Satellite spectrum access for aeronautical and maritime uses

Proposals to permit Earth Stations in Motion in more Ku and Ka band frequencies

Consultation

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1. Overview

1.1 Ofcom is responsible for managing the radio spectrum across the UK. We want to maximise efficient use of this scarce resource, to support continued growth in innovative spectrum uses and secure the economic and consumer benefits that new wireless services can bring.

1.2 There is growing demand for spectrum to support satellite networks. These networks deliver services through a combination of satellite transmitters in space, ground station 'gateways' (which aggregate and distribute large volumes of network data), and user terminal 'earth stations'. Earth Stations In Motion (ESIMs)[1] are a type of user terminal within the Fixed Satellite Service (FSS), providing satellite services on moving platforms on land, sea, and air.

1.3 Increasingly, ESIMs are playing a significant role in connectivity for ships and aircraft. They can deliver services ranging from consumer information and entertainment (especially in locations where fixed and mobile networks are not available), to private communications networks and navigation aids, as well as enhancing service resilience.

1.4 We increased spectrum availability for ESIMs in the 14.25-14.5 GHz (Ku band) range in 2022[2] and said that we would consider further steps after the World Radiocommunication Conference in 2023 (WRC-23).

1.5 WRC-23 agreed provisions that support maritime and aeronautical ESIMs across more frequencies in the wider Ku[3] and Ka[4] bands. We are now consulting on proposals to implement those extra allocations in our licensing framework, and so unlock more spectrum capacity to support UK based businesses and consumers.

What we are proposing – in brief

To support satellite connectivity services for UK ships and aircraft, we are proposing to make more spectrum available for ESIM uplink, aligned with the ITU Radio Regulations, as follows:

- new authorisations for **aeronautical ESIMs** connecting to:
  - ***GSO satellites*** in 12.75-13.25 GHz and 27.8185-28.4545 GHz and 28.8265-29.4625 GHz.
  - ***NGSO satellites*** in 27.5-29.1 GHz and 29.5-30 GHz.
- new authorisations for **maritime ESIMs** connecting to**:**
  - ***GSO satellites*** in 12.75-13.25 GHz and 27.8185-28.4545 GHz and 28.8265-29.4625 GHz.
  - ***NGSO satellites*** in 27.8185-28.4545 GHz and 28.8265-29.1 GHz.

This proposal builds on existing ESIM authorisations in other parts of the Ku and Ka bands, and would significantly expand the spectrum available for ESIMs.[5]

[1] Previously referred to as Earth Stations on Mobile Platforms (ESOMPs).
[2] Statement: More spectrum for satellite connectivity – extending access in the Ku band (14.25 – 14.5 GHz).
[3] Our proposals apply to 12.75–13.25 GHz, which would join existing uplink authorisations in 14-14.5 GHz.
[4] Our proposals cover Ka band uplink frequencies across 27.5–30 GHz. Some of these frequencies are already authorised and our proposals would result in more contiguous access across the band (noting that NGSO use is not permitted in 29.1-29.5 GHz).
[5] Existing authorisations include 14-14.5 GHz for Ku band (GSO and NGSO use) and the Ka band, where GSO use is permitted in 27.5-27.8185 GHz, 28.4545-28.8265 GHz, and 29.4625-30 GHz. NGSO use is also permitted for maritime services in Ka band in the same frequencies (excluding 29.4625-29.5 GHz).

This spectrum is widely used by a range of services in the UK, including other satellite services and fixed services (with significant fixed link deployments across these parts of Ku and Ka bands). To support co-existence, we are proposing to apply the technical conditions embedded in the ITU framework, based on WRC resolutions 121, 123, 156 and 169.

These WRC resolutions limit ESIM transmit power for aircraft at different altitudes, and stipulate that maritime ESIMs must observe a minimum separation from the shore (70 km in Ka band and 158 km in Ku band), unless there is a local agreement in place.[6] We are proposing to waive these limits on maritime use in a subset of new Ka band frequencies already authorised for land ESIMs.[7]

We are proposing to update our **Aircraft radio** and **Ship radio licences** to include all these new frequencies, and to add those frequencies which can be used in the UK to our **Earth Station Network (ESN) licence.**[8] We also propose to update the relevant **Interface Requirements (IR 2077 and IR 2093**) to reflect this new use.[9]

Finally, we are separately proposing to update the list of airfield sites which ESN licensees are required to coordinate with before transmitting in those specific locations. This requirement is set out in schedule 4 of the ESN and applies to all frequencies covered by that licence. We propose to update the list to include Heathrow Airport.[10]

1.6 These proposals would provide significant additional capacity for both maritime and aeronautical connectivity, and provide extra spectrum for GSO and NGSO operators. They would meet growing spectrum demand and support additional broadband services for consumers and businesses by enabling:

- additional aeronautical ESIM use in the UK and for UK registered aircraft overseas (where this is in line with requirements of visited countries); and
- additional maritime ESIM use in the UK for a subset of frequencies, and wider spectrum access for UK registered vessels when further out to sea (including when visiting territories which do not require the same protections for terrestrial services).

1.7 If we confirm our proposals, we expect to vary existing ESN licences to give effect to these changes. We would also update our Ship radio and Aircraft radio licence templates for new applicants, and make these changes available on request for existing licensees.

1.8 Subject to the outcome of this consultation process, we anticipate that new authorisations for ESIMs to use this extra spectrum could be available by the end of 2026.

The overview section in this document is a simplified high-level summary only. The proposals we are consulting on, and our reasoning are set out in the full document.

[6] The separation distances for maritime ESIMs reflect the risk of signals carrying long distances over open water. These separation distance can be waived by 'prior agreement' from the relevant coastal state (for example where protection of fixed links is not a relevant concern).
[7] These frequencies are 27.8185-27.9405 GHz and 28.8265-28.9485 GHz.
[8] The ESN licence covers terminals in a satellite network operating in the UK.
[9] We are also proposing to include in the updated IR 2077 and IR 2093 those frequencies which we authorised for land ESIMs in our 2025 decision on Increasing the use of the 27.5 – 30 GHz band.
[10] We have developed our approach to updating this list with the input of the Civil Aviation Authority.

2. Introduction

2.1 This document sets out our proposals to authorise aeronautical and maritime Earth Stations in Motion (ESIMs) in more of the Ku[11] and Ka[12] bands, in line with decisions taken at recent World Radiocommunication Conferences (WRC).

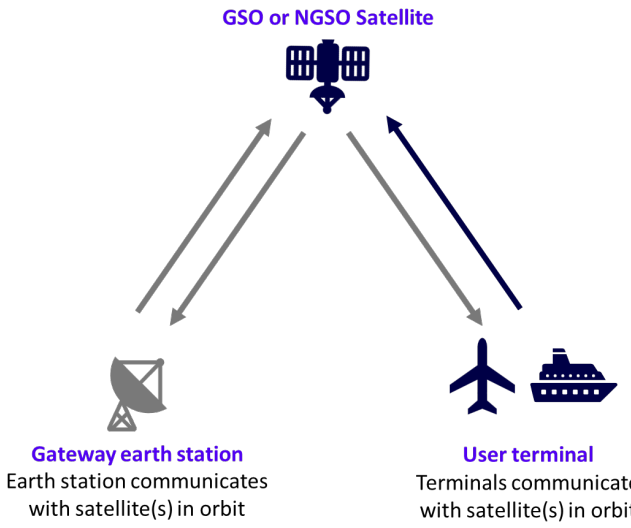
2.2 This section provides background on the current frameworks for ESIMs in the Ku and Ka bands, the demand for and benefits of additional spectrum for ESIMs, the broader spectrum environment for our proposals, and the legal framework underpinning them.

Background

2.3 ESIMs are terrestrial components of satellite communication systems, designed to provide high-speed, reliable, and continuous broadband connectivity to users on the move. ESIMs operate by communicating with geostationary (GSO) and non-geostationary (NGSO) satellites in the Fixed-Satellite Service (FSS).

2.4 ESIMs enable connectivity for 'on the go' services, often in areas beyond the reach of fixed and mobile networks. They can operate on various mobile platforms, including aircraft (aeronautical ESIMs), ships (maritime ESIMs), and land vehicles (land ESIMs). They can deliver services ranging from consumer information and entertainment to private communications networks and navigation aids, as well as enhancing service resilience. With data rates often exceeding 100 Mbps, ESIMs can provide a higher speed alternative to traditional Mobile-Satellite Services (MSS).

Figure 1: Components of GSO or NGSO network, including user terminals (ESIMs)[13]



[11] Our proposals apply to 12.75–13.25 GHz, which would join existing uplink authorisations in 14-14.5 GHz.
[12] Our proposals cover Ka band uplink frequencies across 27.5–30 GHz. Some of these frequencies are already authorised and our proposals would result in more contiguous access across the band (noting that NGSO use is not permitted in 29.1-29.5 GHz).
[13] The UK regulatory framework covers authorisation of uplink transmissions from user terminals, or Gateway earth stations, to a GSO or NGSO satellite.

Existing UK authorisation framework for ESIMs

Licensing framework

2.5 Aeronautical and maritime ESIMs are currently authorised through a mixture of the Earth Station Network (ESN), Aircraft radio, and Ship radio licence products.[14]

2.6 ESN licences are held by, or in conjunction with, a satellite network operator. They provide authorisation and conditions of use for the operation of user terminals within a wider satellite network across the UK. The ESN licence authorises satellite operators to transmit within the UK and its Crown Dependencies, including airspace and territorial waters.[15] There are currently 9 ESN licences on issue covering operators with NGSO services, and around 60 ESN licences applying to GSO services.[16]

2.7 Aircraft radio and Ship radio licences are held by aircraft or ships registered in the UK or Crown Dependencies.[17] These licences authorise ships and aircraft for the radio equipment they carry, and authorise a range of frequencies which can support use cases including navigation, safety, and voice calls. These licences authorise equipment to be used within UK airspace or territorial waters, and can also permit use outside of the UK on a non-interference, non-protection basis, subject to any additional requirements of the visited jurisdiction.[18] In some cases, the Ship radio licence may contain authorisations for use which is not expected to take place in the vicinity of the UK.

2.8 The Aircraft radio and Ship radio licences already authorise the use of ESIMs in some frequencies, subject to conditions (e.g. power limits) and compliance with the technical parameters of Interface Requirements (IR) 2077 and 2093.

2.9 Table 1 below shows the current frequency allocations for aeronautical and maritime ESIMs in the UK following our most recent amendment to this authorisation framework, the 2022 decision to extend access in the Ku band (14.25 – 14.5 GHz). These frequencies can be used for Earth-to-Space (uplink) transmissions.[19]

Table 1: Current UK aeronautical and maritime ESIMs frequency allocations

Frequency Band	Satellite Network	Aeronautical	Maritime
Ku band	GSO	14.0–14.47 GHz	14.0–14.5 GHz
	NGSO	14.0–14.47 GHz	14.0–14.5 GHz

[14] For maritime ESIMs, the terms and conditions are contained in the Ship or Ship Portable Radio: Terms and Conditions booklet (Version 2).
[15] See licence condition 2 of the ESN Licence at Annex 2.
[16] Note that GSO terminals may operate under a licence exemption in certain frequencies in the UK, whilst NGSO ESIMs require the satellite operator to hold an Earth Station Network licence. See IR 2066 and IR 2016 for more detail.
[17] Note that these arrangements do not apply to aircraft and ships registered in other countries, in accordance with The Wireless Telegraphy (Visiting Ships and Aircraft) Regulations 1998 (SI 1998/2970), which permit the licence exempt use of relevant apparatus on board a visiting ship or visiting aircraft, provided that it does not interfere with the emitting or receiving of any authorised wireless telegraphy.
[18] In international waters, operation is expected to be in accordance with the Radio Regulations.
[19] Downlink reception typically operates in 10.7 – 12.7 GHz (Ku band) and 17.7 – 19.7 GHz (Ka band). Ofcom does not issue licences for radio transmissions from satellites in space.

