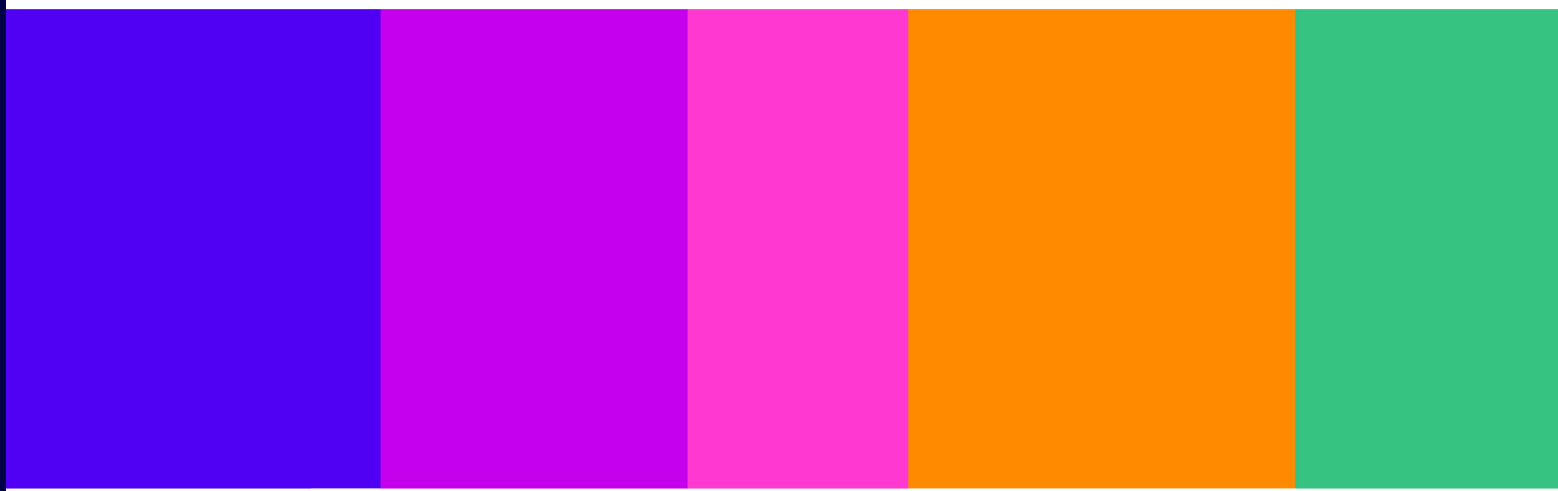


Increasing use of the 27.5–30 GHz and 32 GHz bands

Statement

Published 3 February 2024



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1. Overview

- 1.1 In February 2023 and April 2024, two blocks of spectrum in the 28 and 32 GHz bands were returned to Ofcom. In line with our duty to secure optimal use of spectrum, we have considered how to make these blocks available in a way that maximises the benefits that people, businesses, and other organisations derive from their use.
- 1.2 This document sets out our decisions on the future use of this spectrum, which we expect will help to deliver benefits to people and businesses in the UK by enabling new or enhanced services using satellite or fixed link connectivity including:
- providing broadband to hard-to-reach premises in the UK;
 - backhaul to support delivery of mobile services, especially in rural areas; and
 - provision of communications for other businesses and organisations such as utilities networks, public safety networks and transport providers.

28 GHz

- 1.3 Services which rely on satellite connectivity are increasingly important for UK consumers and businesses, in particular for hard-to-reach premises.
- 1.4 The 27.5-30 GHz (“28 GHz”) band is a core band for satellite services globally and there has been significant growth and development in its use. In the UK, much of the 28 GHz band is already available for satellite use but some spectrum in the band was auctioned in 2000 and 2008 on a national block-assigned basis and has been used for fixed links, primarily used to provide mobile backhaul.
- 1.5 The return of a 2 x 224 MHz block of this spectrum in February 2023, by Arqiva, provided an opportunity to review use of this band, including how to make use of the newly available spectrum.
- 1.6 In our [March 2024 statement and consultation](#), we:
- set out our decision to open an additional 560 MHz of spectrum in the 28 GHz band for satellite gateways;
 - made proposals for enabling further use of 336 MHz of this spectrum for land-based satellite terminals (1 x 112 MHz, 28.8365-28.9485 GHz) and fixed links (2 x 112 MHz, 27.9405-28.0525 GHz paired with 28.9485 - 29.0605 GHz); and
 - made proposals for enabling further use of 224 MHz of unused spectrum (2 x 112 MHz, 28.1925-28.3045 GHz paired with 29.2005-29.3125 GHz) for satellite gateways and fixed links in the London and Northern Ireland regions only.
- 1.7 Whilst noting that satellite gateway operators can access the block assigned portions of the band by entering into commercial arrangements with the incumbent licensees, we additionally proposed that in some cases we would directly authorise satellite gateways on a case-by-case basis in the block-assigned portions of the band.

32 GHz

- 1.8 In April 2024, a block of spectrum in the 32 GHz band (2 x 126 MHz) was returned to Ofcom. The 32 GHz band was auctioned in 2008 on a national block-assigned basis and has been used for fixed links.
- 1.9 In our [August 2024 consultation](#), we proposed to make this spectrum available for fixed links.
- 1.10 Given the availability of two unassigned blocks of spectrum in the 28 and 32 GHz bands, both of which have, in whole or in part, been used for fixed links, and our view that the two bands were likely to be substitutable for fixed link use, we said we planned to consider responses to the two consultations together and publish a combined statement on future use of both the 28 and 32 GHz bands.

What we have decided – in brief

We are not intervening at this time to directly authorise satellite gateway access to block licensed spectrum in the 28 GHz band

- We have decided not to introduce a new process to directly authorise satellite gateways in frequencies licensed to Spectrum Access licensees at this time. This is because we are currently satisfied that it is reasonable to expect market mechanisms to enable further sharing. We may revisit this again in future if we receive evidence that market mechanisms are not proving effective in enabling gateway access.

Future use of unassigned 28 GHz spectrum – satellite gateways, satellite terminals and fixed links

- For land-based satellite terminals, we are making an additional 2 x 112 MHz of spectrum (27.8285-27.9405 GHz and 28.8365-28.9485 GHz) available on a nationwide basis with immediate effect.
- In London and Northern Ireland we are making an additional 2 x 112 MHz of spectrum (28.1925-28.3045 GHz paired with 29.2005-29.3125 GHz) available for satellite gateways (with immediate effect) and point-to-point fixed links (later in 2025).
- We are deferring our decision on whether to make a further 2 x 112 MHz of spectrum (27.9405-28.0525 GHz and 29.9485-29.0605 GHz) available for use by land-based satellite terminals or point-to-point fixed links until we have further evidence on the uptake of spectrum made available through this initial set of decisions.

32 GHz

- We are making 2 x 112 MHz of spectrum (32.459-32.571 GHz paired with 33.271-33.383 GHz) available for point-to-point fixed links on a nationwide basis, available later in 2025.

2. Introduction

- 2.1 The 28 GHz band is currently used for fixed links (in the block-assigned portions of the band) and also for satellite gateways and terminals. The 32 GHz band is currently used for fixed links.
- 2.2 In our [27.5-30 GHz \('the 28 GHz band'\) statement and consultation](#), published on 22 March 2024, we confirmed our decision to open the 2 x 224 MHz block of spectrum returned by Arqiva ("the returned spectrum") and the four 28 MHz guard bands for satellite gateway use under our existing authorisation approaches for non-geostationary orbit (NGSO) and geostationary orbit (GSO) gateways.
- 2.3 In the same document, we also consulted on additional proposals relating to use of the 28 GHz band. We said that we were minded to:
- introduce a process for Ofcom to directly license satellite gateways to access 28 GHz spectrum that is currently authorised on a national or regional basis to Spectrum Access licensees, subject to consultation processes to avoid material impacts on incumbent licensees. However, we also highlighted that it remained our preference to rely on market mechanisms where possible and effective.
 - make 1 x 112 MHz of the returned spectrum available on a nationwide basis for land-based satellite terminals and 2 x 112 MHz for fixed links (with 1 x 112 MHz left unallocated for now).
 - make 2 x 112 MHz of spectrum that is currently unassigned in London and Northern Ireland available for satellite gateways and fixed links.
- 2.4 In our [32 GHz consultation](#), published on 1 August 2024, we proposed to make the unassigned spectrum in the 32 GHz band (32.445-32.571 GHz paired with 33.257-33.383 GHz) available for new fixed links assignments on an Ofcom-managed basis across the UK.
- 2.5 This document is a joint statement setting out our decisions on both the 28 and 32 GHz bands.

Our policy objectives

- 2.6 Our policy objective for the 28 and 32 GHz bands is to secure optimal use of the bands for the benefit of UK citizens and consumers.
- 2.7 Further, our Spectrum Management Strategy (paragraph 3.55) sets out that greater sharing is an important way to achieve more efficient spectrum use, which is why we are seeking to promote sharing in the context of the 28 GHz band.¹
- 2.8 In our [Space Spectrum Strategy](#), we set out two key objectives which are also relevant to our decisions on the future of the 28 GHz band. These include 'providing access to spectrum to enable growth in the benefits that the space sector delivers for people, businesses and the public sector in the UK', and 'enabling as many NGSO satellite systems as possible to provide services in the UK'. The 28 GHz band is an important band for both

¹ In the case of 32 GHz, we are not aware of concrete evidence of demand for any non fixed link use of the band at this time.

GSO and NGSO satellite systems and there has been significant growth and development in its use globally, notably the launch and operation of large-scale constellations of non-geostationary orbit (NGSO) satellites. The band has a primary allocation to the Fixed Satellite Service (FSS) globally in the Radio Regulations and in the UK, making it ideal for the delivery of global satellite services.

Relevant legal framework

- 2.9 Ofcom's statutory powers and duties in relation to spectrum management are set out primarily in the Communications Act 2003 (the "2003 Act") and the Wireless Telegraphy Act 2006 (the "WT Act").

Communications Act 2003

- 2.10 Our principal duties under the 2003 Act are to further the interests of citizens and consumers in respect to communications matters, where appropriate by promoting competition. In doing so, we are also required (among other things) to secure the optimal use of spectrum and the availability throughout the United Kingdom of a wide range of electronic communications services.
- 2.11 Our spectrum management duties under the 2003 Act require us to have regard to:
- a) the desirability of promoting competition in relevant markets;
 - b) the desirability of encouraging investment and innovation in relevant markets;
 - c) the different needs and interests, so far as the use of the electro-magnetic spectrum for wireless telegraphy is concerned, of all persons who may wish to make use of it; and
 - d) the different interests of persons in the different parts of the United Kingdom, of the different ethnic communities within the United Kingdom and of persons living in rural and in urban areas.

Wireless Telegraphy Act 2006

- 2.12 We permit the use of the radio spectrum by granting wireless telegraphy licences under the WT Act. It is unlawful and an offence to install or use wireless telegraphy apparatus without holding a licence granted by Ofcom, unless the use of such equipment is exempted.
- 2.13 In carrying out our spectrum functions we have a duty under section 3 of the Act to have regard in particular to:
- a) the extent to which the spectrum is available for use, or further use, for wireless telegraphy;
 - b) the demand for use of that spectrum for wireless telegraphy; and
 - c) the demand that is likely to arise in future for such use.
- 2.14 We also have a duty to have regard to the desirability of promoting:
- a) the efficient management and use of the spectrum for wireless telegraphy;
 - b) the economic and other benefits that may arise from the use of wireless telegraphy;
 - c) the development of innovative services; and
 - d) competition in the provision of electronic communications services.
- 2.15 Section 8(3B) of the WT Act says the terms, provisions and limitations specified in the licences must be:

- a) objectively justifiable in relation to the wireless telegraphy stations or wireless telegraphy apparatus to which they relate;
- b) not such as to discriminate unduly against particular persons or against a particular description of persons;
- c) proportionate to what they are intended to achieve; and
- d) transparent in relation to what they are intended to achieve.

The desirability of promoting economic growth

2.16 In exercising our regulatory functions, we are also required to have regard to the desirability of promoting economic growth (the “**growth duty**”).² In particular, we must consider the importance for the promotion of economic growth of exercising the regulatory function in a way which ensures that regulatory action is taken only when it is needed, and any action taken is proportionate. Section 110(3) of the Deregulation Act 2015 requires us to have regard to the “Growth Duty: Statutory Guidance” (revised by Government in May 2024).

Structure of this document

2.17 The rest of this document is set out as follows:

- Section 3 sets out our decision on enabling satellite gateway access across the whole 28 GHz band;
- Section 4 sets out our decisions on future use of the unassigned spectrum in the 28 GHz band;
- Section 5 sets out our decision on future use of the unassigned spectrum in the 32 GHz band;
- Section 6 sets out how we plan to implement the decisions in Sections 4 and 5.

² Section 108 of the Deregulation Act 2015, which was extended to Ofcom’s regulatory functions by The Economic Growth (Regulatory Functions) (Amendment) Order 2024.

3. Enabling satellite gateways across the whole 28 GHz band

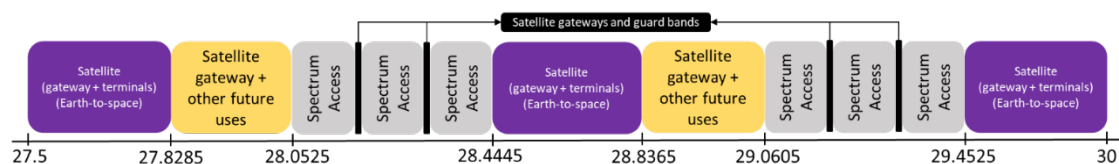
3.1 In this section we set out our decision on our proposal to introduce direct licensing of satellite gateways in 28 GHz spectrum that is currently licensed to Spectrum Access licensees. We have decided not to proceed with direct licensing at this time.

Our consultation proposals

3.2 Following the decision taken in our [22 March 2024 statement and consultation](#), satellite gateways could be directly authorised by Ofcom to access 1,828 MHz of spectrum within the 28 GHz Band (purple and orange blocks in figure 1 below, as well as the guard bands separating the Spectrum Access blocks).

3.3 In that document we also consulted on a proposal for Ofcom to directly authorise satellite gateway (NGSO and PES³) access across the whole band, including by licensing them over the top (OTT) of the block assigned bands (grey blocks in figure 1 below) where there would be no material impact on incumbent Spectrum Access licensees. However, we also highlighted that it remained our preference to rely on market mechanisms where possible and effective. We said that we saw clear potential for additional satellite gateway use in this spectrum that could be enabled under existing mechanisms without significantly constraining future use for fixed links.

Figure 1: 28 GHz band plan



Summary of responses

3.4 We received 16 responses to our consultation, one of which was wholly confidential. Satellite operators, Arqiva, and BT supported the proposal to directly license satellite gateway access across the whole of the 28 GHz band.

3.5 Satellite operators emphasised that the 28 GHz band is a core band for satellite uplinks and that it was critical for the industry that the whole band was available for gateway operations. Some argued that the existing approach of relying on commercial negotiations to access spectrum was time-consuming and costly and that these costs were prohibitive to the rapid deployment of broadband services, and ultimately harmed UK consumers.

3.6 Existing 28 GHz Spectrum Access licensees on the other hand strongly disagreed with the proposal. They agreed that there was potential for additional satellite gateway access in the

³ Permanent Earth Stations. We use this term to refer to gateways for GSO satellites.

spectrum but argued that the market-based approach to spectrum access was working and that Ofcom should continue to rely on this approach.

- 3.7 Three said that Ofcom’s evaluation of the effectiveness of market mechanisms in this case was based on feedback from satellite operators and urged Ofcom to consider the strategic incentives of these operators. It argued that Ofcom should “ensure that the push for regulatory intervention by interested parties is assessed against its market-based policy and overall mandate, which is to allow the market to determine the optimal allocation of spectrum where feasible and ensure spectrum use is maximised for the benefit of end consumers”.
- 3.8 VMO2 said that it was not aware of any satellite operator contacting it to gain access to its spectrum and questioned satellite operator reports that they had been unable to gain access to spectrum despite prolonged efforts. It argued that there was clear potential for additional satellite gateway use in this spectrum under existing mechanisms and therefore that Ofcom’s proposal was premature.
- 3.9 Vodafone said that it had been and continued to be an active participant in leasing of its frequencies, creating a market-based approach to spectrum access and that it had “never got to the point of proposing a price that would be deemed unacceptable by the prospective leaser”. It considered that the proposed policy would punish Vodafone by cutting across commercial agreements that had been negotiated in good faith.
- 3.10 Notwithstanding this, Vodafone said that it was not fundamentally opposed to the direct granting by Ofcom of spectrum licences to satellite gateway providers in the 28GHz band, acknowledging that there were disadvantages to the current approach. It added that, if Ofcom did decide to directly grant licences, this had to be with the express consent of the incumbent licensee and should not preclude incumbents charging a commercially-based fee.

Impacts on incumbent licensees

- 3.11 Vodafone and VMO2 disagreed with our view that the impact of the proposal on the flexibility of future deployment for Spectrum Access licensees would be limited a) due to a limited number of gateways and b) because these would likely be in rural areas⁴. They noted that there was less availability of fibre in rural areas and therefore this is where future fixed links would be needed.
- 3.12 VMO2 noted that it had deployed, and would continue to deploy, further 28 GHz fixed links in the form of backhaul connectivity for mobile sites as part of the Shared Rural Network (“SRN”). It also pointed to its [response](#) to Ofcom’s [2023 Call For input, Review of the use of fixed links and spectrum implications](#), where it had said it expected to increase use of its licensed 28 GHz block, where applicable. It was also concerned that there could be a progressively increasing number of gateway locations, creating a significant number of exclusion zones to the detriment of 28 GHz Spectrum Access licence holders.
- 3.13 VMO2 also suggested that, if deploying new fixed links in 28 GHz became unduly restricted or complex, it would risk undermining many of the benefits of its 28 GHz Spectrum Access

⁴ We also note that SpaceX highlighted in its response that “there is an increasing interest in locating gateways either at, or near, data centres in urban areas to minimise latency.” SpaceX and Kuiper Systems (Amazon) also made similar points in their responses to our [Q/V and E bands Call for input](#).

licence (e.g. the ability to deploy at will, without requiring third party agreements and without restrictive limitations) and reduce investment incentives. It said that it could result in it incurring significant additional costs through being forced to deploy in alternative (Ofcom managed) spectrum bands, assuming spectrum is available in such bands at that location, and that Ofcom should apply a reasonable discount to the Spectrum Access annual licence fees.

Potential alternative options

- 3.14 Vodafone suggested two alternative options to Ofcom's proposed approach:
- a) Spectrum Access Licences be varied so that it becomes an obligation to negotiate with potential spectrum tenants (subject to evidence of serious demand) and consequent leases to be on fair and reasonable terms (but guidance should not include any form of cost-orientation).
 - b) Spectrum Access Licences be left unamended but any evidence of refusal to negotiate leases in good faith could result in Ofcom directly licensing gateways but narrowly within the frequencies of the relevant Spectrum Access licensee.
- 3.15 Vodafone added that Ofcom's standard benchmark for regulatory intervention is evidence of market failure and said it believed that option b was in best alignment with this, arguing that there was no evidence of market failure with respect to Vodafone's frequencies.

Our decision

- 3.16 It remains our view that there is clear potential for additional satellite gateway use in this spectrum and that greater sharing would support optimal use of this spectrum. As set out in our [impact assessment guidance](#), Ofcom operates with a bias against intervention. Having carefully considered the responses and additional evidence (outlined below), we have decided that at this time we will not directly license satellite gateways to access 28 GHz spectrum that is currently licensed to Spectrum Access licensees.

Additional evidence

- 3.17 In our consultation we stated that our preference was to continue to rely on market mechanisms where possible and effective. We also noted that we remained open to pursuing a different approach (i.e. not intervening) if we received evidence that it is possible and effective to rely on existing market mechanisms in the specific circumstances of the 28 GHz band.
- 3.18 We are now aware of additional evidence which gives us increased confidence that deals can be made between satellite providers and Spectrum Access licensees in the 28 GHz band. ✂.
- 3.19 We have held meetings with each of the incumbent licensees in the band. All licensees have told us that they are open to agreeing further leases of spectrum in the 28 GHz band and should be able to handle any such requests reasonably quickly, especially where provided with the relevant technical information.
- 3.20 Further, these discussions confirmed that Spectrum Access Licensees recognise that coexistence between incumbent licensees and new gateways can be simply managed through the use of coordination and/or exclusion zones around the gateway location. As

both fixed links and satellite gateways use highly directional antennas, we expect that the size of any exclusion zones will be very small.

- 3.21 Additionally, on 5 December 2024 the Competition and Markets Authority (CMA) approved the merger of Vodafone and Three in the UK subject to legally binding commitments. This means that, subject to the formal completion of the merger in the first half of 2025, satellite operators will now only need to negotiate with one or two parties – depending on gateway location – to gain access to the whole of the 28 GHz band. This should help to reduce the complexity involved in gaining access to this spectrum.⁵
- 3.22 In view of this new evidence, and given our bias against intervention, our current view is that it would not be proportionate to intervene to directly authorise gateways in the block assigned bands. Put differently, the recent developments suggest that the incremental benefits of intervention do not currently outweigh the risks. This is because the evidence points to the market being capable of achieving similar outcomes through leasing.
- 3.23 We also note that there are growing indications of interest from satellite operators in deploying gateways in urban areas, which under our March 2024 consultation proposals would in any case have likely required direct negotiations with incumbent licensees due to greater fixed links deployments in these areas.

Our expectations moving forward

- 3.24 Following this decision, we expect incumbent licensees to negotiate in a fair and reasonable way with potential spectrum tenants. This includes, for example:
- responding in a timely way to expressions of interest from satellite operators; and
 - engaging constructively in developing technical solutions to sharing requests, and not unreasonably refusing access to the spectrum, especially in cases where the incumbent licensee has no current deployments at the requested location and no concrete plans for new deployments within the near future.
- 3.25 We will monitor progress with further sharing of these frequencies, making use of our information gathering powers as needed.
- 3.26 In terms of the costs to satellite providers of accessing this spectrum, we recognise that incumbent licensees will wish to charge a commercially-based fee for access to this spectrum, which reflects the loss of the option to deploy fixed links in the area or areas affected by a lease agreement (potentially amongst other costs). For reference, we note that the annual licence fees for this spectrum are set out in our [March 2023 Statement: Ofcom’s decision on licence fees for 10 GHz, 28 GHz and 32 GHz spectrum](#)⁶.

Conclusion

- 3.27 In summary, we consider that it is reasonable to expect market mechanisms to enable greater spectrum sharing, taking account of the consultation responses, ~~and~~, and recent Ofcom engagement with the Spectrum Access licensees in which they outlined their willingness to engage in a timely and constructive manner with requests for localised satellite gateway use in spectrum licensed to them.

⁵ We note that this may introduce new challenges, such as reduced bargaining power.

⁶ See page 21.

3.28 We recognise the importance of this band for satellite gateway use and the important benefits more gateways in the UK might bring. Accordingly, whilst we are currently satisfied that it is reasonable to expect further sharing, we may revisit this issue at a future date if we receive evidence that reliance on market mechanisms is not proving effective in enabling gateways to access this spectrum, and are therefore preventing the optimal use of spectrum.

4. Future use of unassigned spectrum in the 28 GHz band

4.1 In this section we set out our decisions on future use of unassigned spectrum in the 28 GHz band:

- Use of returned spectrum in the 28 GHz band; and
- Use of unassigned spectrum in the 28 GHz band in London and Northern Ireland.