Frequency Band	Satellite Network	Aeronautical	Maritime
Ka band	GSO	27.5–27.8185 GHz, 28.4545–28.8265 GHz and 29.4625–30 GHz	
	NGSO	Not currently authorised	27.5–27.8185 GHz, 28.4545–28.8265 GHz and 29.5–30 GHz

Frameworks for additional ESIM uplink spectrum use

ITU[20]

2.10 At the ITU level, decisions from the 2015, 2019 and 2023 WRCs resulted in resolutions authorising GSO and NGSO ESIMs in additional frequencies across the Ku and Ka bands.[21]

2.11 Following WRC-23 the ITU framework - as defined in the Radio Regulations - now provides conditions for uplink access to 12.75-13.25 GHz for maritime and aeronautical ESIMs connecting to GSO satellites; and for maritime and aeronautical ESIMs connecting to both GSO and NGSO satellites across the bulk of 27.5-30 GHz.[22] The associated WRC resolutions also define technical conditions for ESIMs operations, which are designed to manage interference risks with other services and to define minimum ESIM capabilities.

2.12 WRC-27 is also expected to consider the relevant conditions for aeronautical and maritime ESIMs in the Q/V band, for both GSO and NGSO ESIMs (Agenda Item 1.1).[23]

CEPT[24]

2.13 Within Europe, the European Communications Committee (ECC) of CEPT has also taken decisions to support ESIM use in 12.75-13.25 GHz and across 27.5-30 GHz frequencies.[25] The CEPT framework was developed prior to the ITU framework, and many European countries have implemented the ECC framework, either fully or partially.[26]

2.14 In general, the CEPT framework implements equivalent - or in some cases stricter - provisions to manage the impact of ESIM use compared with the ITU. The framework is complemented by ETSI standards covering most types of use in both the Ku and Ka bands.[27] However, the CEPT framework does not cover any maritime use in Ku band (for either GSOs or NGSOs). While it does cover aeronautical use in Ku-band for NGSOs (unlike the ITU) as well as GSOs, the ETSI standard for aeronautical ESIMs connecting with NGSO satellites in Ku

[20] International Telecommunication Union.
[21] Resolution 121 (WRC-23), Resolution 123 (WRC-23), Resolution 169 (Rev. WRC-23), and Resolution 156 (Rev. WRC-23).
[22] NGSO use is not permitted in 29.1-29.5 GHz. Further, there are currently no ITU decisions or regulations addressing the authorisation of NGSO in the lower Ku band (12.75-13.25 GHz), although NGSO use of the 14-14.5 GHz band is supported and widespread. Resolution 133 (WRC-23) invites further studies on NGSO ESIMs in the Ku band prior to WRC-31.
[23] In this case, the Q/V frequencies to be considered include 47.2-50.2 GHz and 50.4-51.4 GHz.
[24] European Conference of Postal and Telecommunications administrations.
[25] ECC Decision (19)04, ECC Decision (15)04, ECC Decision (13)04, and ECC Decision (05)01.
[26] See implementation status set out here ECO Documentation.
[27] The spectrum related instruments of CEPT, as detailed in ECC Decisions, provide an agreed framework across CEPT administrations. These ECC Decisions are not legally binding in their own right but may be implemented by CEPT administrations individually.

band remains in draft.[28] This means that there is not yet a readily available route for equipment to be confirmed as compliant to operate under the CEPT decision.[29] CEPT is also undertaking a broader review of ESIM-related ECC Decisions (including ECC/DEC/(15)04) to reflect technological developments and improve alignment across these decisions.

Benefits of additional spectrum for ESIMs

2.15 There is growing demand for improved satellite-based connectivity for business and consumers using the aviation and maritime sectors.[30] Additional spectrum provides extra capacity for faster, better services to more customers, as well as greater network resilience and more efficient traffic management.

2.16 Stakeholders have previously emphasised that access to additional Ku and Ka band spectrum is important to accommodate traffic growth, maintain service quality, and enable continued investment in next-generation ESIM services, in line with the ITU framework.[31] International alignment would support more seamless operations across the globe, by promoting international harmonisation and minimising barriers to use outside the UK.

2.17 Ongoing industry developments reflect the growth in demand, with satellite operators offering enhanced services and several airlines and cruise lines recently announcing new agreements to provide a commercial service to passengers, and meet the growing expectation of travellers to remain connected whilst on the move.[32] While NGSO services are growing rapidly, there continues to be a substantial market for GSO services as well.[33]

2.18 Expanding spectrum access for ESIMs could therefore create opportunities to expand and enhance such services to the benefit of UK consumers and citizens, as well as businesses (i.e. UK registered ships and aircraft), supporting innovation and growth. We explore the potential benefits of our proposals in more detail in our Impact Assessment (see Annex 1).

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[28] As of May 2026.

[29] We note that in principle a conformity assessment could be made by a body other than ETSI, and that for the UK a British Standards Institution (BSI) standard could be required.

[30] The demand for connectivity is projected to grow, with forecasts including a compound annual growth rate (CAGR) of ~10% over the next five years across both the aviation and maritime connectivity sectors (Industry Arc and Market Research Future).

[31] Industry responses to our 2022 Consultation: Space Spectrum Strategy pointed to growing demand for additional capacity for satellite based connectivity services for the aviation and maritime sectors and their consumers. For example, the GSOA noted the increasing demand for broadband services on the move from airline and cruise passengers. Telesat noted "an increasing demand of people to stay connected regardless of their location… including airplanes and vessels". Viasat commented that "airline passengers…expect [broadband] to work as well in the air as it does on the ground demonstrating the need for full access to 27.5-29.5 GHz spectrum". SES encouraged Ofcom to extend the NGSO aeronautical and ESIM authorisation to include a wider range of frequencies across the 27.5–30 GHz range, as this could provide regulatory certainty for operators to deploy NGSO satellite services in the UK. See GSOA 2022 Space Spectrum Strategy response; Telesat 2022 Space Spectrum Strategy response; Viasat 2022 Space Spectrum Strategy response; SES 2022 Space Spectrum Strategy response.

[32] Recent sector developments include: Amazon LEO entering an agreement with Delta and Jet Blue, as well as ELCOME and MTN; Starlink partnering with British Airways and the Royal Caribbean cruise line; and Inmarsat Maritime announcing its NexusWave maritime connectivity service.

[33] See for example Maritime Satellite Communication Market - Size, Share & Industry Analysis 2031.

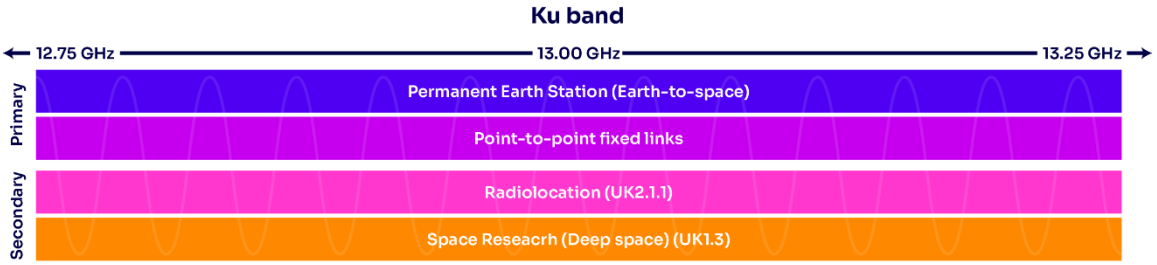
The spectrum environment in Ku and Ka bands

2.19 The Ku and Ka bands are widely used by a mix of services across the UK, with which new ESIM operations would need to share. We provide a high-level overview of the current sharing environments in both the lower Ku and upper Ka bands below, before exploring how the ITU framework we propose to adopt will support co-existence in Section 3.

Lower Ku band (12.75-13.25 GHz)

2.20 The 12.75-13.25 GHz portion of the Ku band is primarily allocated to FSS and terrestrial fixed links, with secondary allocations for Space Research and Radiolocation. The band plan reflecting these current UK allocations is set out below in Figure 2.

Figure 2: Current 12.75–13.25 GHz UK band plan



2.21 There are currently ~2,500 Ofcom-coordinated terrestrial point-to-point fixed links in this band. These support a range of uses including backhaul for the emergency services network, services for the national grid and other CNI services, as well as backhaul for cellular network operators.[34]

2.22 Current FSS use of the band supports Earth-to-Space (uplink) transmissions from Permanent Earth Stations (PES), which are primarily used for commercial television services in this band and can be coordinated with fixed links on a geographic basis.[35]

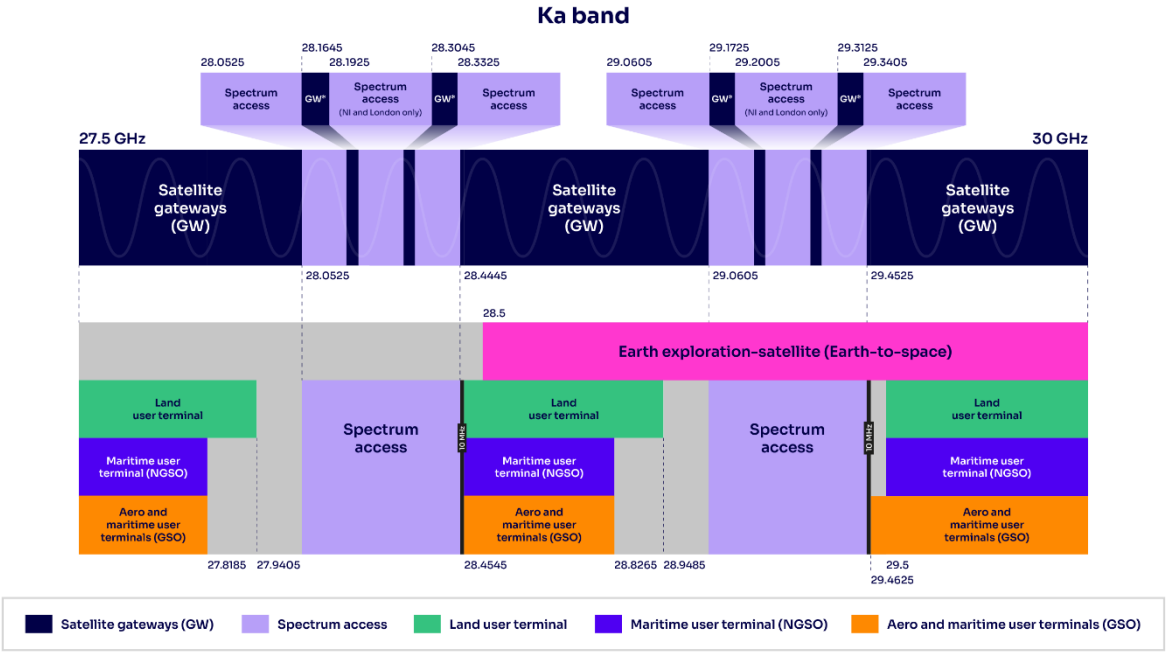
2.23 As indicated by the UK 2.1.1 tag shown in Figure 2, the Ministry of Defence (MOD) also has access to this band for radiolocation on a secondary basis.

Upper Ka band (27.5-30 GHz)

2.24 The Ka band frequencies across 27.5-30 GHz are currently allocated to FSS, Fixed Wireless, and mobile services, on a primary basis, with a secondary allocation for Earth Exploration Satellite use in part of the band (as shown below in Figure 3).

[34] Review of the use of fixed wireless links and spectrum implications (2024).
[35] UK Frequency Allocations for Satellite Earth Stations (Ofw241).

Figure 3: Current 27.5–30 GHz UK band plan[36]



2.25 The 'Spectrum Access' licences held across parts of the Ka band were awarded on a regional basis through auctions in 2000 and 2008. They are mostly used for Fixed Links to support mobile backhaul (although licences are technology neutral and have also been used to support satellite services).

2.26 The FSS allocations are widely used in the UK, and ESIMs have been permitted in a subset of the Ka band frequencies since 2014 (although not co-channel with the Spectrum Access licences). Table 1 above sets out the current frequencies available for aeronautical and maritime use, and highlights how aeronautical use of ESIMs in this band is currently authorised in the UK only when connected to a GSO satellite.

2.27 FSS use has been growing in recent years, facilitated by our 2024 decision to enable GSO and NGSO satellite gateways in additional parts of the Ka band.[37] In 2025, we also decided to permit land-based satellite terminals in specific frequencies, as well as fixed links in London and Northern Ireland.[38] In particular, we expanded the spectrum available to land terminals to include 27.8185-27.9405 GHz and 28.8265-28.9485 GHz, which includes some of the frequencies returned by Arqiva (one of the Spectrum Access licensees). We did not at that point extend these frequencies to airborne and maritime use but noted that we would review this as part of future work. We also deferred our decision on the future use of an additional 2x112 MHz of spectrum returned by Arqiva, noting that there was some uncertainty in future demand for both satellite and fixed services.[39, 40]

[36] Note that GSO terminals are permitted from 29.4625 GHz, while NGSO terminals are only permitted from 29.5 GHz, in line with international regulations.
[37] Statement and consultation: Increasing use of the 27.5–30 GHz band.
[38] Statement: Increasing use of the 27.5–30 GHz and 32 GHz bands.
[39] The additional returned spectrum covers 27.9405-28.0525 GHz paired with 28.9485-29.0605 GHz.
[40] Statement on the Authorisation of Earth Stations on Mobile Platforms.

Ofcom's Duties

2.28 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

2.29 Our principal duty under Section 3 of the 2003 Act is to further the interests of citizens in relation to communications matters and to further the interests of consumers in relevant markets, where appropriate by promoting competition. In relation to spectrum, Ofcom is required to secure the optimal use of the electro-magnetic spectrum and the availability of a wide range of electronic communications services throughout the United Kingdom.

2.30 In performing its duties, Ofcom also has to have regard to a number of factors as appear relevant to the circumstances, including:

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.

2.31 The 2003 Act further provides that Ofcom must in all cases have regard to the principles of transparency, accountability, proportionality, and consistency, as well as ensuring that its actions are targeted only at cases in which action is needed.

Wireless Telegraphy Act 2006

2.32 In carrying out our spectrum functions we have a duty under Section 3 of the WT 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.

2.33 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.

Ofcom's authorisation regime

2.34 Ofcom has the power to permit the use of the radio spectrum by granting wireless telegraphy licences under Section 8 of 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.

2.35 Under Section 9 of the WT Act, a wireless telegraphy licence may be granted by Ofcom subject to such terms, provisions and limitations as Ofcom sees fit. Any 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

2.36 In exercising our regulatory functions, we are also required to have regard to the desirability of promoting economic growth (the "growth duty"). 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 (the "2015 Act") requires us to have regard to the "Growth Duty: Statutory Guidance" (revised by Government in May 2024).

UK Government's Statement of Strategic Priorities

2.37 Under Section 2B(2) of the 2003 Act, when exercising our functions relating to the management of radio spectrum, we are required to have regard to the UK Government's Statement of Strategic Priorities (SSP) that has been designated by the Secretary of State under Section 2A(1) pursuant to the requirements set out in Section 2C of the 2003 Act. The current SSP was designated on 28th April 2026.[41] Amongst other things, it highlights the value of the space sector to UK GDP, emphasises the important role that spectrum plays in supporting this sector and calls on Ofcom to apply a spectrum management approach which supports development in a number of areas, including satellite communications.

Structure of the document

2.38 This document is structured as follows:

- Section 3 sets out our proposal to adopt the ITU framework for extending ESIM authorisation in the Ku and Ka bands and our co-existence assessment, including how the ITU framework should support co-existence in a UK context;
- Section 4 sets out our implementation approach to the licence changes that would flow from our proposals;
- Section 5 sets out next steps, including the timeline for consultation responses.

2.39 The consultation also includes annexes containing our Impact Assessment (Annex 1) and draft licences showing the changes we are proposing as follows:

- Draft Satellite Earth Station Network Licence (Annex 2)

[41] Statement of Strategic Priorities.

- Draft Aircraft radio Licence (Annex 3)
- Draft Ship radio Terms and Conditions (Annex 4)
- Draft IR 2077 (Annex 5)
- Draft IR 2093 (Annex 6)

3. Our proposed approach to authorising ESIMs in 12.75–13.25 GHz and 27.5–30 GHz

3.1 This section sets out our proposal to open new frequencies for aeronautical and maritime ESIMs, as follows:

- new authorisations for **aeronautical ESIMs** connecting to:
  - i) **GSO satellites** in 12.75-13.25 GHz and 27.8185-28.4545 GHz and 28.8265-29.4625 GHz.
  - ii) **NGSO satellites** in 27.5-29.1 GHz and 29.5-30 GHz.
- new authorisations for **maritime ESIMs**[42] connecting to:
  - iii) **GSO satellites** in 12.75-13.25 GHz and 27.8185-28.4545 GHz and 28.8265-29.4625 GHz.
  - iv) **NGSO satellites** in 27.8185-28.4545 GHz and 28.8265-29.1 GHz.

3.2 We also set out our proposed technical conditions, and explain how aligning with the ITU framework generally supports co-existence in a UK context.

Our proposed approach

3.3 To enable new and improved satellite services we are proposing to expand the spectrum we make available for ESIMs.[43] We propose to align with the current ITU framework for extended Ku and Ka band frequencies, incorporating the technical provisions set out in a range of WRC resolutions to ensure co-existence with other services in the UK.

3.4 A summary of how the new frequencies would support different services, and which WRC resolutions would apply to are shown in Table 2 below:

Table 2: WRC Resolutions authorising ESIMs in Ku and Ka band frequencies

Band	Frequencies	Orbit	Permitted New Use	WRC Resolutions
Ku	12.75 – 13.25 GHz	GSO	Maritime and aeronautical	Resolution 121 - WRC 23

[42] Note that the relevant ITU resolutions limit maritime use within 158 km of the coastline in 12.75-13.25 GHz without additional prior agreement from the relevant coastal state. A separation of 70 km is also stipulated in the new Ka band frequencies without additional prior agreement from the relevant coastal state.

[43] That is to say the spectrum which is available for authorisation through the ESN, Ship Radio and Aircraft radio licences – see Section 4 for more details on how we propose to implement this proposal in those licences.

Band	Frequencies	Orbit	Permitted New Use	WRC Resolutions
Ka	27.5 – 29.1 GHz 29.5 – 30 GHz	NGSO	New aeronautical use Additional maritime use in certain frequencies[44]	Resolution 123 - WRC 23
	27.5 – 29.5 GHz	GSO	Additional maritime and aeronautical use in certain frequencies[45]	Resolution 169 - WRC 19
	29.5 – 30 GHz	GSO		Resolution 156 - WRC 23

3.5 Making new frequencies available in line with the current ITU framework would provide consistency for satellite operators (and ships and aircraft), given that the ITU framework underpins satellite operations across many territories and in international waters and airspace. Adopting the current ITU framework should allow us to significantly expand ESIM capacity in the shortest order (by leveraging an established co-existence regime) while being minimally disruptive to other spectrum users.

3.6 We consider this approach would support the efficient use of spectrum by enabling more spectrum sharing and additional use in these frequencies. We consider this additional use to be optimal given the potential to support new and growing services (as set out in Section 2) without constraining incumbent use. By aligning with existing international frameworks, we would provide an efficient means to enable this shared use, meeting growing demand and benefitting from existing technology and operational frameworks. We set out in more detail why we consider that the proposed technical conditions support co-existence with existing users throughout the rest of this section.

3.7 We also consider this the best approach to achieving our objectives, including to support innovation and improve consumer outcomes. Our proposals are also consistent with the growth duty, as this additional spectrum can provide benefits for businesses in the UK as well as consumers. In making these proposals, we have also had regard to the Statement of Strategic Priorities (SSP), which emphasises the importance of facilitating satellite communications in our spectrum management work.

Background on ITU framework and how this informs our assessment of co-existence

Overview of relevant WRC resolutions

3.8 The interference scenarios relevant to ESIM use in these frequencies have been studied extensively internationally, leading to several WRC Resolutions setting out co-existence requirements.

[44] Current allocations cover 27.5 - 27.8185 GHz, 28.4545 - 28.8265 GHz, 29.5 - 30 GHz. New frequencies would therefore be 27.8185 - 28.4545 GHz, 28.8265 - 29.1 GHz.
[45] Current allocations cover 27.5 - 27.8185 GHz, 28.4545 - 28.8265 GHz, 29.4625 - 30 GHz. New frequencies would therefore be 27.8185 - 28.4545 GHz, 28.8265 - 29.4625 GHz.

3.9 The World Radiocommunication Conference 2015 (WRC-15) led to WRC Resolution 156, enabling ESIM use with GSO satellites in 29.5 – 30.0 GHz. Subsequent WRCs introduced further ESIM-related Resolutions (169, 121 and 123 from WRC-23), which expanded the frequencies and use cases covered by the ITU framework, each supported by extensive technical studies:

a) **WRC Resolution 121 (WRC-23) details the conditions for ESIMs on aircraft and vessels communicating with GSO space stations in 12.75-13.25 GHz (Ku band)**.[46] To protect terrestrial services, the resolution includes requirements for a minimum separation distance from the shore (of 158 km) [47] and limits on Equivalent Isotropic Radiated Power (EIRP) density towards the horizon for maritime ESIMs, as well as a Power Flux Density (PFD) mask for aeronautical ESIMs. The resolution also includes a requirement for ESIMs not to cause interference to, or claim protection from, authorised terrestrial services in these frequencies. In addition, there are limits on EIRP density to protect NGSO systems, and minimum technical capability requirements for ESIMs are set out.[48]

b) **WRC Resolution 123 (WRC-23) details the conditions for ESIMs on aircraft and vessels communicating with NGSO space stations in 27.5-29.1 GHz and 29.5-30 GHz (Ka band).** This includes a minimum separation distance from the shore (of 70 km) and limits on EIRP density towards any administration for maritime ESIMs, as well as a PFD mask for aeronautical ESIMs. It also specifies minimum technical capability requirements for ESIMs and requires compliance with the Equivalent Power Flux Density (EPFD) limits set out in Article 22 of the ITU Radio Regulations.

c) **WRC Resolutions 156 (Rev. WRC-23) and 169 (Rev. WRC-23) provide regulations for ESIMs communicating with GSO space stations in specific frequencies in the Ka band**. Both WRC resolutions specify an off-axis EIRP density mask to protect NGSO systems, and require ESIMs to operate under the control of a network control and monitoring centre (NCMC) meeting minimum capability requirements. To protect terrestrial services, WRC Resolution 169 includes requirements for minimum separation distance (70 km from the shore) and limits on EIRP density towards the horizon for maritime ESIMs, as well as a PFD mask for aeronautical ESIMs.

Summary of key co-existence issues underpinning WRC resolutions

3.10 The work informing these WRC resolutions assessed compatibility between ESIMs and all relevant incumbent services, including the Fixed Service (FS), Mobile Service (MS), Aeronautical Radionavigation Systems (ARNS), Earth Exploration-Satellite Service (EESS), space research, and both GSO and NGSO Fixed-Satellite Service (FSS) networks. We have reviewed these studies[49] to ensure that all interference scenarios relevant to the UK deployment are covered.

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[46] There is currently no ITU allocation for ESIMs connecting to NSGO satellites in the 12.75-13.25 GHz.
[47] Note that this separation from the shore (and the similar requirement in place in Ka band) is the separation required for maritime ESIM transmission without prior agreement of the relevant coastal administration.
[48] Satellite operators should note that WRC-23 Resolution 121 specifies that the Radiocommunication Bureau must be notified of intent to use these frequencies between two and eight years prior to operation.
[49] ITU-R, July 2023, Annex 14 to Working Party 4A Chairman's Report, SUPPORTING MATERIAL THAT WAS DEVELOPED TO ADDRESS WRC-23 AGENDA ITEM 1.16 [NON-GSO_ESIM
ITU-R, July 2023, Annex 13 to Working Party 4A Chairman's Report, SUPPORTING MATERIAL THAT WAS DEVELOPED TO ADDRESS WRC-23 AGENDA ITEM 1.15
ITU/United Kingdom of Great Britain and Northern Ireland, June 2019, SHARING AND COMPATIBILITY BETWEEN ESIM AND FIXED SERVICE

3.11 Based on the methodologies developed for assessing coexistence, measures were developed for the protection of relevant incumbent services:

a) Protection of terrestrial services is achieved by imposing EIRP spectral-density limits towards the horizon with additional minimum distance requirements for maritime ESIMs, and PFD and out-of-band emission limits for aeronautical ESIMs.
b) Protection of NGSO FSS systems is ensured through EIRP spectral-density masks or maximum EIRP constraints in the bands 12.75-13.25 GHz and 27.5-28.6 GHz.
c) Protection of NGSO MSS feeder links in the band 29.1 – 29.5 GHz is provided through appropriate EIRP spectral-density limits.