4.2 In summary, we have decided to:

- open 2 x 112 MHz of the returned 28 GHz spectrum for land-based satellite user terminals;
- defer our decision on the remaining 2 x 112 MHz of returned spectrum; and
- in London and Northern Ireland, open 2 x 112 MHz of unassigned spectrum for satellite gateways and point-to-point fixed links.

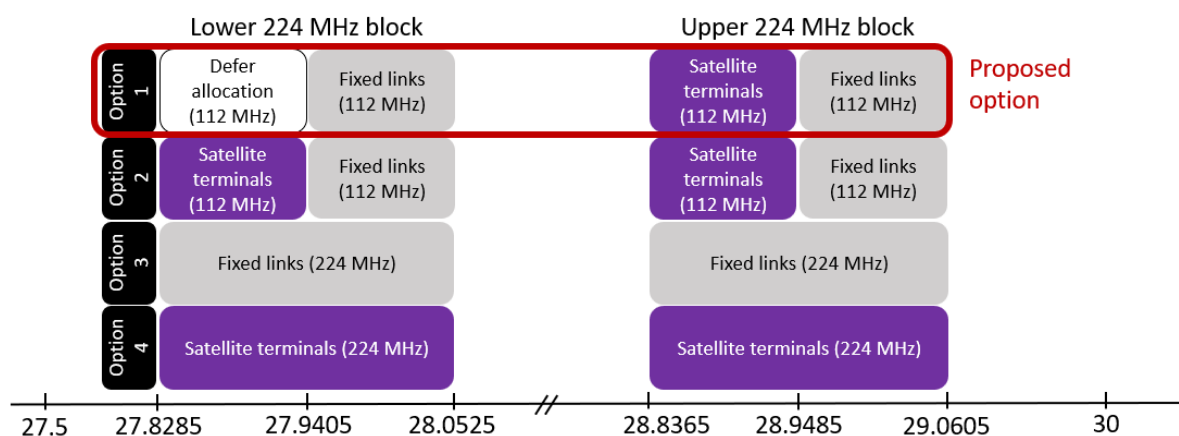
Use of returned spectrum in the 28 GHz band

Consultation proposals

4.3 In March 2024 we consulted on authorising additional uses of the returned 28 GHz spectrum which could coexist with gateways. We said that the most likely potential future uses were satellite terminals and point-to-point fixed links, but that it was not feasible for these two services to share frequencies in this band. We identified four options for authorising these additional uses:

- i) Option 1: open 112 MHz for satellite land-based terminals, 2 x 112 MHz for point-to-point fixed links and defer allocation of the remaining 112 MHz until we better understand the demand for additional 28 GHz spectrum from alternative applications;
- ii) Option 2: split the spectrum equally between land-based satellite terminals and point-to-point fixed links, which would mean 2 x 112 MHz of spectrum for land-based satellite terminals and 2 x 112 MHz for fixed links;
- iii) Option 3: open the entire 2 x 224 MHz of spectrum for point-to-point fixed links; and
- iv) Option 4: open the entire 2 x 224 MHz of spectrum for satellite land-based terminals.

Figure 2: Options in our consultation for allocating returned 28 GHz spectrum



4.4 We said that our preferred option was option 1, explaining that we held mixed evidence on the likely potential benefits of making additional 28 GHz spectrum available for land-based satellite land terminals or fixed links. In relation to fixed links, we said that evidence of future demand was somewhat mixed. In relation to land-based satellite terminals, we noted that the amount of usable Ka band satellite downlink spectrum (between 17.3 – 20.2 GHz) may be constrained due to sharing with existing fixed links, and therefore it was difficult to assess how much additional 28 GHz uplink spectrum might be needed for satellite terminals.

4.5 We set out our initial view that deferring a decision on part of the spectrum provided us with the opportunity to further assess optimal use for other services that could in the future deliver benefits for UK citizens and consumers.

4.6 Following closure of our consultation, we sent an [open letter](#) to satellite operators seeking additional information in relation to how land-based satellite user terminals might operate in the Ka band in future.

Summary of responses

4.7 We received 16 responses to our consultation, one of which was wholly confidential. Non-satellite respondents and Eutelsat agreed with option 1. Most satellite respondents argued for making more of the spectrum available for satellite terminals, with many supporting option 4, i.e. to open all of the spectrum for satellite terminals. Arqiva, Goonhilly, and Three did not comment on this proposal.

Likely possible uses and authorisation approach

4.8 All respondents agreed that we had correctly identified the possible uses of the returned 28 GHz spectrum and no respondent identified additional alternative uses. Most respondents also agreed with our view that alternative use of the returned spectrum would be an allocation decision for either point-to-point fixed links or land-based satellite terminal use and that auctioning the spectrum was unlikely to secure optimal use.

4.9 Vodafone thought that Ofcom had potentially missed an option that would let the market decide the optimal usage of the spectrum via auction but had the view that the most effective usage is likely by multiple parties and applications, which is not readily expressed via auction.

Preferred options for spectrum allocation

- 4.10 Five respondents (BT, JRC, Eutelsat, VMO2 and Vodafone) agreed with our proposal to make half (2 x 112 MHz) of the returned spectrum available for fixed links. These respondents did not disagree with our view that the evidence of future demand for fixed links is mixed. BT said that our proposed approach was a pragmatic solution. Vodafone commented that 2 x 112 MHz may not be sufficient to meet demand in all cases, but it would be difficult to justify more spectrum than this.
- 4.11 Vodafone ~~✗~~. It said that other users of the 26 GHz band did not have the luxury of alternative 28 GHz licences and that it was eminently sensible for Ofcom to make some 28 GHz spectrum available for these users.
- 4.12 Most satellite operators argued that Ofcom should implement option 4, i.e. to make all of the spectrum available for satellite terminals. They highlighted growing demand for satellite connectivity and argued that the 28 GHz band is a core band for satellite use globally. They also argued that there was no need to defer use of the bottom 1 x 112 MHz of the spectrum, with some informing us that their terminals would be able to make use of this block for satellite terminals.
- 4.13 Amazon supported option 4 while also suggesting a hybrid between option 3 and 4 which would allocate the upper 224 MHz of spectrum to satellite terminals and the lower 224 MHz of spectrum to fixed links, possibly authorising fixed links to access the upper block of spectrum on a secondary basis. ~~✗~~.
- 4.14 However, whilst expressing interest in accessing more spectrum, satellite operators provided limited specific evidence regarding deployment of terminals in the 28 GHz band. This led us to send an open letter to satellite operators seeking additional information on satellite operators current and planned use of the 28 GHz band.
- 4.15 We received six responses to the letter, two of which were wholly confidential⁷.
- 4.16 Information provided in open letter responses confirmed that most operators are still in the early stages of deploying user terminals in the UK; most operators that responded had not yet started to offer commercial services, although some provided details of planned launch dates and the range of use types they expected to support. They said that additional spectrum would unlock a number of benefits including higher quality service to individual customers, the ability to serve more customers, an expansion of the areas they could serve with terminals and lower costs.
- 4.17 In relation to usability of the spectrum for satellite terminals, four of the satellite industry respondents to our consultation said that the heavy use of the downlink spectrum by fixed links would not act as a constraint on their use of 28 GHz spectrum. Viasat pointed to ECC Report 232 which it said demonstrated that FSS earth stations deployed in very high fixed links density zones will be able to use more than 65% of the 18 GHz band at the worst location (and 95% in rural areas).

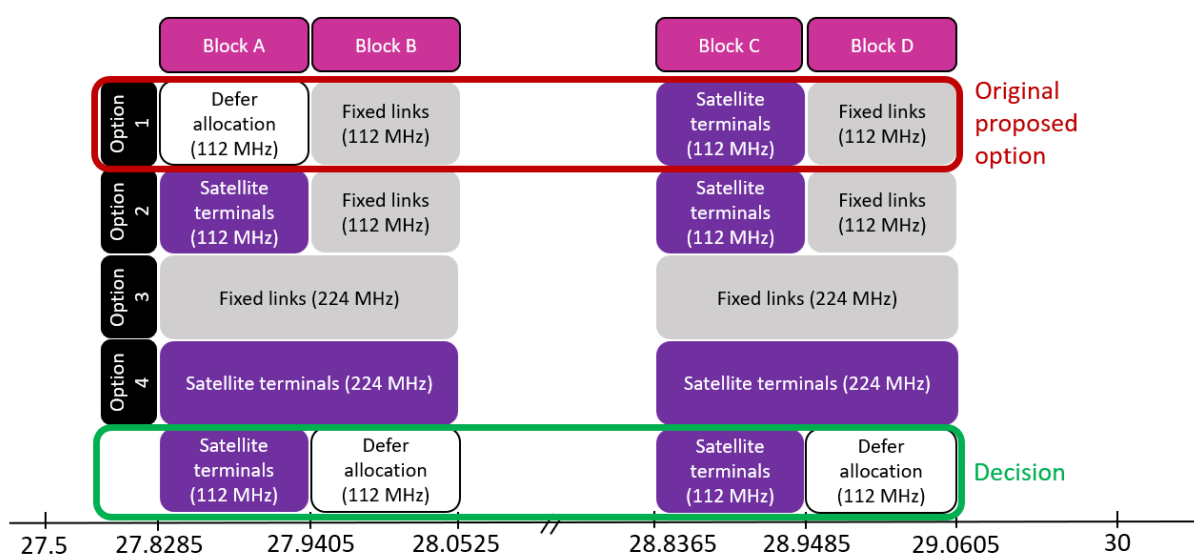
Our decision

Decision summary

⁷ The non-confidential responses to the open letter are [published on our website](#) under the 'Additional responses' subheading.

- 4.18 We have decided to proceed with an approach to the 28 GHz returned spectrum which includes elements of the original options 1 and 2:
- we will open 2 x 112 MHz of the returned 28 GHz spectrum for land-based satellite user terminals; and
 - we are deferring decision on the remaining 2 x 112 MHz.
- 4.19 This decision takes account of responses to both the 28 GHz consultation (March 2024) and the 32 GHz consultation (August 2024). In parallel, we have decided to make 2 x 112 MHz available for fixed links in the 32 GHz band (see Section 5).
- 4.20 We illustrate this in Figure 3 below, with the four options from our consultation shown for context. For ease of reference in the subsequent discussion, we have labelled each of the 1 x 112 MHz spectrum blocks as Block A, Block B, etc.

Figure 3: Decision on allocation of returned 28 GHz spectrum



- 4.21 We will monitor uptake of fixed links and satellite terminals in the 28 and 32 GHz bands and, based on this, decide how to make this spectrum available at a future date.

Our assessment of spectrum demand - fixed links and land-based satellite terminals

Fixed links

- 4.22 As noted earlier, respondents to our March 2024 consultation did not disagree with our view that the evidence of future demand for fixed links is mixed, and we did not receive any additional evidence in responses to change this assessment.
- 4.23 Further, since the publication of our 28 GHz consultation in March 2024, additional spectrum has become available in the 32 GHz band. 32 GHz spectrum is suitable for point-to-point fixed links and, unlike 28 GHz, there is no competing interest in this spectrum for satellite or other services at this time.
- 4.24 Responses to the 32 GHz consultation (discussed in Section 5) support our view that 32 GHz is broadly substitutable for 28 GHz from a fixed links perspective. As such, we consider that the availability of unassigned spectrum in 32 GHz provides us with an additional means to address the demand for fixed links expressed in responses to the 28 GHz consultation.

Land-based satellite terminals

- 4.25 In the case of demand for land-based satellite terminals, most satellite operators argued that all of the returned 28 GHz spectrum should be allocated for land-based satellite terminals. They said that this would enable them to deploy wider channels and deliver additional capacity.
- 4.26 However, none of the satellite operators that responded to our open letter were currently operating terminals in all of the spectrum that is currently available for terminal use in the 28 GHz band. Operators were either just operating in the top frequency block (29.5-30 GHz) or had not yet launched satellites to support terminals in the UK. Further, not every operator has current plans to use terminals that can make use of all of the potentially available spectrum. We present a summary of responses from operators who responded to our open letter in Table 1 below, showing which parts of the returned 28 GHz spectrum operators expect to use for terminals.

Table 1: Planned frequency use for satellite terminals by operator⁸

Operator	Lower 224 MHz block	Upper 224 MHz block
Amazon	In the future (next generation terminals)	Yes (first generation terminals)
Avanti	N/A	N/A
Eutelsat	No	Yes (bottom 112 MHz only)
Telesat	Yes	Yes

- 4.27 We accept that the planned terminal use by satellite operators may well be realised in the future. However, as operators are still in the early stages of deploying terminals or launching satellites to support terminals, there remains uncertainty around the extent and timing of potential future terminal use of this returned spectrum.
- 4.28 In relation to suggestions that all of the spectrum could be allocated to satellite terminals with fixed links authorised on a secondary basis, we note that most responses to the consultation agreed with our view that it is not feasible for these two services to share frequencies in this band. Further, most fixed links operators require links with high availability, and secondary (or opportunistic) access to spectrum, coupled with the risk of interference, would not align with these needs. We therefore do not consider that authorising fixed links on a secondary basis is a feasible option.

Rationale for our decision

- 4.29 In view of the above, and taking account of our duty to secure optimal use of spectrum, we have looked again at how best to allocate the returned spectrum.

We are making 2 x 112 MHz (Blocks A and C) available for land-based satellite terminals

⁸ One of the confidential respondents also confirmed that its terminals would be capable of using all of the returned spectrum, while another confidential respondent did not specify which specific frequencies it planned to use.

- 4.30 We have decided to make half (2 x 112 MHz) of the returned spectrum available for land-based satellite terminals (i.e. Blocks A and C in Figure 3).
- 4.31 The allocation of Block C for terminals is consistent with our original proposal. In our consultation, we said that we recognised the potential benefits and importance of making harmonised spectrum available for satellite services. We noted that Block C was already available for terminal use in CEPT countries and that harmonisation with the CEPT band plan could deliver benefits for the price and availability of satellite services in the UK. We continue to consider that this is the case.
- 4.32 However, we originally proposed to defer decision on allocation of Block A. We took this position because (i) we were unsure that this spectrum would be useful for land-based satellite terminals; and (ii) as Block C was being made available for terminals, this left Block A as an unpaired block. Fixed links typically make use of paired blocks of spectrum and therefore we did not consider that this block would be useful for fixed links.
- 4.33 Satellite operators said that there was no need to defer use of Block A, arguing that they could in fact make use of it. We accept this argument. As this spectrum block would not be suitable for fixed links, and taking account of the potential benefits of additional satellite terminal bandwidth, we have decided to make it available for land-based satellite terminals.

We are now deferring a decision on 2 x 112 MHz (Blocks B and D) and will keep this under review

- 4.34 We have decided to defer our decision on the other half (2 x 112 MHz) of the returned spectrum (i.e. Blocks B and D in Figure 3).
- 4.35 As explained earlier, we continue to consider that the evidence of future demand for fixed links is mixed. This, coupled with the availability of an equivalent amount of alternative spectrum in the 32 GHz band for fixed links, means that we no longer see a strong case for making this 28 GHz spectrum available for fixed links at this time.
- 4.36 The alternative would be to make this spectrum available for land-based satellite terminals. This would mean that all the returned spectrum would be available for land-based satellite terminal use. However, for the reasons set out above in paragraphs 4.24-4.26, we consider that there remains some uncertainty about the extent and timing of the future demand for this spectrum. As such, we think that it would be premature to make all of the returned spectrum available for land-based satellite terminals at this time.
- 4.37 Instead of making a decision now, we will monitor uptake of fixed links and satellite terminals in the 28 and 32 GHz bands and, based on this, decide how to make this spectrum available at a future date.

We have decided to modify the position of the 10 MHz guard band

- 4.38 In our consultation, we presented our initial view that a 10 MHz guard band would be needed between the satellite terminal and fixed links allocations in the 28 GHz band to protect fixed links receivers from harmful interference. In our original proposal, this meant a 10 MHz guard band was needed between Blocks C and D. We proposed that this would be taken from the satellite terminal allocation (i.e. at the top of Block C, 28.9385-28.9485 GHz), meaning that there would be 102 MHz available for satellite terminals, rather than 112 MHz.
- 4.39 However, having looked at this issue again, we noted that under our original proposal, fixed links would not in any case be able to make full use of the spectrum in Blocks B and D. This

is because we would need to leave some frequency separation at the top of Blocks B and D to protect adjacent Spectrum Access licensees. This means that we could make a maximum of 3 x 28 MHz channels (or 1 x 56 MHz channel) for fixed links in this spectrum, and could include the 10 MHz guard band(s) within Blocks B and D without impacting the amount of usable spectrum for fixed links⁹.

4.40 In view of this, we have now decided to make the full 112 MHz of Block C available for satellite terminals. If we subsequently decided to make Blocks B and D available for fixed links, we would need to include a 10 MHz guard band within each of these blocks to ensure coexistence between fixed links and satellite terminals.

Effect of our decision on the spectrum available for satellite terminals

4.41 Prior to our decision, there was a total of 1,228 MHz of spectrum available for land-based satellite terminals in the 28 GHz band (the purple blocks in Figure 4). Following our decision, there will now be a total of 1,472 MHz of spectrum available for land-based satellite terminals in the 28 GHz band (the purple blocks in Figure 5), an increase of 244 MHz (2 x 112 MHz of returned spectrum as well as 2 x 10 MHz blocks that were previously used as guard bands).

Figure 4: 28 GHz frequencies available for land-based satellite terminals (before statement)

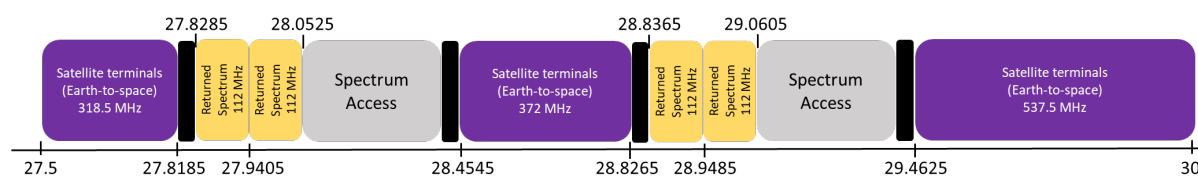
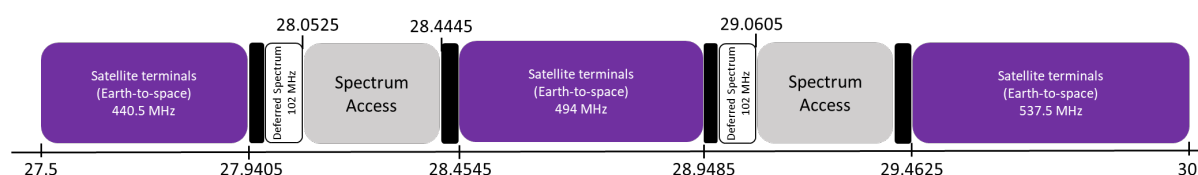


Figure 5: 28 GHz frequencies available for land-based satellite terminals (after statement)



Opening up unassigned 28 GHz spectrum in London and Northern Ireland for satellite gateways and fixed links

Our consultation proposals

4.42 In our consultation we noted that, in addition to the 2 x 224 MHz spectrum returned by Arqiva, there was 2 x 112 MHz of unassigned spectrum in London and Northern Ireland (28.1925 – 28.3045 GHz paired with 29.2005 – 29.3125 GHz).

4.43 We proposed to open this spectrum for new satellite gateway applications and point-to-point fixed links, which would be authorised on an Ofcom-managed basis. We also requested views on other potential demand for this spectrum.

⁹ Under the assumption that we would only implement 28 and 56 MHz channel bandwidths.

Summary of responses

- 4.44 BT, JRC, VMO2 and Vodafone supported authorising this spectrum for fixed links on an Ofcom-managed basis. Several satellite operators (Avanti, Eutelsat, GSOA, Rivada and Telesat) argued that this spectrum should be made available for satellite land terminals.
- 4.45 Vodafone said that it did not think it was appropriate to cater for the deployment of satellite gateways in Greater London. It was concerned that opening this spectrum for gateways “may easily contaminate the band and render it useless for other (potentially higher value) uses”. SpaceX on the other hand argued that gateways should be allowed in urban areas. It said that “gateway location can impact service latency, so policies should not preclude gateways from appearing in and near urban areas. As such, making this spectrum available in Northern Ireland and London will help satellite operators enter the UK market and once in, to grow.”

Our decision

- 4.46 We have decided to proceed with our proposal to open this spectrum for new satellite gateway applications and fixed links on an Ofcom-managed basis.
- 4.47 We note the arguments from satellite operators arguing for more spectrum for land-based terminals; however, as set out earlier in this section, we have already made additional spectrum available for satellite terminals and consider that this is appropriate to the current evidence of demand. In addition, we are aware of some demand for fixed links in the London area and do not consider that fixed links and land-based satellite terminals would be able to coexist in these frequencies. On balance, we consider that our decision to make this spectrum available for satellite gateways and fixed links is the most likely to secure optimal use.
- 4.48 We do not agree with Vodafone’s argument that satellite gateways in Greater London could contaminate the band and render it useless for other (potentially higher value) uses. Satellite gateways and fixed links both use highly directional antennas. Directional antennas radiate and receive greater power in specific directions, and this makes them less susceptible to interference from unwanted sources than omnidirectional (or less directional) antennas. This reduces the interference risk and means that these two services should be able to coexist well in the London area (as they do elsewhere), enabling potentially greater use of spectrum, and therefore a more optimal allocation of a finite resource, than would be achieved by a single-use allocation.

5. Future use of unassigned spectrum in the 32 GHz band

- 5.1 In this section we set out our decision on future use of unassigned spectrum in the 32 GHz band.
- 5.2 We have decided to proceed with our proposal to open this spectrum for point-to-point fixed links on an Ofcom-managed basis.

Consultation proposals

- 5.3 In August 2024 we consulted on making spectrum in the 32 GHz band (32.445-32.571 GHz paired with 33.257-33.383 GHz) available for new fixed links assignments on an Ofcom-managed basis across the UK.
- 5.4 We set out our view that 28 GHz and 32 GHz spectrum is broadly substitutable from a fixed links perspective and said that we planned to review responses to this consultation alongside the 28 GHz consultation responses and publish a combined statement on these issues.
- 5.5 We proposed to open channels with 28 and 56 MHz channel bandwidths (but not smaller bandwidths, i.e. 7 or 14 MHz, unless responses indicated a demand for it). We did not however make a firm proposal on the specific channel plan, noting that this would require further work to investigate which channel plan would provide the most efficient way of making this spectrum available for new assignments while protecting BT's links in the adjacent spectrum.

Summary of responses

- 5.6 We received eight [responses to our consultation](#), one of which was confidential. All respondents but one agreed with our proposal to make the 32GHz band available for fixed link use. The respondent that disagreed, John Wood, cited public health and environmental concerns.

Authorisation approach

- 5.7 All respondents who commented on authorisation of this spectrum, with the exception of John Wood, agreed with our proposal to make the spectrum available on an Ofcom-managed basis.
- 5.8 The JRC said that the ability to access the spectrum on a link-by-link basis would be valuable to JRC members as their networks continue to expand. Orkney Island Council agreed, noting that if Ofcom were to manage the process of authorisation of this band, there may be potential for increased competition and opportunities for smaller alternative providers to apply. BT also agreed, noting that if there was demand for a new national block allocation for fixed links in this approximate frequency range it would probably have been possible to secure that on a commercial basis by spectrum trading of this or other suitable spectrum.

Substitutability with 28 GHz

- 5.9 All respondents that commented specifically on the issue of substitutability of 28 and 32 GHz spectrum agreed that these two spectrum bands are broadly substitutable from a fixed links perspective.
- 5.10 Satellite respondents argued that the availability of this substitutable spectrum meant that more of the 28 GHz spectrum could be used for satellite terminals.