3.12 Across these studies, ESIM use was assessed under worst-case geometries, including low-elevation angles, with maritime terminals operating close to coastlines, and aircraft across the full range of operational altitudes, including low altitudes (which can be considered the most demanding interference scenarios). [50, 51] Both co-channel and adjacent-channel effects were analysed, and aggregate NGSO interference scenarios were included where relevant. In all cases, the studies confirmed that coexistence is achievable where ESIMs meet the requirements defined in the ITU framework.

Alignment of ITU framework with UK allocations and services

3.13 The UK service allocations in the relevant Ku and Ka band frequencies (12.75-13.25 GHz and 27.5-30 GHz) and in adjacent bands are similar to those in Article 5 of the ITU Radio Regulations. As a result of this alignment, we do not expect significant additional coexistence issues for the UK based services sharing this spectrum, as they have already been considered during the ITU studies. We set out in more detail below how the ITU framework accounts for sharing with these other UK services, as well as highlighting a small set of additional technical conditions which we are proposing to align with the existing UK framework.

Lower Ku-band (12.75-13.25 GHz)

3.14 In the UK, this part of the Ku-band is predominantly used by terrestrial fixed links, under the co-primary allocation for Fixed Services (FS). As a result, we propose that ESIMs connecting with GSO satellites in this band must ensure the protection of FS operations. This reflects the sharing environment assumed in the relevant ITU interference studies.

a) The ITU-R studies were designed to ensure that FS links, typically characterised by narrow beams and limited interference margins, remain protected under both long-term and short-term interference conditions.[52]
b) For maritime ESIM, the studies focused on determining the minimum coastal protection distance required to ensure compliance with FS protection criteria, and determined that limiting operations at 158 km from the shore provided robust protection.
c) For aeronautical ESIM, ITU-R studies concentrated on developing an appropriate PFD mask as the primary means of ensuring FS protection rather than applying geographic

[50] Note that these studies include aircraft operations on the tarmac, to enable gate-to-gate operation.
[51] The assumed technical parameters are also broadly consistent with those applicable in the current UK framework, including maximum EIRP levels and minimum elevation angles.
[52] The analyses relied on statistical simulation tools to model interference from aircraft- and vessel-based ESIM into FS receivers. These studies used conservative and internationally recognised assumptions, including antenna performance characteristic and ITU-R propagation models.

constraints. Multiple CDF-based statistical assessments, covering aircraft altitudes from ground level to 12 km, demonstrated that the PFD mask specified in the resolutions provided suitable protection for fixed links (both for long and short-term interference).

3.15 We note that the lower edge of the ESIM uplink allocation at 12.75 GHz sits next to the upper edge of the band allocated to FSS Space-to-Earth transmissions (10.7–12.75 GHz). This is used for downlink by both GSO and NGSO ESIMs already operating in 14-14.5 GHz.

3.16 We recognise that some receivers in the downlink band could potentially be impacted by neighbouring uplink transmissions near the 12.75 GHz boundary. However, in the case of NGSO receivers, the Radio Regulations specify that their use of the spectrum is on a 'non protection' basis with regards to GSO operations (i.e. the new services we are currently proposing to authorise).[53]

3.17 We also consider that there are practical reasons to believe that any risks to these adjacent band receivers should be limited. The scenarios where there is greatest risk would likely involve different ESIM systems being co-located on the same aircraft or vessel, or where different ESIM systems are stationed in close proximity to each other (e.g. at port or on the tarmac). In the first scenario, we consider it reasonable that the owner of a ship or aircraft could manage any issues locally.[54] The second scenario should be relatively limited to brief periods of time, given the typical 'in motion' nature of the services we are considering.

Upper Ka–band (27.5–30 GHz)

3.18 As shown in Section 2, this part of the Ka band is authorised in the UK on a co-primary basis to the Fixed Satellite Service and to the Fixed Service (operating under 'Spectrum Access licences' issued by Ofcom through auction). FSS use includes satellite terminals and gateways, while the 'Spectrum Access' licences are predominantly used for fixed links, many of which provide backhaul for mobile networks.

3.19 Both the FSS and Fixed Service uses are accounted for by the WRC resolutions we are proposing to apply:

a) The ITU-R studies examined ESIM coexistence with FSS and terrestrial services based on a set of conservative assumptions, including free-space propagation, maximum ESIM transmit power, 100% duty cycle, low aircraft altitudes and worst-case antenna alignment. These scenarios were assessed against the established ITU-R long and short-term protection criteria applicable to both the Fixed Service and the Mobile Service.
b) For the FSS, the studies relied on the protection provisions of Article 22 for GSO networks and RR 9.12 for non-GSO systems. They showed that compliance with the ITU-R off-axis EIRP mask for GSO ESIM, or with the altitude-dependent PFD-based power-control mask for NGSO ESIM, is sufficient to meet the satellite protection thresholds, including in aggregate scenarios involving large numbers of aircraft. Protection is therefore delivered through meeting these emission limits (without requiring further geographic separation).
c) For the FS, the studies assessed both GSO and NGSO ESIM under a set of conservative assumptions (maximum uplink power, 100% duty cycle, low aircraft altitudes, and worst-case alignment with FS main beams), and evaluated these against the FS short-

[53] See ITU footnote 5.441.
[54] Examples of such measures could include antenna separation or placement to minimise coupling, the use of additional filtering or shielding, power management or operational scheduling to avoid simultaneous transmissions.

and long- term protection criteria. For GSO and NGSO aeronautical ESIMs, the PFD mask ensures that neither single-entry nor aggregate interference exceeded FS thresholds across all altitudes, even in scenarios involving thousands of aircraft. Maritime ESIM also meet FS protection needs when operating at a minimum offshore distance of around 70 km.

3.20 As noted in Section 2, although the Fixed Service operates in much of the upper Ka band, some spectrum was returned by one of the Spectrum Access licensees (Arqiva) in 2023. This covers 2x224 MHz of spectrum in the frequencies 27.8285-28.0525 GHz and 28.8365-29.0605 GHz.

3.21 Our initial view is that the 70 km separation distance required for maritime users to protect terrestrial services (in the absence of 'prior agreement') could be waived in the UK for 27.8185-27.9405 GHz and 28.8265-28.9485 GHz.[55] This represents the lower half of each returned 224 MHz block, plus the associated lower 10 MHz legacy guard bands.[56] We previously authorised FSS land terminals to use this spectrum in 2025, and there are no fixed links requiring protection.

3.22 Our initial view is that the separation distance from the shore should not be waived in the remaining 2x112 MHz of the returned Arqiva spectrum at this point (27.9405-28.0525 GHz and 28.9485-29.0605 GHz). Our 2025 Statement deferred a decision on the future use of this spectrum given uncertain demand signals from both Fixed Links and FSS users. As Fixed Links remain a potential use of this spectrum in future, we consider it would be prudent to maintain the separation requirement until a decision on future terrestrial use is made.[57]

Our provisional co-existence assessment for 12.75-13.25 GHz and 27-30 GHz

3.23 The UK services operating within these frequencies fall within the same service allocations assessed in the ITU-R studies, with comparable technical parameters. Given the extent of the ITU-R studies we provisionally consider that the existing ITU framework should be sufficient to manage co-existence for UK services.

3.24 We further note that as an additional protection, WRC resolutions 121, 123 and 169 require ESIMs to operate on a non-interference basis with regards to terrestrial services. As this requirement would effectively be transferred into the UK framework (by including compliance with the resolutions as a licence condition), this provides an extra backstop for any interference risks to be managed.

3.25 We acknowledge that, for maritime use cases, the separation required from the coastline to operate without the prior agreement of coastal administrations will have a limiting effect on opportunities for ESIM use when closer to the shore. This reflects the potential for signals to carry long distances over open waters, and the potential risk to receivers along the

[55] In our 2025 Statement: Increasing use of the 27.5-30 GHz and 32 GHz bands we considered that the guard bands were no longer required in these frequencies. We are proposing that as these additional 2x10 MHz are already available for land terminals, they could also be made available for maritime use without requiring additional separation from adjacent channel links.

[56] Note that we would also continue to waive this separation requirement in frequencies which we currently authorise and which are not co-channel with fixed links.

[57] I.E. because the ability to authorise future fixed links in 27.9405-28.0525 GHz and 28.9485-29.0605 GHz could be constrained if ESIMs were operating close to the shore, as a potential source of interference.

coastline, including in the UK.[58] Our initial view is that it is appropriate to waive this separation requirement in frequencies where Fixed Links are not present, and not being considered for the future (i.e. 27.8285-27.9405 GHz and 28.8365-28.9485).

3.26 Although an authorisation on the basis we are proposing would limit the use of maritime ESIMs in some frequencies when close to the UK shore, our initial view is that this is necessary to provide suitable protection to existing users providing important services. Our proposed approach would overall still bring significant capacity benefits in UK waters (while protecting incumbent services) and bring additional benefits as vessels move further out to sea.[59] We recognise that our proposal comes with some added complexity for ships and satellite operators. However we consider that offering the opportunity to access some of the spectrum closer to the shore, rather than applying the baseline ITU restrictions uniformly, would provide flexibility to support more maritime services around the UK.

3.27 We have also considered if an alternative co-existence methodology (such as one based on varying transmit power and elevation angles when closer to the shore) could bring benefits for maritime operations closer to the UK. However our current view is that materially lower transmit powers would be required to substantively improve co-existence and that this would not be sustainable for commercial services.[60] Such a framework could also come with additional compliance and enforcement complexity.[61]

UK-specific considerations

3.28 We have undertaken checks to ensure that our proposed co-existence approach is consistent with existing UK licensing arrangements, and that they account for any broader public sector activity in the Ku and Ka bands.

Maximum terminal EIRP

3.29 To ensure electromagnetic compatibility (EMC) with sensitive avionic systems in the vicinity of airfields, we propose a maximum EIRP limit of 55 dBW per ESIM terminal. This mirrors the restriction already in place in other frequency bands and enables ESIM operation without posing a risk to ground-based aviation equipment.

Minimum elevation-angle requirement

3.30 A minimum 3° elevation-angle requirement is currently applied in the UK licensing framework for ESIMs in authorised frequencies. This measure protects ground services from low elevation angle emissions and is consistent with the assumptions used in the ITU-R studies underpinning the ITU framework for ESIMs. We propose to extend this requirement to the new frequencies we are looking to make available.

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[58] As noted above, both bands are used extensively for fixed links, with ~2500 assignments in 12.75-13.25 GHz. This includes licences providing backhaul for the emergency services, the national grid and other CNI uses, as well as backhaul for the mobile network operators.

[59] This could include UK registered vessels operating in international waters and by agreement with other administration (for example where fixed link use is more limited).

[60] We note that the CEPT framework for Ka band (which we discuss in more detail from paragraph 3.34 below) does include a variable PFD limit rather than a separation distance for Ka band. However, our view is that in most scenarios this is unlikely to support operations much further in towards the shore.

[61] For example, compliance would depend on monitoring variable transmit powers at different distances, rather than a simple and clearly defined cut off.

Public sector users and national coordination sites

3.31 **Military users:** Potential licensees should be aware that the 12.75-13.25 GHz spectrum includes a 'UK 2.1' footnote, meaning that military users may operate in this spectrum. This use is associated with a secondary allocation for Radiolocation. We are not proposing to include any specific protection requirements for this use, and our understanding is that such activities are limited to certain times and locations.[62] A 'UK 2.1' footnote does not apply to 27.5-30 GHz, although there are military allocations in the adjacent frequencies.

3.32 **Use around airfields:** Our Earth Station Network (ESN) licence currently requires ESIM operators to obtain permission from either the CAA or the relevant airport authority before operating within the perimeter fence of an airfield.[63] We are proposing to extend this coordination requirement to the new frequencies we are proposing to authorise in 12.75-13.25 GHz (GSO only) and across 27.5-30 GHz. This will ensure consistency with our existing framework and ensure any local coordination considerations specific to airport operations can be accounted for before ESIM transmissions take place. As part of this, we are also proposing to update the list of protected airports to include Heathrow Airport, a major airport missing from the coordination schedule.[64] This update would apply to all uses and frequencies covered under the ESN licence, which we discuss in more detail in Section 4.