Channel plan

- 5.11 BT said that it would be interested in the channel arrangements that Ofcom settles on and the limits on in-block and out of block EIRP that will be applied for new fixed links authorised in the 32 GHz spectrum. It noted that it had not experienced any interference problems with adjacent operators to date and had no coordination mechanisms in place. It added that, with appropriate guard bands, it was hopeful that adjacent band coordination would be unnecessary.
- 5.12 JRC said that a significant number of its' members' link requests are still for 7 and 14 MHz bandwidths.

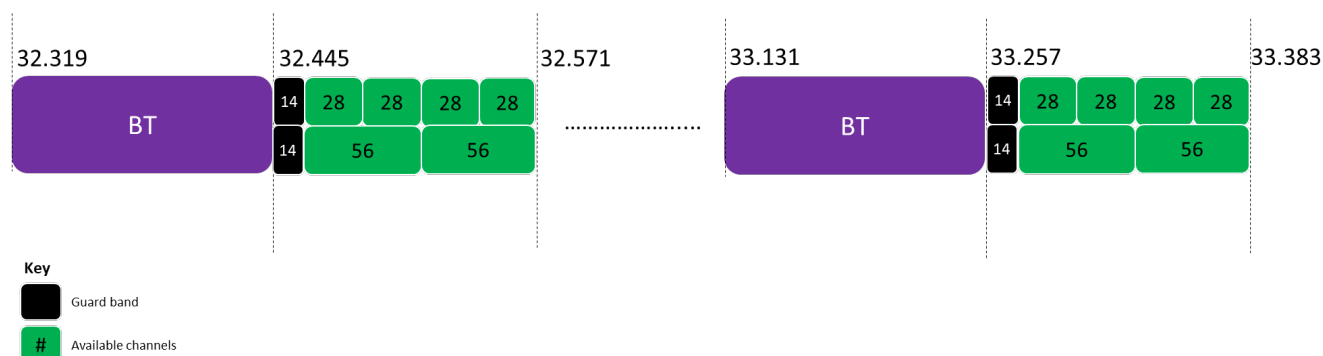
Our decision

- 5.13 As noted, all respondents but one agreed with our proposal to make the 32 GHz band available for fixed link use.
- 5.14 The respondent that disagreed, John Wood, argued that our proposals did not take account of environmental or public health concerns. We note that, since May 2021, all Ofcom licences which authorise transmit powers in excess of 10 Watts EIRP have included a condition which require licensees to comply with the general public EMF limits in the ICNIRP Guidelines. This includes point-to-point fixed links licences covered by this decision. Further details on our policy regarding environmental concerns can be found in our [EMF statement](#), published in October 2020 (see in particular paragraphs 3.43-3.54). Our position on this point has not changed.
- 5.15 We have therefore decided to proceed with our proposal to open this spectrum for point-to-point fixed links on an Ofcom-managed basis. Our assessment is that our proposal to open up 28MHz and 56MHz channels can be implemented without impact on adjacent services.
- 5.16 We considered the point raised by JRC that its members still apply for 7 or 14 MHz channels. However, as highlighted in our recent [review of fixed links](#), there is a trend towards the use of larger channel bandwidths. We consider that we are more likely to realise the optimal use of the 32 GHz spectrum by focusing on supporting larger channel bandwidths (i.e. 28 and 56 MHz), especially as there are options to apply for smaller channel bandwidths in other similar bands, e.g. the 23 GHz and 38 GHz bands. We have therefore decided not to include an option for 7 or 14 MHz channels at this time.

Channel plan

- 5.17 Figure 6 shows the channel plan that we will use in the returned 32 GHz spectrum.

Figure 6: 32 GHz channel plan



- 5.18 This channel plan means that there will be a 14 MHz guard band between new assignments in the bottom channel and the adjacent block. This is in addition to any frequency separation that BT maintains within its licensed frequency block for the purpose of meeting licence boundary conditions.
- 5.19 Our analysis indicates that this frequency separation should be sufficient to manage coexistence between new assignments and adjacent users without the need for coordination. There is a theoretical risk of interference if the new links are geometrically aligned with BT links, i.e. follow the same path. We consider that the risk of this occurring in practice is very low. We note that use of higher performance antennas (e.g. ETSI Class 4 antennas) would further reduce the risk of interference.
- 5.20 In relation to EIRP limits, the permitted EIRP for each new fixed link in this spectrum will be calculated by our licensing system using the approach set out in section 2 of our [Technical Frequency Assignment Criteria document for fixed links](#).

6. Implementing our decisions

6.1 In this section we set out how we plan to implement decisions on future use of spectrum in the 28 and 32 GHz bands:

- Returned spectrum in the 28 GHz band;
- Returned spectrum in the 32 GHz band; and
- Unassigned spectrum in the 28 GHz band in London and Northern Ireland

Returned spectrum in the 28 GHz band

Land-based satellite user terminals can now access an additional 2 x 112 MHz of 28 GHz spectrum

6.2 As set out in paragraph 4.18, we have decided to open 2 x 112 MHz of the returned 28 GHz spectrum for land-based satellite user terminals with immediate effect.

6.3 We have updated the Earth Station Network (ESN) licence template to include the additional frequencies that we are making available for land-based satellite terminals only. We have included a marked-up version of the revised licence template at annex 1 for information.

How to apply for these frequencies

6.4 **All new ESN licences** issued from mid-February onwards will receive a copy of the new licence including the additional 28 GHz frequencies.

6.5 **Existing ESN licensees** that wish to make use of the additional frequencies should submit a licence variation request using the relevant application form on our [website](#). The ESN application forms do not include an option to add additional frequencies. Therefore, applicants should submit a covering letter alongside their application form specifying that they are requesting the additional frequencies to be added to their licence.

6.6 **Licence exempt services.** Land-based terminals connecting to GSO satellites that comply with [IR 2066](#) are currently exempt from the need to hold a licence.

- a) In line with our legal duties, we plan to update IR 2066 (to include the additional frequencies) and reflect this in an update to the licence exemption regulations later this year following our consultation on other proposed changes to Exemption Regulations¹⁰.
- b) Until then, a GSO satellite operator wishing to use the additional frequencies for land-based terminals can apply for an Earth station network licence using the relevant application form on our website.

6.7 As noted in our Space Spectrum Strategy Statement, we are planning to consider greater use of network licences in the space sector, including the potential removal of existing licence exemption of terminals and transition to an alternative 'light network licensing' regime. If our wider consideration of exemptions in the satellite sector indicates there is a

¹⁰ See paragraph 2.19 of our [Updating Wireless Telegraphy Licence Exemptions consultation](#), published on 17 January 2025

case to change our current approach (in relation to the exemption of GSO land-based terminals), we will consult on this separately.

Other future use of the returned 28 GHz spectrum

- 6.8 We plan to consult on enabling access for maritime and aeronautical ESIMs in the 28 GHz band later this year, taking account of relevant outcomes from WRC-19 and WRC-23.
- 6.9 We have deferred decision on the unallocated 2 x 112 MHz (27.9405-28.0525 and 28.9485-29.0605 GHz). We plan to return to this issue when there is clearer evidence on the relative demand for satellite terminals or point-to-point fixed link use of these frequencies.

Returned spectrum in the 32 GHz band

- 6.10 As set out in paragraph 5.15, we have decided to open this spectrum for point-to-point fixed links on an Ofcom-managed basis.
- 6.11 Changes to the frequencies available for Ofcom-assigned fixed links will require changes to our licensing system and application form. We will schedule this work in alongside ongoing work to upgrade our licensing system and expect to complete this work later in 2025.
- 6.12 We will provide updates on the [Licensing Updates](#) page on our website to confirm the implementation timeline. Additionally, a notice will be posted once the adjustments are complete and the frequencies are available for new applications.

Unassigned spectrum in the 28 GHz band in London and Northern Ireland

- 6.13 As set out in paragraph 4.46, we have decided to open this spectrum for satellite gateways and fixed links on an Ofcom-managed basis.
- 6.14 Satellite operators may apply for access to the unassigned spectrum in London and Northern Ireland (28.1925 – 28.3045 GHz paired with 29.2005 – 29.3125 GHz) with immediate effect. Applications for new NGSO gateway licences will follow the existing NGSO gateway licensing process outlined in the [NGSO guidance document](#). Information on how to apply for a new PES licence can be found on our [website](#).
- 6.15 For fixed links in this spectrum, we will follow the same process set out above in relation to the 32 GHz band and expect to complete this work to the same timescale, i.e. later in 2025.

A1. Updated licence template for the Earth Station Network (ESN) licence

A1.1 As explained at paragraph 6.3, we have updated the Earth Station Network (ESN) licence template to include the additional frequencies that we are making available for land-based satellite terminals. We show the changes from the current licence in Table 2, followed by the revised licence template.

Table 2: Key changes from the current version of the Earth Station Network licence

Current version	Revised version
<p>3.1. The station(s) operating with geostationary satellites shall:</p> <p>a) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.8185 GHz, 28.4545-28.8265 GHz, 29.4625-30 GHz;</p> <p>b) for aeronautical stations, not transmit within the frequency range 14.47-14.5 GHz;</p> <p>c) transmit only to the satellite and its associated orbital longitude specified in Schedule 2;</p>	<p>3.1. Land station(s) (including stations on vehicles and trains) and station(s) on offshore installations operating with geostationary satellites shall:</p> <p>a) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.9405 GHz, 28.4545-28.9485 GHz, 29.4625-30 GHz;</p> <p>b) transmit only to the satellite and its associated orbital longitude specified in Schedule 2;</p> <p>3.2. Maritime station(s) operating with geostationary satellites shall:</p> <p>c) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.8185 GHz, 28.4545-28.8265 GHz, 29.4625-30 GHz;</p> <p>d) transmit only to the satellite and its associated orbital longitude specified in Schedule 2;</p> <p>3.3. Aeronautical station(s) operating with geostationary satellites shall:</p> <p>e) transmit within one or more of the following frequency ranges: 14.0-14.47 GHz, 27.5-27.8185 GHz, 28.4545-28.8265 GHz, 29.4625-30 GHz;</p> <p>f) transmit only to the satellite and its associated orbital longitude specified in Schedule 2;</p>

Current version

Revised version

3.2. Land station(s) (including stations on vehicles and trains), station(s) on offshore installations and maritime station(s) operating with non-geostationary satellites shall:

- d) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.8185 GHz, 28.4545-28.8265 GHz, 29.5-30 GHz;
- e) transmit only to the satellite network specified in Schedule 2;

3.3. Aeronautical station(s) operating with non-geostationary satellites shall:

- f) transmit within the frequency range 14.0-14.47 GHz;
- g) transmit only to the satellite network specified in Schedule 2;

3.4. Land station(s) (including stations on vehicles and trains) and station(s) on offshore installations operating with non-geostationary satellites shall:

- g) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.9405 GHz, 28.4545-28.9485 GHz, 29.5-30 GHz;
- h) transmit only to the satellite network specified in Schedule 2;

3.5. Maritime station(s) operating with non-geostationary satellites shall:

- i) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.8185 GHz, 28.4545-28.8265 GHz, 29.5-30 GHz;
- j) transmit only to the satellite network specified in Schedule 2;

3.6. Aeronautical station(s) operating with non-geostationary satellites shall:

- k) transmit within the frequency range 14.0-14.47 GHz;
- l) transmit only to the satellite network specified in Schedule 2;

A1.2 In addition to the changes shown in table 2, clauses 3.4-3.8 in the current version have been renumbered as clauses 3.7-3.11 in the revised version.

Satellite (Earth Station Network)

Sector/class/product	<Product>
Licence number	<Lic_No>
Licensee	<Lic_Name>
Licensee address	<Address>
Licence first issue date	<Issue_Date>
Licence version date	<Date>
Payment interval	<Year>

1. This Licence is issued by the Office of Communications ("Ofcom") on <Date> and replaces any previous authority granted in respect of the service subject to this Licence by Ofcom or by the Secretary of State.
2. This Licence authorises <Lic_Name> ("the Licensee") to establish, install and/or use radio transmitting and/or receiving stations and/or radio apparatus as described in the schedule(s) (hereinafter together called "the radio equipment") subject to the terms set out below and subject to the terms of the General Licence Conditions booklet (Version OfW597).