Other authorisation options

3.33 We have considered whether there could be other approaches to authorising these frequencies in the UK, including whether the CEPT framework or more bespoke national regimes could be applied.

CEPT framework

3.34 As noted in Section 2, there are ECC Decisions that apply to ESIM use in these frequencies, most of which are supported by harmonised ETSI standards. The bulk of these ECC Decisions were developed prior to the ITU framework being updated at WRC-23. The relevant ECC decisions and the uses they apply to are summarised below in Table 3.

Table 3: ECC framework authorising ESIMs in Ku and Ka band frequencies

Band	Frequencies	Orbit	ECC Decisions	ETSI standards
Ku	12.75 – 13.25 GHz	GSO (Aero only)[65]	ECC Decision (19)04	ETSI standard EN 302 186

[62] We note that our existing ESN and Aircraft radio and Ship radio licences impose operational restrictions around two Crown sites in the conventional Ku band (14.0–14.5 GHz), including exclusion zones up to 5 km and conditional use up to 7 km depending on EIRP. This approach was developed to protect specific uses in those frequencies, and we are not proposing to extend this measure to 12.75-13.25 GHz.

[63] This requirement allows additional checks to be made on any local considerations around sensitive airfield environments (e.g. operational and safety considerations).

[64] As part of this proposal, we are also suggesting that the coordination discussion should in the first instance be with the Airport, rather than the CAA. We are also engaging with the CAA to identify any airfields which are no longer in use, which could be removed from these requirements in future.

[65] There is currently no authorisation framework for maritime ESIMs in the 12.75-13.25 GHz part of the Ku band under the ECC decision.

Band	Frequencies	Orbit	ECC Decisions	ETSI standards
		NGSO (Aero only – pending standardization)	ECC Decision (19)04	Draft only
Ka	27.5 – 29.1 GHz 29.5 – 30 GHz	NGSO	ECC Decision (15)04[66]	ETSI Standard EN 303 979
	27.5 – 30 GHz	GSO	ECC Decision (15)04 ECC Decision (13)01 ECC Decision (05)01	ETSI standard EN 303 978

3.35 Although there are parallels between the ITU and CEPT frameworks, the relevant parts of the ITU framework were developed more recently and represent international agreements from the most recent WRCs.[67] While the technical conditions of the ECC framework and the ITU are often similar, there are some cases where the ECC framework could be considered more restrictive.[68]

3.36 In addition, the ECC framework does not authorise any maritime ESIMs in 12.75-13.25 GHz. While the ECC framework does cover aeronautical ESIMs connecting with NGSO satellites in 12.75-13.25 GHz (unlike the ITU framework) the ETSI standard supporting this remains under development. Consequently any reliance on these aeronautical NGSO provisions would depend on a standard that is still subject to change (or a different and novel type of conformity assessment).

3.37 Given the above, we consider that basing our authorisation and co-existence approach on the ECC framework could be unduly restrictive and would introduce additional complexity, in particular for equipment used globally, without the benefits to justify this.

ESIMs connecting with NGSO satellites in 12.75-13.25 GHz

3.38 Given that the current ITU framework does not support ESIMs connecting with NGSO satellites in 12.75-13.25 GHz, we have considered whether we should take alternative steps to permit this for the UK. In particular, we have considered if we could use the relevant parts of ECC framework, either in full, or as a foundation for a more bespoke authorisation that would permit aeronautical ESIMs connecting with NGSOs in these frequencies.[69]

[66] Note that ECC is currently revising ECC/DEC/(15)04 to incorporate WRC-23 Resolution 123, expanding ESIM authorisation to additional Ka-band segments and aligning technical conditions. The update also aims to clarify roles between satellite operators and service providers.

[67] We are also aware that the ECC is now looking to update parts of its framework to reflect WRC Resolutions affecting the Ka band.

[68] For example, the ECC framework for Ka band has a more demanding PFD mask for aeronautical use, while for Ku band it imposes a maximum EIRP of 50 dBW on-axis (which is not imposed by the ITU framework and is below the limit of 55 dBW typically required in UK licences).

[69] While we have also considered the potential for more NGSO maritime use in these frequencies; the same need to protect fixed links which limits GSO maritime use close to the UK would remain, and therefore the immediate benefits of this could be more limited.

3.39 Our proposed approach would already significantly increase the spectrum supply (by more than 400%) and capacity for aeronautical ESIMs connecting to NGSO satellites. However, we recognise that some demand may remain, both for more spectrum supply in general and more specifically for more access to Ku band. This is because the upper Ku frequencies (14-14.5 GHz) are widely used globally, including for terminals used by major operators.[70]

3.40 We are mindful that the studies which defined the co-existence framework for the ECC decision are now more than 8 years old, and the satellite industry in general, and the NGSO sector in particular, have changed considerably in this time. The assumptions on which co-existence values were developed would therefore require review.[71] We are also mindful that the ETSI standard to support this ECC decision remains in draft.

3.41 In addition, a new authorisation from the UK - ahead of wider international standards - could create complexity from both an operational and compliance perspective:

- Operationally, new use would need to manage around different approaches in other jurisdictions (noting that in Europe, some countries have adopted the ECC decision, while others have adopted it only partially or not at all).[72]
- From a compliance perspective, a new UK authorisation would create a right to transmit in international airspace (on a non-interference basis) under Article 4.4 of the Radio Regulations. This places a responsibility on the UK to manage issues associated with this regime. We would need to be confident that a new framework addressed co-existence issues not just in the UK and Europe, but more widely.

3.42 Our current view is that this would not be straightforward and that such an authorisation would be more beneficial if it aligned with wider international standards, which is more likely to be possible in the coming years.

3.43 We note that WRC-23 Resolution 133 envisages further studies with a view to consider NGSO ESIMs operating in 12.75-13.25 GHz at WRC-31. We would expect to review our approach in light of any new authorisations agreed through that process, which could then enable authorisation options that align better with global usage.

3.44 We further note that work remains ongoing in ETSI to agree a standard for NGSO equipment transmitting in this frequency range.[73] If the satellite industry continues to affirm demand for these frequencies and can evidence how co-existence could be achieved (in line with UK uses and the wider international framework), the completion of this standard could potentially provide a basis for revisiting UK authorisation options at an earlier point.

Other terminal use cases (land terminals and drones)

3.45 We recognise that there may be interest in more ESIM uses beyond the aeronautical and maritime use cases we have considered here, in particular for land terminals and drones.

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[70] We are aware that there is also stakeholder interest in, and some international use of 13.75-14 GHz for ESIM uplink by NGSOs. In the UK there are active Defence allocations in these frequencies, and we are not in a position to consider further sharing of these frequencies at this point.

[71] See for example ECC PFD study which extrapolated on the basis of data inputs in the 14 GHz band, and used the then OneWeb constellation to inform aggregation parameters.

[72] See ECO Documentation for current implementation status in Europe.

[73] Current timelines suggest this could be finalised by 2028 - see ETSI portal.

3.46 In the case of land terminals, we note that we have already taken steps to increase the frequencies that are available for their use in Ka band (see our 2025 Statement on Increasing use of the 27.5-30 GHz and 32 GHz bands). In Ku band, our approach reflects the current ITU framework, and also our view of potential co-existence risks. In particular, we consider that uncoordinated use of land terminals in close proximity to the extensive use of Fixed Links could pose co-existence risks.

3.47 For drones, we have already taken steps to support such use under the Unmanned Aircraft Systems (UAS) licence introduced in 2022. This licence permits GSO ESIMs on drones in parts of the Ka and Ku bands. Our current view is that further authorisation of ESIMs for drones in these frequencies would require a more detailed co-existence analysis and could be challenging, given the density of fixed links which the drone could pass through. Given the spectrum options already made available, and the potential for additional coordination challenges, we are not proposing to extend the frequencies authorised for aeronautical ESIMs to include drones at this time.[74]

3.48 We expect to consult shortly on the longer-term spectrum requirements for drones, and plan to consider the wider spectrum needs of the drone sector as part of that process.

Question 1: Do you agree with our proposal to make spectrum available for aeronautical and maritime ESIMs connecting with GSO satellites in 12.75-13.25 GHz, in line with the ITU framework?

Question 2: Do you agree with our proposal to make additional spectrum available for aeronautical and maritime ESIMs connecting with GSO and NGSO satellites in Ka band (authorisations across 27.5-30 GHz), in line with the ITU framework?

Question 3: Do you agree with our proposed technical conditions for ensuring co-existence?

[74] Consequently, if we proceed with our proposed authorisation of ESIMs in these frequencies, we plan to update our guidance for GSO operators holding an ESN licence to highlight that providing connectivity to drones is not permitted in these frequencies.

4. Proposed licensing implementation approach

4.1 This section outlines how we would implement the proposed changes to the Aircraft radio, Ship radio and Earth Station Network (ESN) licenses. We outline the proposed amendments for each of the licence products and the associated Interface Requirements, as well as the process we propose to use to update our products for new and existing licensees.

Our proposed approach to updating licences

4.2 As set out in Section 2, we currently issue three different licences which support the use of Earth Station in Motion (ESIMs) on ships and aircraft:

- Satellite Earth Station Network (ESN) licence;
- Aircraft radio licence; and
- Ship radio licence.

4.3 We are proposing to vary existing ESN licences and update the Aircraft radio, and Ship radio licence templates to reflect the new authorisations for aeronautical and maritime ESIMs in the Ku and Ka bands.

Adding new frequencies and co-existence conditions

4.4 For aeronautical use, the co-existence framework we have considered would allow for use both in and over the UK, and further afield, in all proposed frequencies. We are therefore proposing to add the full set of aeronautical frequencies we are consulting on (as set out in paragraph 3.1) to both our Aircraft radio and ESN licences. This is because the Aircraft radio licence authorises use of radio equipment within the UK and further afield on UK registered aircraft - subject to any additional conditions from the visited country - while the ESN authorises a satellite operator to provide services within the UK.[75]

4.5 For maritime use, our co-existence assessment for fixed links in 12.75-13.25 and parts of 27.5-30 GHz relies upon maritime ESIMs observing a separation distance from the coast, unless there is prior agreement to operate closer to the shore. We are proposing to waive this separation requirement for new frequencies where fixed links do not require protection in the UK (27.8185-27.9405 GHz and 28.8265-28.9485 GHz).

4.6 Because the ESN licence applies to the territorial extent of the UK, we propose to add only the frequencies 27.8185-27.9405 GHz and 28.8265-28.9485 GHz to the ESN licence for maritime use. We consider that the fuller set of proposed maritime frequencies can be made available to vessels travelling further afield (subject to the necessary permissions of visited countries[76]). We therefore propose to add the wider set of frequencies to our Ship radio licence, subject to compliance with the relevant separation distances.

[75] The ESN can also enable a satellite operator to provide services in and over the UK to a visiting aircraft.
[76] I.E. this would allow a vessel to seek prior agreement to use some more frequencies closer to the shore than can be permitted near to the UK at present.

4.7 Note that for authorisations covering UK territories, we would also propose to extend these to the Crown Dependencies, subject to further discussion and agreement with the relevant administrations.

4.8 We are consequently proposing the following updates:

a) **For the ESN licence:**

i) Add the frequencies 12.75-13.25 GHz for aeronautical ESIMs connecting to GSO satellites;
ii) add the frequencies 27.8185-28.4545 GHz, 28.8265-29.4625 GHz for aeronautical ESIMs connecting to GSO satellites (which would mean all of 27.5-30 GHz would in future be available for this use);
iii) add the frequencies 27.5-29.1 GHz and 29.5-30 GHz for aeronautical ESIMs connecting to NGSO satellites; and
iv) add the frequencies 27.8185-27.9405 GHz and 28.8265-28.9485 GHz for maritime ESIMs connecting to either GSO or NGSO satellites.

b) **For the Aircraft radio licence:**

i) Add the frequencies 12.75-13.25 GHz for aeronautical ESIMs connecting to GSO satellites;
ii) add the frequencies 27.8185-28.4545 GHz, 28.8265-29.4625 GHz for aeronautical ESIMs connecting to GSO satellites, (which would mean all of 27.5-30 GHz would in future be available for this use); and
iii) add the frequencies 27.5-29.1 GHz and 29.5-30 GHz for aeronautical ESIMs connecting to NGSO satellites.

c) **For the Ship radio licence:**

i) Add the frequencies 12.75-13.25 GHz for maritime ESIMs connecting to GSO satellites;
ii) add the frequencies 27.8185-28.4545 GHz, 28.8265-29.4625 GHz for maritime ESIMs connecting to GSO satellites, (which would mean all of 27.5-30 GHz would in future be available for this use, when the required separation distances are observed); and
iii) add the frequencies 27.8185-28.4545 GHz, 28.8265-29.1 GHz for maritime ESIMs connecting to NGSO satellites (which would mean all of 27.5-29.1 GHz and 29.5-30 GHz would in future be available for this use, when the required separation distances are observed).

4.9 **For the ESN licence, we also propose to add conditions which require the licensee to comply with the relevant WRC Resolutions** which establish the co-existence measures required in these frequencies (see Table 2). We consider it is appropriate to include these conditions, given that we propose to rely on the WRC Resolution rules to manage what might otherwise be material interference risks. We consider it appropriate to include this requirement in the ESN licence as we would expect the satellite operator to maintain overall control and management of the satellite system in the areas it is licensed for (i.e. around the UK).

4.10 In addition, we are proposing to clarify that these WRC Resolutions will apply where relevant across the Ka band ESIM authorisations we already have in place in ESN licences.

This will clarify our overall framework for Ka band and ensure a consistent approach aligned with the ITU framework.[77]

4.11 **For the Aircraft and Ship radio licences, we also consider that the use of ESIMs in the new frequencies we are proposing should be in conjunction with an operator who holds an ESN licence. We are therefore proposing to add a guidance note to these licences indicating this.**[78]

4.12 We consider this a sensible measure to ensure that relevant controls and expertise are applied to the installation and management of ESIMs operating in the vicinity of the UK, as part of the wider approach to co-existence sets out in this document.[79] This approach is also in line with the approach we took when making 14.25-14.5 GHz spectrum available in 2022.

4.13 For operations outside the areas to which the ESN applies, our Aircraft radio and Ship radio licences already highlight that the licence does not remove the licensee from any requirements of visited jurisdictions and other relevant regulations (i.e. the Radio Regulations). This provides a backstop for any interference concerns outside of the UK.

4.14 Overall, we consider our proposal to update all three licence types in this way to be objectively justified as this is in line with the international framework and will allow UK registered ships and aircraft to operate both within the UK and further afield. We believe the proposal is non-discriminatory as it implements the global framework agreed in the Radio Regulations for both aeronautical and maritime ESIMs in the UK and beyond.

4.15 We consider the proposal to be transparent as it clearly outlines what we intend to achieve. We have sought to align our proposals with our existing authorisation framework for aeronautical and maritime ESIMs wherever possible, to provide certainty for stakeholders.

4.16 In developing these proposals, we have also had regard to the priority placed on satellite communications in the Statement of Strategic Priorities (SSP) designated by the UK Government, and our duty to consider economic growth potential in our decisions.

Amending the ESN Airport coordination requirement

4.17 As noted in Section 3, the ESN licence contains a list of airports (see Schedule 4) where agreement must be obtained from the airport or the CAA before using radio equipment authorised by the licence in that location. This is intended to ensure that any local considerations (e.g. safety and interference management) can be taken into account before operating.

4.18 The current schedule does not include Heathrow Airport, which we consider an administrative oversight. Consequently we are now proposing to add Heathrow to the list of locations to be coordinated with, to ensure the same regime applies there as applies for other major UK airports. We are also proposing to update the schedule to clarify that

[77] Note that the separation distances indicated in the Resolutions for maritime use are not transferred to the existing Ka band authorisations in ESN licences, since the issuing of the ESN means we are authorising use inside the territory of the UK. This means that the separation distance would not apply to 27.5-27.9405 GHz, 28.4545-28.9485 GHz and 29.4625-30 GHz.

[78] This condition refers to use of ESIMs in the UK or its Crown Dependencies, including airspace and territorial waters, operating under a UK Ship Rado or Aircraft radio licence.

[79] This new guidance is consistent with our wider approach to managing satellite networks and does not impose a material burden on existing licensees. In addition, existing licensees will only receive these updated terms when they request a licence variation.

contact should be made directly with the airport where possible, and so removing the CAA as an initial point of contact.[80]

Editorial and procedural updates

4.19 We are also proposing some limited typographical, editorial and procedural changes to these licences, which are intended to ensure common terminology across the documents, and bring existing conditions up to date.

ESN licence

a) **Replace references to Radio Equipment Directive (RED) with references to Radio Equipment Regulations (REG).** This update would ensure licences align with the current UK legislative framework.

Aircraft radio and Ship radio licences

b) **Updating references in the Aircraft radio and Ship radio licences from ESOMPs to ESIMs.**[81] This will ensure more consistent terminology across licences. We will also introduce the ESIM term as a cross-reference to the 'satellite earth station' terminology introduced as part of making available spectrum between 14-14.5 GHz in 2022;

c) **Adding receiver frequencies in the Aircraft radio and Ship radio licences, and into Interface Requirements (IR) 2077 and 2093.** Under the UK regulatory framework, Ofcom does not issue radio licences for radio transmissions from satellites in space. Ofcom does however regulate radio equipment use at ground level in the UK.[82] For clarity, we are also proposing to include the internationally established receiver frequencies associated with the uplink that we are authorising.

d) **Replace references to Radio Equipment Directive (RED) with references to Radio Equipment Regulations (REG),** as we are doing for the ESN, where this is referenced.

4.20 Marked up versions showing the proposed changes to the ESN licence, Aircraft radio licence, and the relevant section of the Ship or Ship Portable Radio terms and conditions can be found in Annexes 2, 3, and 4.[83] Changes to the licence template are indicated by bold, underlined text for new additions and strike-out text for deletions.

4.21 We also propose to reflect these changes (including the expectation of compliance with the relevant WRC resolutions) in IR 2077 and IR 2093. These Interface Requirements help ensure that our requirements are reflected in the specification of equipment operating in the UK market. Marked up versions of revised IR 2077 and IR 2093 can be found in Annexes 5 and 6.

4.22 In February 2025, we published a Statement confirming our decision to extend the authorisation for land terminals operating in the 27.5 – 30 GHz band.[84] We now also propose to update IR 2077 and IR 2093 to reflect this decision.

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[80] The CAA would remain a fallback contact option if contact with the airfield cannot be made directly.

[81] ESOMP stands for Earth Station On Moving Platforms, and was replaced by ESIMs in a satellite context at WRC-15.

[82] Receive only stations are licence exempt.

[83] Note that these also include a small number of typographical changes, for example where clause numbering would change as a result of the more substantive changes we are proposing.

[84] Statement: Increasing use of the 27.5-30 GHz and 32 GHz bands

Licence variation process and fees

Variation process

4.23 Under Schedule 1 of the WT Act, where Ofcom proposes to vary a wireless telegraphy licence, we must give the person holding the licence a notification stating:

a) The reason for the proposed variation; and
b) the period during which the person notified has an opportunity to make representations about the proposal.[85]

4.24 The above notification criteria do not apply to a proposal to vary a licence if the proposal is made at the request or with the consent of the licensee.

4.25 To give effect to our proposals, we do not propose to immediately vary existing Aircraft radio and Ship radio licences. Instead, we would make the additional frequencies (and associated editorial changes) available to existing licensees either on request, or when other licence changes trigger a template update. Additionally, we propose to update our licence templates for the Aircraft radio licence and Ship radio licence terms and conditions booklet to incorporate these new frequencies (and associated editorial changes), so the revised licences would automatically be on offer to new licensees.

4.26 We are proposing to vary the ESN licence because we are proposing, alongside the frequencies we would be adding and the associated conditions for their use, to update the existing airport protection list contained in Schedule 4 of the ESN licence. We therefore propose to give effect to our proposals relating to ESN licences by notifying all existing ESN licensees of our proposal to vary each licence to include the proposed new frequencies, the proposed update to Schedule 4 and the associated editorial updates. We would also propose to embed these changes in our ESN licence templates for future licensees.

Fees

4.27 We do not anticipate any new fee implications for authorising the shared use of these frequencies and expect that licences would continue to be issued based on the current fee regimes. For ESN licences, a cost-based fee of £200 applies annually. For Ship Radio, licences are free when applied for online and cost £20 for offline applications, covering an indefinite period. For Aircraft radio licences, fees have a specified payment interval (which is typically for every 3 years) and are linked to the take-off weight of the aircraft.[86]

Question 4: Do you agree with our proposed amendments to the Earth Station Network, Aircraft radio, and Ship radio licence products to extend the authorisation for aeronautical and maritime ESIMs connecting to GSO and NGSO satellites?

Question 5: Do you agree with our proposal to reflect these changes in the relevant Interface Requirements?

Question 6: Do you have any other comments on our overall approach to authorising ESIMs in these frequencies, and implementing this in our licensing framework?

[85] Generally speaking this period must be at least 30 days.
[86] See our Aeronautical licence fees and calculator for more details.

5. Next steps

Consultation timelines

5.1 This consultation will be open for comments for 8 weeks, closing at **5pm on 11 August 2026**. Consultation questions can be found in Annex 10.

5.2 We will consider all responses to this consultation to inform our approach, before publishing our final decision on authorising new frequencies for ESIM use. We expect to publish a final statement in Q3 2026/27.

Confirming our approach

5.3 Subject to the outcome of this consultation, we will take steps to update the templates for our existing Earth Station Network (ESN), Ship radio and Aircraft radio licences, and initiate the variation of ESN licences set out in Section 4. We would also update the Interface Requirements (IR) 2077 and 2093 to reflect our updated conditions. The changes we are proposing to licence templates and the Interface Requirements are set out in Annexes 2-6.

5.4 We anticipate that these updates could be available by the end of 2026, with access to additional ESIM frequencies available from this point. Existing Aircraft radio and Ship radio licensees would be able to request a variation to update their licence to enable use of the new frequencies, with the relevant conditions.

5.5 If we confirm the proposals we are making today, we would also in due course update the UK Frequency Allocation table to reflect these new authorisations.

Future authorisations approach

5.6 As set out in this document, we recognise that the satellite sector is continuing to grow and evolve, with the potential to provide more services for consumers and businesses. As these services develop, there may be more demand for spectrum in future, including for maritime and aeronautical ESIMs.

5.7 We have highlighted the further discussions expected on the use of ESIMs in Q/V band frequencies as part of the World Radiocommunication Conference 2027 (WRC-27). We have also highlighted the potential for further discussion at WRC-31 on the use of ESIMs connecting to NGSO satellites in 12.75-13.25 GHz, and that the relevant ETSI standard for aeronautical NGSO use is still under development.

5.8 We will closely monitor demand for these services and review any decisions taken at future WRCs that would increase spectrum supply for ESIMs, to ensure that the UK framework remains up to date and supports new services wherever possible.

A1. Impact Assessment

Background

A1.1 In this document we have set out proposals to allow access to more spectrum for Earth Stations in Motion (ESIMs) in the Ku and Ka bands. These proposals are in line with Ofcom's statutory duty to ensure the optimal and efficient use of the radio spectrum in the UK.

A1.2 Section 7 of the Communications Act requires Ofcom to carry out and publish an assessment of the likely impact of implementing a proposal which would be likely to have a significant impact on businesses or the general public, or when there is a major change in Ofcom's activities. Such an assessment must set out how, in our opinion, the performance of our general duties is secured or furthered by or in relation to what we propose.

A1.3 More generally, impact assessments form part of good policy making, and 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.

A1.4 In the following section we provide that assessment, including qualitative evidence on the potential impacts of our proposals, an evaluation of that impact on stakeholders, and an evaluation of any impact on opportunities for growth. We also provide an equality impact assessment for these proposals, along with considerations related to the Welsh language.