ISSUED BY OFCOM

SATELLITE (EARTH STATION NETWORK) LICENCE SCHEDULE 1 TO LICENCE NUMBER <Lic_No> TERMS, PROVISIONS AND LIMITATIONS COVERED BY THIS LICENCE

This schedule forms part of Licence <Lic_No>, issued to <Lic_Name>, the Licensee on <Issue_Date>, and describes the terms and equipment specifications covered by this Licence.

1. The Licensee may establish and use:

- 1.1. Permanent, transportable or mobile sending and receiving network earth station(s) ("the station(s)") for the purpose of providing wireless telegraphy links between the station(s) and geostationary or non-geostationary satellite(s).

2. Geographical extent of the licence

2.1. This licence authorises earth stations:

- a) on land (within the UK, Channel Islands or the Isle of Man);
- b) on offshore energy installations which are within the UK territorial sea and also those which are outside UK territorial seas (and the territorial seas of the Channel Islands and Isle of Man) but within the UK Continental Shelf (as set out in The Civil Jurisdiction (Offshore Activities) Order 1987; and
- c) on any vessel or aircraft (which is within or above the territory of the UK, the Channel Islands or the Isle of Man or within or above the territorial seas of the UK, the Channel Islands or the Isle of Man)¹¹.

3. Limitations on use

3.1. Land station(s) (including stations on vehicles and trains) and station(s) on offshore installations operating with geostationary satellites shall:

- a) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.9405 GHz, 28.4545-28.9485 GHz, 29.4625-30 GHz;
- b) transmit only to the satellite and its associated orbital longitude specified in Schedule 2;

3.2. Maritime station(s) operating with geostationary satellites shall:

- c) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.8185 GHz, 28.4545-28.8265 GHz, 29.4625-30 GHz;
- d) transmit only to the satellite and its associated orbital longitude specified in Schedule 2;

3.3. Aeronautical station(s) operating with geostationary satellites shall:

- e) transmit within one or more of the following frequency ranges: 14.0-14.47 GHz, 27.5-27.8185 GHz, 28.4545-28.8265 GHz, 29.4625-30 GHz;
- f) transmit only to the satellite and its associated orbital longitude specified in Schedule 2;

3.4. Land station(s) (including stations on vehicles and trains) and station(s) on offshore installations operating with non-geostationary satellites shall:

- g) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.9405 GHz, 28.4545-28.9485 GHz, 29.5-30 GHz;
- h) transmit only to the satellite network specified in Schedule 2;

¹¹ Stations on an aircraft or vessel which is registered in the United Kingdom, Channel Islands and Isle of Man and which is outside those territories and outside their territorial seas are not authorised under this licence but may be separately authorised under wireless telegraphy licences for that individual vessel or aircraft. Radio equipment on foreign vessels and aircraft which are for the time being within the limits of these places [the UK, the Channel Islands or the Isle of Man] and their territorial seas may be exempt for wireless telegraphy licensing see <https://www.legislation.gov.uk/uksi/1998/2970/made>

3.5. Maritime station(s) operating with non-geostationary satellites shall:

- i) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-27.8185 GHz, 28.4545-28.8265 GHz, 29.5-30 GHz;
- j) transmit only to the satellite network specified in Schedule 2;

3.6. Aeronautical station(s) operating with non-geostationary satellites shall:

- k) transmit within the frequency range 14.0-14.47 GHz;
- l) transmit only to the satellite network specified in Schedule 2;

3.7. Additionally:

- m) station(s) that transmit with e.i.r.p. greater than 55 dBW shall operate only with prior consent from Ofcom and registration of the station(s) against the Licence;
- n) station(s) that transmit within the frequency range 14.0-14.5 GHz inclusive shall not operate at any location that is less than or equal to 5 km from the two geographical locations specified in Schedule 3 without prior consent from Ofcom and registration of the station(s) against the Licence;
- o) station(s) that transmit with e.i.r.p. greater than 50 dBW and less than 55 dBW (50 dBW < e.i.r.p. < 55 dBW) in the frequency range 14.0-14.5 GHz inclusive shall not operate at any location that is greater than 5 km and less than or equal to 7 km from the two geographical locations specified in Schedule 3 without prior consent from Ofcom and registration of the station(s) against the Licence; and
- p) station(s) shall not operate within the perimeter fence of any of the aerodromes specified in Schedule 4 without prior consent from the Civil Aviation Authority or stated Airport Authority.

3.8. Protection of radio astronomy and fixed links in the 14.25-14.5 GHz band

- q) To protect radio astronomy, a land or maritime station shall not transmit in the frequency range 14.47-14.5 GHz when located within a 175 km radius of either of the national grid references below¹²:
 - Jodrell Bank – focus point of circle is NGR SJ5739392556;
 - Cambridge – focus point of circle is NGR TL5439992385.
- r) Licensees shall protect fixed links at 14.25-14.5 GHz in accordance with any Notice issued by Ofcom.

3.9. Protection of radio astronomy stations operating in the 10.6-10.7 GHz band

¹² Due to UK terrain, the interference areas are not symmetrical around each of the radio astronomy sites. By offsetting the centre of the interference area (away from the site) we can more closely match the interference area which has the overall result of reducing the size of the protection area.

- s) For protection of the following six UK radio astronomy stations:
- Jodrell Bank - NGR (Easting) 379817, (Northing) 370806
 - Cambridge - NGR (Easting) 539423, (Northing) 254028
 - Darnhall - NGR (Easting) 364278, (Northing) 362263
 - Defford - NGR (Easting) 390201, (Northing) 244700
 - Knockin - NGR (Easting) 332854, (Northing) 321877
 - Pickmere - NGR (Easting) 370407, (Northing) 376953
- t) Licensees shall manage interference by limiting unwanted emissions¹³. For non-geostationary orbit systems this includes the suppression of satellite transmissions in the channel immediately adjacent to 10.7 GHz or taking other measures¹⁴.

3.10. Protection of geostationary satellites and earth stations communicating with geostationary satellites

- u) Non-geostationary satellites and earth stations communicating with non-geostationary satellite(s) shall ensure compliance with the relevant equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations in both the Earth-to-space and space-to-Earth directions.

3.11. Protection of fixed links in the 17.7-19.7 GHz band

- v) For non-geostationary systems, licensees shall ensure compliance with the relevant power flux-density limitations in Article 21 of the Radio Regulations in the space-to-Earth direction.
- w) In any case, NGSO satellites operating in the space-to-Earth direction shall not cause undue (or harmful) interference to fixed links, and compliance with the relevant power flux-density limitations referred to in 3.8.q does not release licensees from this obligation.

4. Apparatus

4.1. The Licensee shall ensure that:

- a) The wireless telegraphy apparatus comprised in the station(s) ("the apparatus") is so designed, constructed, maintained and operated, that its use does not cause any undue interference to other users of the spectrum;
- b) The apparatus complies with (and is maintained in accordance with) the relevant performance specification(s) published by the operator(s) of the geostationary or non-geostationary satellite(s); and

¹³ As stated in ITU-R Recommendation RA.1513 (<https://www.itu.int/rec/R-REC-RA.1513>) interference from any one network should not cause more than 2% data loss to radio astronomy measurements. Data loss occurs when the thresholds given in ITU-R Recommendation RA.769 (<https://www.itu.int/rec/R-REC-RA.769>) are exceeded.

¹⁴ See [ECC Report 271 \(https://docdb.cept.org/download/3422\)](https://docdb.cept.org/download/3422).

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- c) The apparatus used for transmission complies with the Radio Equipment Directive and UK Interface Requirement 2077.

5. Additional conditions for mobile operation

- a) The radio equipment shall be established or installed so that transmissions from the radio equipment may only be made when the radio equipment's operation is enabled by the crew of the vehicle, aircraft, vessel or train upon which it is mounted, and under the operational control of the network control facility. The radio equipment shall provide the crew with a means to terminate transmissions immediately;
- b) Where an aircraft or vessel is registered in the United Kingdom, Channel Islands or the Isle of Man, the Licensee shall ensure that all radio equipment on board that aircraft or vessel is endorsed by either a separate licence or exemption under the Wireless Telegraphy Act 2006;
- c) Transmissions from the radio equipment shall automatically be terminated on loss or significant degradation of the downlink signal from the relevant satellite;
- d) For operation with geostationary satellites, the radio equipment shall employ a stabilised platform with the ability to maintain a pointing accuracy ± 0.2 degrees towards the relevant satellites throughout transmissions; and
- e) For operation with geostationary satellites, the maximum EIRP at angles greater than or equal to 2.5 degrees from the antenna main beam axis shall not exceed 20 dBW/40 kHz from any individual station.

6. National and international obligations

- a) The relevant satellite data shall have been submitted to ITU in accordance with established ITU procedures; and
- b) All transmissions from the radio equipment must be terminated prior to any change of location; unless the apparatus used for transmission is designed for mobile operation and incorporates a stabilised platform or is operating under a specific exemption authorised by Ofcom.

7. Requirements specific to Satellite (Earth Station Network)

Licences

- a) The Licensee shall keep a record of the operational characteristics of all terminals in the network, including the locations of fixed installations or, for mobile operation, details of the vehicles, aircraft, vessels or trains on which the terminals are installed and the associated route or defined area of operation, which Ofcom may wish to have access to for enforcement purposes;
- b) The radio equipment shall implement independent local control and monitoring functions at the terminal, and be authorised, supervised and administered by a network control and monitoring centre;
- c) The Licensee shall have the facility to disable individual terminal transmission; and

- d) For satellite networks in MESH configuration, the network operator must nominate and notify Ofcom of those earth station(s) located in the UK which have independent centralised control and monitoring functionality and possess the capability to suppress transmissions from any earth station within the network. Earth stations that are capable of dynamic assignment as point-to-multipoint and point-to-point configuration may only be licensed as permanent earth stations.

8. Additional conditions for operation with non-geostationary satellites

8.1. The radio frequencies authorised by this Licence must be used in common with other non-geostationary 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”.

8.2. The Licensee shall cooperate with all NGSO Licensees such that each satellite system (comprising the satellites, gateway 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.

8.3. In the event that -

- a) 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
- b) 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.

8.4. 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.

8.5. 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.

9. Interpretation

9.1. In this and subsequent schedule(s):

- a) “earth station” means a radio transmitter located on the surface of the earth or mounted on a vehicle, aircraft, vessel or train and intended for communication with one or more satellites;
- b) “geostationary satellite” means a satellite in geostationary orbit which remains approximately in a fixed position relative to a position on the surface of the earth;

- c) “non-geostationary satellite” means a satellite that does not remain fixed relative to a position on the surface of the earth; and
- d) “IR” means the United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 8 of the Radio Equipment Directive (Directive 2014/53/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available of radio equipment on the market (known as the Radio Equipment Directive)).

Notes

1. This Licence does not remove any other obligations that the Licensee may have in relation to satellite filings made under the ITU Radio Regulations.
2. This Licence does not affect the requirement, when necessary, to obtain licences or authorisations under other Acts, such as the Communications Act (2003).
3. Some terminal installations require local authority planning approval.
4. The Licensee must apply for a variation of the Licence from Ofcom before making any changes which may contravene the conditions of the Licence.
5. Technical terms used shall have the meanings assigned to them in the ITU Radio Regulations.
6. For radio equipment installed on aircraft, licensees are advised that they must comply with Civil Aviation Authority (CAA) airworthiness requirements and regulations.
7. Further information, in respect of airworthiness requirements and certification requirements before installation, can be obtained by contacting the Civil Aviation Authority:

Civil Aviation Authority Tel:

0330 022 1500

<http://www.caa.co.uk>

SCHEDULE 2

Licence No	<Lic No>	Licence version date	<Date>	Payment Interval	<1 Year>
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Earth Station Network Name	Emergency Telephone Number (24 Hours)
<Network_name>	<Emergency_telephone>

Network Type	Satellite Type	Satellite / Satellite Network Name	Geostationary Orbital Longitude (degrees)
<Network_type>	<Geostationary/NonGeostationary>	<Sat_name>	<Orbit_long>

Operations are subject to the provision of Article 4.4 of the ITU Radio Regulations (non-interference basis to users of this spectrum) prior to international coordination.