Impact Assessment Summary

A1.5 We are proposing to make new spectrum available for ESIMs as follows:

- new authorisations for **aeronautical ESIMs** connecting to:
  - i) **GSO satellites** in 12.75-13.25 GHz and 27.8185-28.4545 GHz and 28.8265-29.4625 GHz.
  - ii) **NGSO satellites** in 27.5-29.1 GHz and 29.5-30 GHz.
- new authorisations for **maritime ESIMs**[87] connecting to:
  - iii) **GSO satellites** in 12.75-13.25 GHz and 27.8185-28.4545 GHz and 28.8265-29.4625 GHz.
  - iv) **NGSO satellites** in 27.8185-28.4545 GHz and 28.8265-29.1 GHz.

A1.6 We are proposing to update the Aircraft radio and Ship radio licence templates to include these frequencies (which would be available to existing licensees on request). We are also proposing to vary ESN licences to incorporate those frequencies which can be used within the territories of the UK.

A1.7 Overall, we expect our proposals will have a material positive impact, by providing extra capacity for existing services and innovative new applications. This includes opening new

[87] Note that the relevant ITU resolutions limit maritime use within 158 km of the coastline in 12.75-13.25 GHz without additional prior agreement from the relevant coastal state. Similarly, a separation of 70 km is stipulated in the new Ka band frequencies, except where this is waived by local agreement.

opportunities for satellite operators to offer their services to more customers, and the provision of new services for ships and airlines, which can both support those businesses and provide benefits for citizens and consumers.

A1.8 We consider that these benefits significantly outweigh any risks, which we consider limited, given our decision to implement an internationally recognised co-existence framework to protect incumbent users (as set out in Section 3).

A1.9 We therefore provisionally consider that it is appropriate to make this extra spectrum available for ESIMs in this way. Doing so would be in line with our duties to secure the efficient use of spectrum and the wide availability of communication services, as well as our duty to support economic growth.

Impact on satellite operators

A1.10 We envisage that our approach would be particularly beneficial for satellite operators seeking to provide services in the UK, as adding new frequencies to our ESN licence will enable operators to provide services to both UK registered and visiting ships and aircraft. Our proposals would provide an increase in spectrum availability of around a 15% for NGSO and GSO operators connecting with maritime ESIMs in the UK, with increases for aeronautical spectrum supply of more than 100% for GSO operators and more than 400% for NGSOs.[88] This will allow operators to serve more aircraft and boats, and serve existing customers better, with the ability to carry more traffic and support higher throughput.[89]

A1.11 We recognise that we are proposing to make spectrum available in different ways for ESIMs connecting to GSO and NGSO satellites. In particular, we are only proposing to authorise ESIMs in 12.75-13.25 GHz and 29.1-29.5 GHz where these connect to GSO satellites.

A1.12 While we are in principle keen to see more and efficient sharing between GSO and NGSO services, our current proposals for these frequencies reflects existing international arrangements and the coordination processes in place today.[90] Given that this is a global industry, we currently consider that it is proportionate to align with the global framework. This approach should reflect global usage and installation patterns and would still provide a > 400% increase in spectrum supply for aeronautical ESIMs connecting with NGSOs, and significant additional capacity for maritime use with NGSOs. We set out our rationale for this further in Section 3 (paragraphs 3.40-3.44).

A1.13 We will keep this position under review, including by monitoring any developments in the ITU framework for ESIMs connecting to NGSO satellites in these frequencies. We note that WRC-27 Agenda Item 1.1 is expected to consider the relevant conditions for aeronautical and maritime ESIMs in the Q/V band, and that WRC-31 Resolution 133 invites further study of NGSO ESIM use in 12.75-13.25 GHz. If this work leads to a new international framework for NGSO ESIMs in these frequencies, we would expect to review our own framework and consider updating authorisations accordingly.

[88] The proposed increase in spectrum supply for maritime use available outside of UK territorial waters is much larger, where this can be used in line with international regulations.
[89] Visiting ships and aircraft operating in this way must do so on a non-interference and non-protection basis, and in line with other conditions they are subject to in their jurisdictions of origin.
[90] In developing our proposal, we have also considered the potential additional complexity of developing further coordination measures for other existing UK services.

Impact on ship and aircraft operators

A1.14 We also anticipate that our proposals would have a beneficial impact on UK registered ship and aircraft operators.[91] This is because we are proposing to make extra spectrum available that could support services from a range of satellite providers.

A1.15 We envisage these services could provide benefits to passengers (e.g. onboard connectivity and entertainment) which might improve the commercial offering UK registered ships and aircraft can provide. We also envisage that such extra connectivity could have benefits for crew welfare, as well as provide additional resilience and connectivity options for craft as they move about the world. We have provided examples of some of the services which could be further supported by this extra spectrum in Section 2 (paragraphs 2.16-2.18).

A1.16 Our approach also ensures that UK based companies would be able to receive access to this spectrum under licence, and not risk being at a competitive disadvantage compared with overseas ships and aircraft, including those visiting which may access these frequencies under WT Act on a non-interference, non-protection basis.

A1.17 While we have considered if we could go further to permit additional use on ships closer to the UK (by altering the separation distance required by the ITU framework in more frequencies), we currently think this could present an unjustified risk to incumbent users delivering important services. We explain this view further in Section 3 (in particular paragraph 3.27). We are still proposing steps to increase spectrum supply closer to the UK where possible, by waiving this separation requirement in 224 MHz of spectrum where fixed links are not present. Our approach would therefore provide extra capacity in UK waters, while making more spectrum use possible further out to sea.

A1.18 We consider that our proposals have minimal scope to have negative impacts on ship and aircraft operators. Whilst we are proposing new licence conditions, we are doing this to make available new frequencies in a minimally disruptive or burdensome way. Operators who do not wish to use these frequencies would not need to do so. We are also proposing that the additional requirements to abide by specific WRC Resolutions are only set out in the ESN licences. We consider this appropriately reflects the greater responsibility and expertise of a satellite network operator in meeting these technical conditions, and so our proposed approach would minimise burdens on ship and aircraft operators.

Impact on other spectrum users

A1.19 We have considered the potential impact on incumbent users in the Ku and Ka bands, with respect to our proposals to extend the authorisation for aeronautical and maritime ESIMs, and to implement the ITU framework and relevant conditions.

A1.20 As outlined in paragraphs 2.27 and 3.14, terrestrial fixed links are allocated on a co-primary basis with Fixed-Satellite Service (FSS) in the Ku band. We do not envisage there will be any adverse impacts on Fixed-Service (FS) (or other FSS services) if we proceed with our proposal to adopt the ITU framework for co-existence. The conditions set by the ITU are designed to ensure other services are protected from aeronautical and maritime ESIMs.

A1.21 Paragraphs 2.31 – 2.33 and 3.20 outline the current use of the Ka band for FSS and Spectrum Access Licences, which are predominantly used for fixed links. We set out in

[91] Note that we expect that benefits would also apply to foreign registered ships and aircraft, which we have accounted for when discussing the satellite operators who would provide services to them in the UK.

paragraphs 3.20 – 3.22 our analysis of how the ITU framework supports co-existence in the UK context.

A1.22 We are also proposing to include compliance with the relevant ITU conditions in our ESN licence terms, to help ensure that incumbent services are protected. This provides us with options to enforce the co-existence measures our proposal is based on. Because an ESN license is used to licence a satellite terminal network in the UK, our initial view is that this should be sufficient to secure the protection of other UK-based services, without duplicating conditions across several licences.

Impact on citizens and consumers

A1.23 As set out in paragraph 2.15, additional spectrum for aeronautical and maritime ESIMs could offer a number of benefits to UK consumers. This could include helping to meet growing demand for in-flight and on-ship connectivity, as identified in paragraphs 2.16–2.18. Businesses will have the opportunity to access greater satellite capacity for their aircraft and vessels, supporting more traffic and allowing consumers to remain connected, regardless of location.

A1.24 As mentioned in paragraph 2.16, bringing the UK authorisation framework in line with the ITU framework would promote international harmonisation for aeronautical and maritime ESIM services, allowing for simpler and smoother operations for businesses when moving in and out of UK waters and airspace. Our proposals would also ensure that customers of businesses registered in the UK are not at a disadvantage when travelling outside of the UK (as licensed ships and aircraft will be permitted to use these frequencies more widely).[92]

Impact on economic growth

A1.25 As discussed in paragraphs 2.18 and 3.7, extending the authorisation for ESIMs could encourage innovation and competition in the satellite sector. As set out in Section 2, there have been a number of recent industry announcements of partnerships with a number of airline and passenger cruise operators. Extending the authorisation for this service could encourage further investment and growth in satellite broadband for both the aviation and maritime sectors.

Alternative Approaches

A1.26 We set out in Section 3 (paragraphs 3.33-3.48) our analysis of the potential to adopt alternative frameworks for ESIMs (including approaches based on ECC decisions, or more bespoke UK frameworks, in particular for NGSO use in 12.75-13.25 GHz).

A1.27 We explained that, given the international nature of these services, it seems most proportionate to adopt an internationally established framework that should enable smooth operations across more of the globe. We also noted that we would expect to review our approach to ESIMs connecting with NGSO satellites when this is revisited by WRC-31 (as envisaged by WRC Resolution 133 (WRC-23)).

Land terminals and Drones

A1.28 Our proposals in this document focus on expanding spectrum access for maritime and aeronautical uses. Although we recognise that other ESIM uses (e.g. land terminals and drones) could be considered, we have not proposed this for the reasons set out below.

[92] Subject to compliance with any further conditions set out by local administrations.

Land Terminals

A1.29 In the Ka band we have already made more spectrum available for land terminals as part of our 2025 decision to increase access to the 27.5 – 30 GHz band. In Ku band, our approach reflects the current international framework and the co-existence environment in the UK. We consider that the uncoordinated use of land terminals in 12.75-13.25 GHz could raise significant co-existence challenges given the preponderance of Fixed Links, and the potentially minimal geographic separation there would be between services (compared with aeronautical and maritime uses).

Drones (UAV licence)

A1.30 In December 2022 we confirmed our decision to introduce a licence for Unmanned Aircraft Systems (UAS), more commonly referred to as drones. This licence already permits use of GSO ESIMs on drones in parts of the Ku and Ka bands. We noted in paragraph 3.47 that the ITU framework we are proposing to adopt did not focus on drone-based scenarios, which could raise extra co-existence issues (e.g. with fixed links).

A1.31 Given this, and given the spectrum options already made available, we currently consider it appropriate not to consult on extending the authorisation for new ESIMs to include drones at this time. However, we will be consulting on updating our spectrum authorisation framework for drones this summer, as part of our wider approach to understanding and meeting the spectrum needs of that sector.

Equality impact assessment

A1.32 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.

A1.33 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). 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:

a) the vulnerability of children and of others whose circumstances appear to us to put them in need of special protection;

b) the needs of persons with disabilities, older persons and persons on low incomes; and

c) the different interests of persons in the different parts of the UK, of the different ethnic communities within the UK and of persons living in rural and in urban areas.

A1.34 We do not consider that our proposals will affect any specific groups of persons (including persons that share protected characteristics under the 2010 Act or the 1998 Act) differently to the general population. This is because they apply to increased spectrum access above and around the whole of the UK (as well as permitting use outside of the UK on a non-protection basis and in line with requirements of a visited jurisdiction).

A1.35 While some spectrum users that would co-exist with these proposed ESIM authorisations do provide particular benefits to rural communities (e.g. Fixed Links supporting rural connectivity), our approach is intended to safeguard co-existence with these services.

A1.36 To support accessibility, Ofcom's policy is that we can provide information in a variety of formats on request, e.g. accessible PDF, large print, easy read, audio recording or braille, to support access for a wide range of potential users. If you let us know what information you require and in what format, we will consider the request and respond within 21 days.

Welsh language

A1.37 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).

A1.38 We do not consider our decisions would have any impact on opportunities for persons to use the Welsh language or treat the Welsh language less favourably than the English language. We also do not think there are ways in which our decisions could be formulated to have, or increase, a positive impact, or, not have adverse effects or decrease any adverse effects. This is because our proposal relates to spectrum access around and above the whole of the UK.

A2. Draft Satellite Earth Station Network (ESN) licence

Wireless Telegraphy Act 2006

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)[93].