SCHEDULE 3

Restrictions on equipment to be located within 7 km of the following National Grid References apply - see Schedule 1, Sections 3 i) and j) for further details.

SE 20900 56100

SS 20500 12600

SCHEDULE 4

Permission to operate equipment subject to this Licence from any location within the perimeter fence of the aerodromes listed below must be obtained from either the CAA or the Airport Authority.

CAA Contact: 0207 453 6531

Aerodrome name	Address	Postcode	Telephone	UK/CI/NI	Easting	Northing	Aerodrome POC
Aberdeen / Dyce	Aberdeen Airport	AB21 7DU	01224 723714	UK	387997	812609	Duty Tels Officer
Alderney	Alderney Airport	GY9 3AJ	01481 822851	CI	556723	5506468	Senior Air Traffic Controller
Belfast City	Belfast City Airport	BT3 9JH		NI	337483		ATC Supervisor
Benbecula	Benbecula Aerodrome	HS7 5LA	01870 602051	UK	78483	855733	Senior Air Traffic Controller
Biggin Hill	Biggin Hill Airport	TN16 3BN	01959 574677	UK	541691	161064	ATS Manager
Birmingham	Birmingham International Airport	B26 3QJ	0121 780 0922	UK	417220	284022	Duty Engineering Officer
Blackpool	Blackpool Airport	FY4 2QY	01253 343434	UK	332307	431071	Senior Telecommunications Officer
Bournemouth	Bournemouth International Airport	BH23 6SE	01202 364150	UK	411201	97844	ATS Manager
Bristol	Bristol Airport	BS48 3DY	08701 212747	UK	350055	165098	Air Traffic Engineering Manager
Cambridge	Cambridge Airport	CB5 8RX	01223 293737	UK	548723	258544	Senior Air Traffic Controller
Cardiff	Cardiff International Airport	CF62 3BD	01446 712562	UK	306643	167265	Duty Engineering Officer
Carlisle	Carlisle Airport	CA6 4NW	01228 573629	UK	348265	560609	Senior Telecommunications Officer
Coventry	Coventry Airport	CV8 3AZ	02476 308638	UK	435519	274761	Senior Air Traffic Engineer
Cranfield	Cranfield Aerodrome	MK43 0AL	01234 754761	UK	494909	242446	Manager ATS
Dundee	Dundee Airport	DD2 1UH	01382 643242	UK	336868	729382	Senior Air Traffic Controller
Doncaster/Sheffield	Robin Hood Airport	DN9 3RH	01302 624870	UK	46603	39807	ATC Manager
East Midlands	East Midlands Airport	DE74 2SA	01332 852910	UK	445367	326168	Duty Engineering Officer
Edinburgh	Edinburgh Airport	EH12 9DN	0131 317 7638	UK	314389	673842	Duty Air Traffic Engineer

Exeter	Exeter Airport	EX5 2BD	01392 367433	UK	300326	93702	Senior Air Traffic Controller	Belfast
			028 9448 4281			380283		
Aldergrove	Belfast International Airport	BT29 4AB	028 9045 4871	NI	315195	376510	Duty Air Traffic Engineer	

Aerodrome name	Address	Postcode	Telephone	UK/CI/NI	Easting	Northing	Aerodrome POC
Farnborough	Farnborough Airport	GU14 6XA	01252 526015	UK	485452	153678	Senior Air Traffic Controller
Filton	Filton Aerodrome	BS99 7AR	0117 969 9094	UK	359103	180229	Senior Air Traffic Controller
Glasgow	NATS, Control Tower	PA3 2SG	0141 840 8029	UK	247869	666993	Manager Engineering
Gloucestershire	Gloucestershire Aerodrome	GL51 6SR	01452 857700	UK	388598	221747	Duty Aerodrome Controller
Guernsey	Guernsey Airport	GY8 0DJ	01481 237766	CI	528960	5476102	Senior Air Traffic Controller
Hawarden	Hawarden Airport	CH4 0DR	01244 522012	UK	334748	364998	Senior Air Traffic Controller
Humberside	Humberside Airport	DN39 6YH	01652 682022 01667 464293	UK	509295	409914	Air Traffic Manager
Inverness	Inverness Airport	IV2 7JB		UK	277380	851836	ATC Inverness
Isle of Man	Isle of Man Airport	IM9 2AS	01624 821600 01534 492226	UK	228463	468452	Senior Air Traffic Engineer
Jersey	Jersey Airport	JE1 1BW		CI	558699	5451100	Senior Air Traffic Controller
Kirkwall	Kirkwall Airport	KW15 1TH	01856 886205	UK	348020	1008196	Senior Air Traffic Controller
Land's End / St Just	Land's End Aerodrome	TR19 7RL	01736 788944	UK	137630	28983	Senior Air Traffic Controller
Leeds Bradford	Leeds Bradford International Airport	LS19 7TU	0113 391 3277 0151 288 4300	UK	422418	441129	Duty Air Traffic Engineer
Liverpool	Liverpool Airport Plc	L24 1YD		UK	343507	382196	Senior Air Traffic Controller
London City	London City Airport	E16 2PX		UK	542674	180487	Duty Air Traffic Engineer

London Gatwick	London (Gatwick) Airport	RH6 ONP	020 7646 0205 01293 601060	UK	526676	140318	Duty Air Traffic Engineer
London Luton	London Luton Airport	LU2 9LY	01582 395029 01279 669316	UK	512422	220804	Duty Air Traffic Engineer
London Stansted	London Stansted Airport	CM24 1QW		UK	553916	223081	Duty Air Traffic Engineer
Londonderry /Eglinton	City of Derry Airport	BT47 3PY	028 7181 1099	NI	253681	422039	Senior Air Traffic Engineer
Manchester	Manchester Airport	M90 1QX	0161 499 5025	UK	381796	384132	Duty Air Traffic Engineer
Manchester Woodford	Manchester Woodford	SK7 1QR	0161 439 3383	UK	390174	382355	Senior Air Traffic Controller
Manston	Kent International Airport	CT12 5BP	01843 825063	UK	633140	165662	Senior Air Traffic Controller
Newcastle	Newcastle Airport	NE13 8BZ	0191 214 3244	UK	419802	571483	Senior Air Traffic Controller
Northolt	RAF Northolt	HA4 6NG	020 8833 8228	UK	509755	184987	Air Traffic Supervisor
Aerodrome name	Address	Postcode	Telephone	UK/CI/NI Easting	Northing	Aerodrome POC	
Norwich	Norwich Airport	NR6 6JA	01603 420645	UK	622014	313753	Tels/Engineering
Oxford/ Kidlington	Oxford Airport	OX5 1RA	01865 844272	UK	446949	215594	Senior Air Traffic Controller
Pembrey	Pembrey Airport	SA16 0HZ	01554 891534	UK	240360	204220	Senior Air Traffic Controller
Plymouth	Plymouth City Airport	PL6 8BW	01752 515341	UK	250511	60229	Senior Air Traffic Controller
Prestwick	Glasgow Prestwick International Airport	KA9 2PL	01292 511107	UK	236746	626815	Senior Air Traffic Controller
Redhill	Terminal Building	RH1 5YP	01737 823377	UK	530105	147698	Senior Air Traffic Controller
Scatsta	Scatsta Aerodrome	ZE2 9QP	01806 242791	UK	438844	1172284	Senior Air Traffic Controller
Scilly Isles / St Mary's	St Mary's Airport	TR21 ONG	01720 422677 01273 467377	UK	92020	10300	Senior Air Traffic Controller
Shoreham	Shoreham Airport	BN4 5FJ		UK	519999	105406	Senior Air Traffic Controller

Southampton	Southampton Airport	SO18 2NL	023 8062 7113	UK	445278	116962	Duty Air Traffic Engineer
Southend	London Southend Airport	SS2 6YF	01702 608120	UK	586898	189290	Senior Air Traffic Controller
Stornoway	Stornoway Aerodrome	HS2 0BN	01851 707415	UK	145851	933141	Senior Air Traffic Controller
Sumburgh	Sumburgh Airport	ZE3 9JP	01950 460173	UK	439533	1110613	Senior Air Traffic Controller
Swansea	Swansea Aerodrome	SA2 7JU	01792 204063	UK	256904	191635	Senior Air Traffic Controller
Teesside	Teesside International Airport	DL2 1LU	01325 332811	UK	437041	512801	Senior Air Traffic Controller
Warton	British Aerospace	PR4 1AX	01772 852374	UK	341805	427980	Senior Air Traffic Controller
Wick	Wick Aerodrome	KW1 4QP	01955 602215	UK	336317	952799	Senior Air Traffic Controller
Wolverhampton	Wolverhampton Aerodrome	DY7 5DY	01384 221378	UK	382473	291103	Senior Air Traffic Controller
Wycombe Air Park / Booker	Wycombe Air Park	SL7 3DP	01494 529261	UK	482630	190993	Senior Air Traffic Controller
Yeovil / Westland	Yeovil Aerodrome	BA20 2YB	01935 475222	UK	353823	115831	Senior Air Traffic Controller

A2. Impact assessments

- A2.1 Section 7 of the Communications Act requires us to carry out and publish an assessment of the likely impact of implementing a proposal which may significantly affect businesses or the public, or when there is a major change in Ofcom’s activities.
- A2.2 More generally, impact assessments form part of good policy making and we therefore expect to carry them out in relation to a large majority of our proposals. We use impact assessments to help us understand and assess the potential impact of our policy decisions before we make them. They also help us explain the policy decisions we have decided to take and why we consider those decisions best fulfil our applicable duties and objectives in the least intrusive way. Our [impact assessment guidance](#) sets out our general approach to how we assess and present the impact of our proposed decisions.
- A2.3 The relevant duties in relation to the proposal on which we are consulting are set out in section 2.
- A2.4 Taking our decision and proposals in the round, we consider that they will support the development of satellite services in the UK, by providing satellite operators with access to additional 28 GHz spectrum for use by land-based satellite terminals nationwide, and by satellite gateways in London and Northern Ireland. Making additional spectrum available for fixed links in 32 GHz, as well as additional 28 GHz spectrum in London and Northern Ireland, will also support the provision of high-capacity wireless backhaul in a range of communication services.
- A2.5 We consider that this decision to support communications services will:
- a) Support efficient use of spectrum by enabling satellite operators to make greater use of the 28 GHz band, and enable fixed link operators to make greater use of both the 28 and 32 GHz bands.
 - b) Encourage investment and innovation, by making it easier for these operators to roll out infrastructure and services in the UK.
 - c) Support competition, by expanding the potential capacity for satellite operators to provide broadband services, which can facilitate entry and expansion by satellite broadband providers, and in the case of fixed link operators, expand their capacity to provide backhaul services, thereby potentially improving downstream wholesale and retail mobile services.
 - d) Promote the interests of UK consumers, particularly those in rural areas who may have fewer or no options for broadband provision.
- A2.6 Below, we discuss how the individual decisions and proposals set out in this document may affect relevant stakeholders, including UK citizens and consumers.

Impact assessment: decision not to directly license satellite gateways across the whole 28 GHz band

- A2.7 We have decided not to directly license satellite gateways to access 28 GHz spectrum that is currently licensed to Spectrum Access licensees, at this time.

- A2.8 As set out in our [impact assessment guidance](#), Ofcom operates with a bias against intervention, and in our [March 2024 consultation](#) we stated that our preference was to rely on market mechanisms where possible and effective. We noted in the consultation that we remained open to pursuing a different approach to the proposal to introduce direct Ofcom licensing of satellite gateways in the Spectrum Access Licence frequencies (i.e. not intervening), if we received evidence that it is possible and effective to rely on existing market mechanisms in the specific circumstances of the 28 GHz band.
- A2.9 In this case, our bias against intervening is balanced against the risks of inefficiency from not intervening: for example, the negotiation process between Spectrum Access licensees and satellite operators could be slow, or access could be refused in cases where sharing should be feasible because the licensee has no current deployments at the requested location, and no concrete plans for new deployments within the near future.
- A2.10 Set against these, are the costs and benefits from intervening to introduce direct licensing of satellite gateways. A risk of intervening is that it reduces certainty to Spectrum Access licensees, which may reduce the likelihood of further investment in fixed links. However, in principle, a benefit of intervening is that it could enable greater, more timely, use of this band by satellite gateways, which in turn could translate into better satellite backhaul, broadband and other services.
- A2.11 Since the consultation in May 2024, the following developments have occurred, which are relevant to our decision on whether it is possible to rely on existing market mechanisms:
- a) We are now aware of additional evidence which gives us increased confidence that bilateral deals can take place between satellite operators and incumbent licensees in the 28 GHz band.
 - b) We have held meetings with each of the incumbent licensees in the band. All licensees have told us that they are open to agreeing further leases of spectrum in the 28 GHz band and should be able to handle any such requests reasonably quickly, especially where provided with the relevant technical information.
 - c) The CMA has approved the merger of Vodafone and Three in the UK subject to legally binding commitments. Subject to the completion of the merger, this means that satellite operators will need to negotiate with fewer parties to gain additional access to spectrum.
- A2.12 In view of this new evidence, and given our bias against intervention, our current view is that it would not be proportionate to intervene to directly authorise gateways in the block assigned bands. Put differently, the recent developments suggest that the incremental benefits of intervention do not currently outweigh the risks. This is because the evidence points to the market being capable of achieving similar outcomes through leasing.
- A2.13 We recognise the importance of this band for satellite gateway use and the important benefits more gateways in the UK might bring. Accordingly, whilst we are currently satisfied that it is reasonable to expect the current arrangements to enable further spectrum sharing, we have set out our expectations that we expect incumbent licensees to negotiate in a fair and reasonable way with potential spectrum tenants as this is important to enable the benefits of further investment in satellite gateways. This includes, for example:
- responding in a timely way to expressions of interest from satellite operators; and

- engaging constructively in developing technical solutions to sharing requests, and not unreasonably refusing access to the spectrum, especially in cases where the incumbent licensee has no current deployments at the requested location and no concrete plans for new deployments within the near future.

A2.14 We will monitor progress with further sharing of these frequencies, making use of our information gathering powers as needed, and may revisit this issue at a future date if we receive evidence that reliance on market mechanisms is not proving effective in enabling gateways to access this spectrum, and are therefore preventing the optimal use of spectrum.

Impact assessment: future use of unassigned spectrum in the 28 GHz band

A2.15 In our consultation we identified land-based satellite terminals and fixed links as the main potential use cases for this spectrum, but that it was not likely to be feasible for these services to share frequencies in this band. We noted that we held mixed evidence on the likely potential benefits of making additional 28 GHz spectrum available for satellite land terminals or fixed links, due to mixed evidence of demand for more fixed links and due to uncertainty about the usability of all the available spectrum for satellite terminals. This led to us making a proposal to make 2 x 112 MHz of spectrum for fixed links, 1 x 112 MHz for land-based satellite terminals and to defer our decision on the remaining 1 x 112 MHz.

A2.16 Following the responses to the consultation, we have decided to open 2 x 112 MHz of the returned 28 GHz spectrum for land-based satellite user terminals (Blocks A and C in Figure 3). We are deferring making a decision on the remaining 2 x 112 MHz (Blocks B and D in Figure 3).

A2.17 The allocation of Block C for terminals is consistent with our original proposal. In our consultation, we said that we recognised the potential benefits and importance of making harmonised spectrum available for satellite services. We noted that Block C was already available for terminal use in CEPT countries and that harmonisation with the CEPT band plan could deliver benefits for the price and availability of satellite services in the UK. We continue to consider that this is the case.

A2.18 We originally proposed to defer decision on allocation of Block A. Satellite operators said that there was no need to defer use of Block A, arguing that they could in fact make use of it. We accept this argument. As this spectrum block would not be suitable for fixed links, and taking account of the potential benefits of additional satellite terminal bandwidth, we have decided to make it available for land-based satellite terminals.

A2.19 As a consequence, there will be a total of 1,472 MHz of spectrum available for land-based satellite terminals in the 28 GHz band, an increase of 244 MHz.¹⁵

A2.20 We expect that this decision will benefit consumers and citizens in the UK by providing additional satellite terminal capacity and allowing satellite operators to deploy wider channels.

¹⁵ This includes 2x10 MHz guard bands.

- A2.21 We also consider there is limited downside risk, because satellite terminals are able to coexist with satellite gateways in the same frequencies, and with the incumbent users of the adjacent parts of the band.
- A2.22 With regard to the 2 x 112 MHz of spectrum that we had originally proposed to make available for fixed links (Blocks B and D in Figure 3), the availability of additional spectrum in 32 GHz that is suitable for fixed links use (and that is broadly substitutable with 28 GHz spectrum from a fixed links perspective) caused us to revisit our proposed approach to this spectrum. We therefore considered again whether there may be a stronger argument to also make this spectrum available for land-based satellite terminals. However, while satellite operators argued strongly for making all of the spectrum available for satellite terminals, the evidence provided was not sufficiently compelling for us to decide to make all of this spectrum available to satellite terminals at this time.
- A2.23 Rather than taking a decision on use of the remaining 2 x 112 MHz spectrum now, we will monitor uptake of 32 GHz for fixed links as well as evidence of growth in demand for satellite terminals in 28 GHz and, based on this, decide how to make the remaining 2 x 112 MHz of returned 28 GHz spectrum available at a future date.
- A2.24 We believe that this decision is proportionate, considering the current limited evidence of additional demand for these uses in these frequencies, over and above the demand that could be met with our decisions to make 2 x 112 MHz available for land-based satellite terminals in 28 GHz and spectrum available for fixed links in 32 GHz. Given the uncertainty over future demand, this approach also avoids the negative consequences of making an incorrect policy decision now on the remaining unallocated spectrum.
- A2.25 Overall, we expect our decision (to make 2 x 112 MHz of spectrum available for land-based satellite terminals now, make additional spectrum for fixed links available in 32 GHz given the lack of alternative use cases, and defer the decision on 2 x 112 MHz of returned 28 GHz spectrum) to be the most likely to strike the right balance of realising the consumer and citizen benefits of greater spectrum for land-based satellite terminal use and fixed links now, while taking account of uncertainty around the level of future demand for both fixed links and land-based satellite terminals.

Impact assessment: opening up unassigned 28 GHz spectrum in London and Northern Ireland for satellite gateways and fixed links

- A2.26 We have decided to open this spectrum for new satellite gateway applications and fixed links on an Ofcom-managed basis. Our overall spectrum management approach is that, where coexistence can reasonably occur, sharing between alternative uses is likely to maximise the value of scarce spectrum.
- A2.27 In this case, satellite gateways and fixed links both use highly directional antennas. Directional antennas radiate and receive greater power in specific directions and this makes them less susceptible to interference from unwanted sources than omnidirectional (or less directional) antennas. This reduces the interference risk and means that these two services should be able to coexist well in the London and Northern Ireland areas, enabling potentially greater use of spectrum, and therefore a more optimal allocation of a finite resource, than would be achieved by a single-use allocation.

- A2.28 We considered the benefits of allocating this unassigned spectrum in London and Northern Ireland to use by land-based satellite terminals. As set out in the previous section, we are already making additional spectrum available for satellite terminals, and we consider that this is appropriate to the current evidence of demand for terminal use. In addition, we are aware of some demand for fixed links in the London area and do not consider that fixed links and land-based satellite terminals would be able to coexist using the same frequencies. On balance, we consider that our decision to make this spectrum available for satellite gateways and fixed links is the most likely to secure optimal use of spectrum.
- A2.29 We expect the benefits of our decision to open this spectrum for both satellite gateways and fixed links (a) to exceed the costs, in terms of interference and sterilisation risks, and (b) to deliver net benefits that are greater than alternative options of not using the spectrum or opening the spectrum up to a single use.

Impact assessment: use of returned spectrum in the 32 GHz band

- A2.30 We have decided to open this spectrum for point-to-point fixed links on an Ofcom-managed basis. As set out in our 32 GHz consultation, we are not aware of concrete evidence of demand for any other type of use in this spectrum at this time.
- A2.31 Absent any other potential use of the band and given the potential demand for fixed links, the optimal use of the spectrum for this band is, at present, further use by fixed links. In addition, given our view that this spectrum is broadly substitutable with 28 GHz from a fixed links perspective, we consider that making this spectrum available for fixed links should help to satisfy the demand for fixed links expressed in responses to the 28 GHz consultation, e.g. for licensees who need to migrate links from the 26 GHz band (see paragraph 4.9). Therefore we expect that this decision will deliver consumer and citizen benefits by enabling a range of new or enhanced services which use fixed link connectivity, e.g. backhaul to support delivery of mobile services, provision of communications for utilities networks, etc.
- A2.32 We have also considered the risks to this decision. Adjacent users will be protected by guard bands, discussed in section 4. We are unaware of other uses of this spectrum that could deliver significant benefits. Accordingly, our overall view is that the benefits of this decision are likely to outweigh any potential negative impacts.

Equality impact assessment

- A2.33 We have given careful consideration to whether our decisions will have a particular impact on persons sharing protected characteristics (broadly including race, age, disability, sex, sexual orientation, gender reassignment, pregnancy and maternity, marriage and civil partnership and religion or belief in the UK and also dependents and political opinion in Northern Ireland), and in particular whether they may discriminate against such persons or impact on equality of opportunity or good relations. This assessment helps us comply with our duties under the Equality Act 2010 and the [Northern Ireland Act 1998](#). We have also had regard to the matters in section 3(4) of the Communications Act.

- A2.34 When thinking about equality we think more broadly than persons that share protected characteristics identified in equalities legislation and think about potential impacts on various groups of persons (see paragraph 4.7 of our impact assessment guidance).
- A2.35 In particular, section 3(4) of the Communications Act also requires us to have regard to the needs and interests of specific groups of persons when performing our duties, as appear to us to be relevant in the circumstances. These include:
- the vulnerability of children and of others whose circumstances appear to us to put them in need of special protection;
 - the needs of persons with disabilities, older persons and persons on low incomes; and
 - the different interests of persons in the different parts of the UK, of the different ethnic communities within the UK and of persons living in rural and in urban areas.
- A2.36 We consider our decisions have the potential benefit of facilitating satellite broadband in ‘hard-to-reach’ areas across the UK, which may improve equality of opportunity in those areas. In addition, we expect our decisions will enable greater use of backhaul by Spectrum Access licensees and other fixed link operators, enhancing mobile services and other connectivity services across the UK, noting that VMO2 said 28 GHz backhaul links in future are likely to be particularly important in rural areas. We have not identified any adverse impacts on specific groups of persons that are likely to be affected in a different way to the general population.

Welsh language

- A2.37 Ofcom is required to take Welsh language considerations into account when formulating, reviewing or revising policies which are relevant to Wales (including proposals which are not targeted at Wales specifically but are of interest across the UK).
- A2.38 We do not consider our decisions have any impact on opportunities for persons to use the Welsh language or treating the Welsh language no less favourably than the English language. We also do not think there are ways in which our decisions could be formulated so as to have, or increase, a positive impact, or not have adverse effects or decrease any adverse effects. This is because our decisions relate to spectrum access across the UK (and for one of our decisions, London and Northern Ireland only).
- A2.39 We note that Ofcom’s current practice is to offer to produce spectrum licences in Welsh, and when requested does provide licences in Welsh, in accordance with its obligations set by the Welsh Language Commissioner. This will apply to licences discussed in this document.

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.