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:

[93] 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.

c) transmit within one or more of the following frequency ranges: 14.0-14.5 GHz, 27.5-**27.9405 GHz** ~~27.8185 GHz~~, 28.4545-**28.9485 GHz** ~~28.8265 GHz~~ and 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: **12.75-13.25 GHz,** 14.0-14.47 GHz, ~~27.5-27.8185, 28.4545-28.8265, 29.4625-30.0 GHz~~ **27.5-30 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;

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-**27.9405 GHz** ~~*27.8185*~~, 28.4545-**28.9485 GHz** ~~28.8265~~ and 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~~ **one or more of the following frequency ranges**: 14.0-14.47 GHz, **27.5-29.1 GHz, 29.5-30.0 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. **The Licensee shall ensure that the establishment and use of the Licensed Radio Equipment is in accordance with the technical provisions for operation (excluding requirements which apply exclusively to the notifying administration) set out in the World Radiocommunication Conference ("WRC") Resolutions[94] below:**

i. **In the frequency band 12.75 - 13.25 GHz, where the Licensee operates an aeronautical ESIM (Earth Station In Motion) with a geostationary satellite orbit network, the Licensee shall comply with the technical provisions contained in WRC-23 Resolution 121, as in force in March 2026.**

ii. **In the frequency bands 27.5 - 29.1 GHz and 29.5 - 30 GHz, where the Licensee operates an aeronautical or maritime ESIM with a non-geostationary satellite orbit network, the Licensee shall comply with the technical provisions of WRC-23 Resolution 123, as in force in March 2026.**

iii. **In the frequency band 27.5 - 29.5 GHz, where the Licensee operates an aeronautical or maritime ESIM with a geostationary satellite orbit network, the Licensee shall comply with the technical provisions of WRC-19 Resolution 169, as in force in March 2026.**

iv. **In the frequency band 29.5 - 30 GHz, where the Licensee operates an aeronautical or maritime ESIM with a geostationary satellite orbit network, the Licensee shall comply with the technical provisions of WRC-23 Resolution 156, as in force in March 2026.**

3.9. **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 below[95]:

- 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.

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

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

[94] https://www.itu.int/hub/publication/r-reg-rr-2024/

[95] 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.

- 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 emissions[96]. For non-geostationary orbit systems this includes the suppression of satellite transmissions in the channel immediately adjacent to 10.7 GHz or taking other measures[97].

3.11. 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.

3.12. 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~~ **3.11.v** does not release licensees from this obligation.

4. Apparatus

3.13. 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

[96] 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.

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

c) The apparatus used for transmission complies with the Radio Equipment ~~Directive~~ **Regulations 2017** 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, **for land stations in all frequencies permitted in this Licence, and aeronautical and maritime stations in 14.0-14.5 GHz**, 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**, for land stations in all frequencies permitted in this Licence and, aeronautical and maritime stations in 14.0-14.5 GHz**, 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))~~ **the Radio Equipment Regulations 2017, as amended by the Product Safety and Metrology etc. (Amendment etc.) (EU Exit) Regulations 2019.**

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>

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/Non-Geostationary>	<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)~~ **n) and o)** 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 **in the first instance; recourse to the CAA shall be made as an alternative where necessary**.

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 Aldergrove	Belfast International Airport	BT29 4AB	028 9448 4281	NI	315195	380283	Duty Air Traffic Engineer
Belfast City	Belfast City Airport	BT3 9JH	028 9045 4871	NI	337483	376510	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

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
Heathrow	**Heathrow Airport**	**TW2 2GW**	**08700 000123**	**UK**	**507435**	**175916**	**tbc**
Humberside	Humberside Airport	DN39 6YH	01652 682022	UK	509295	409914	Air Traffic Manager
Inverness	Inverness Airport	IV2 7JB	01667 464293	UK	277380	851836	ATC Inverness
Isle of Man	Isle of Man Airport	IM9 2AS	01624 821600	UK	228463	468452	Senior Air Traffic Engineer
Jersey	Jersey Airport	JE1 1BW	01534 492226	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	UK	422418	441129	Duty Air Traffic Engineer
Liverpool	Liverpool Airport Plc	L24 1YD	0151 288 4300	UK	343507	382196	Senior Air Traffic Controller
London City	London City Airport	E16 2PX	020 7646 0205	UK	542674	180487	Duty Air Traffic Engineer
London Gatwick	London (Gatwick) Airport	RH6 0NP	01293 601060	UK	526676	140318	Duty Air Traffic Engineer
London Luton	London Luton Airport	LU2 9LY	01582 395029	UK	512422	220804	Duty Air Traffic Engineer
London Stansted	London Stansted Airport	CM24 1QW	01279 669316	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

Aerodrome name	Address	Postcode	Telephone	UK/CI/NI	Easting	Northing	Aerodrome POC
Northolt	RAF Northolt	HA4 6NG	020 8833 8228	UK	509755	184987	Air Traffic Supervisor
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 0NG	01720 422677	UK	92020	10300	Senior Air Traffic Controller
Shoreham	Shoreham Airport	BN4 5FJ	01273 467377	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

A3. Draft Aircraft Radio licence

making communications work for everyone

WIRELESS TELEGRAPHY ACT 2006

Aircraft Radio Licence

Licensee Details and Validity

Product name	Aircraft
Licence number	*[Licence number]*
Aircraft Reg	*[Aircraft Reg]*
Aircraft Make	*[Aircraft Make]*
Aircraft Model	*[Aircraft Model]*
MMSI	*[MMSI Number]*
Date of Issue	*[Date of issue]*
Licence start date	*[Licence start date]*
Payment Interval	*[Payment Interval (does not apply for short term use)]*
Expiry Date	*[Expiry date (applies for short term use only)]*
Licensee Name	*[Licensee name]*
Licensee address	*[Address field 1]* *[Address field 2]* *[Postcode field]* *[Region]*

1. This Licence is issued by the Office of Communications ("Ofcom") 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 *[Licensee 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) (together called "the Radio Equipment") subject to the terms set out below and subject to the terms of the Wireless Telegraphy Licence Conditions Booklet OfW 597.

3. The schedules (and any subsequent schedule(s) Ofcom may issue as a variation to this Licence at a later date) as well as the Wireless Telegraphy Licence Conditions Booklet OfW 597 are incorporated into and form part of this Licence.

Issued by the Office of Communications (Ofcom)

Schedule 1

Radio Equipment

1. In this Licence, the Radio Equipment means the following equipment:

Generic description of equipment:

1	2 GHz CGC operating between 1980 to 2185 MHz
2	Air traffic control (ATC) transponder operating on 1030 and 1090 MHz
3	Airborne radar operating between 13250 to 13400 MHz
4	Area navigation (NAV)/distance measuring equipment (DME) operating between 960 to 1215 MHz
5	Automatic direction finding (ADF) operating between 0.255 to 0.526 MHz
6	Distance measuring equipment (DME) operating between 960 to 1215 MHz
7	Emergency locator transmitter operating on 121.5 and 406 MHz
8	Emergency radio equipment operating on 123.1 and 121.6 MHz
9	Emergency services network equipment operating between 800 to 2100 MHz
10	~~ESOMP~~**ESIM** operating between ~~17300~~**10700** to 30000 MHz
11	Global positioning systems (GPS) operating between 1227.6 to 1575.42 MHz
12	High frequency communications operating between 2.85 to 22 MHz
13	Maritime radio equipment/SAR aircraft MMSI operating between 0.415 to 9500 MHz
14	Marker beacons operating between 74.8 to 75.2 MHz
15	Mobile communications on aircraft operating between 925 to 2170 MHz
16	Radio altimeter operating between 4200 to 4400 MHz and 15400 to 15700 MHz
17	Satellite communication operating between 1525 to 1660.5 MHz
18	TCAS/ACAS operating on 1030 and 1090 MHz
19	UHF radio equipment operating between 453.0125 to 462.4875 MHz
20	VHF communication operating between 117.975 to 137 MHz
21	VHF navigation / Marker operating between 108 to 117.575 MHz
22	VHF portable operating between 117.975 to 137 MHz
23	WAS/WiFi operating between 2412 to 14500 MHz
24	Weather radar operating between 5350 to 5460 MHz and 9300 to 9500 MHz

Use of Radio Equipment

2. The Radio Equipment may only be used in accordance with Condition 4 of the Wireless Telegraphy Conditions Booklet OfW 597 and the terms and conditions set out below and in any subsequent schedules.

3. The Radio Equipment may only be used as follows:

   (a) by a person who holds (or is under the direct supervision of a person who holds) a valid Flight Radio Telephony Operator Licence issued by the Civil Aviation Authority ('CAA') or equivalent licence issued by a national aviation authority, unless such a requirement has been exempted under the Air Navigation Order 2016, as amended, or equivalent legislation that applies in the Isle of Man, Guernsey or Jersey; or

(b) in the event of an emergency where there is a risk to life, by any person to summon assistance.

Schedule 2

Additional Terms and Conditions for Specific Equipment (blank if not applicable)

ATC transponder

G.1 For the ATC Transponder the provisions in the Licence requiring a person who uses the Radio Equipment to hold (or be under the direct supervision of a person who holds) a Flight Radio Telephony Operator Licence do not apply, insofar as they relate to the use of the Transponder, as long as the person has no control over the operation of the Transponder, other than to switch it on and off.

G.2 An ATC Transponder must:

(a) conform to the Radio Equipment Regulations 2017; or

(b) have the appropriate approval, granted by (or on behalf of) the CAA or the European Aviation Safety Agency.

2 GHz CGC - Satellite-facing terminals and complementary ground component-facing terminals forming part of a 2 GHz mobile satellite service

A.1 For the Satellite-facing terminals and Complementary Ground Component (CGC)-facing terminals ("the 2 GHz CGC Equipment"), the following terms and conditions shall also apply:

(a) The 2 GHz CGC Equipment shall be operated on a 'non-interference non-protected' basis: that is, the use of the 2 GHz CGC Equipment shall not cause harmful interference to and shall not claim protection against harmful interference from any other radio communication service operating in accordance with Article 5 of the Radio Regulations, wherever that other service may be operating;

(b) When the aircraft is on the ground and stationary the 2 GHz CGC Equipment may transmit at the limits set out in Clauses A2(a)(ii) and A2(b)(ii), below, provided the duration is restricted to the time necessary to test the 2 GHz CGC Equipment on board the aircraft;

(c) The Licensee must operate the 2 GHz CGC Equipment only within the frequency bands identified below:

(d) The Licensee is authorised to install and use the 2 GHz CGC Equipment in or over:

i. The UK, the UK's territorial seas, the Bailiwick of Jersey, the Bailiwick of Guernsey or the Isle of Man; and

ii. Any Member State of the European Union as defined in the Interpretation Act 1978.

(e) When the aircraft is in or over an administration other than the UK, the Channel Islands or the Isle of Man, the 2 GHz CGC Equipment shall be used in accordance with the relevant regulations and authorisations of that administration;

(f) Identification signals or other means shall be used to allow transmissions of the 2 GHz CGC Equipment to be identified;

(g) The Licensee is only authorised to operate the 2 GHz CGC Equipment to connect with a satellite or CGCs operated by Inmarsat Ventures Limited forming part of a 2GHz Mobile Satellite System.

A.2 The 2 GHz CGC Equipment shall comply with the essential requirements of the Radio Equipment Regulations 2017 and with the following maximum transmit power / power density conditions, when transmitting within the 1980 to 1995 MHz band:

(a) when transmitting to a satellite:

i. 45 dBm / 200 kHz e.i.r.p. is permitted when the aircraft is operating at altitudes of 1000 metres and above;

ii. 24 dBm / 200 kHz e.i.r.p. is permitted when the aircraft is operating at an altitude below 1000 metres;

(b) when transmitting to one or more CGCs:

i. 40 dBm e.i.r.p is permitted when the aircraft is operating at altitudes of 1000 metres and above; or

ii. 24 dBm e.i.r.p. is permitted when the aircraft is operating at altitudes below 1000 metres.

Interpretation

(a) All technical terms, unless the contrary intention appears, shall have the meaning assigned to them in the Radio Regulations;

(b) "associated facilities" and "electronic communications network" have the meaning given to them by section 32 of the Communications Act 2003(b);

(c) "CGCs" of mobile satellite systems (MSS) shall mean ground-based stations used at fixed locations, in order to improve the availability of MSS in geographical areas within the footprint of the system's satellite(s), where communications with one or more space stations cannot be ensured with the required quality. This is the definition used in Article 2 of Decision No 626/2008/EC of the European Parliament and of the Council of 30 June 2008 on the selection and authorisation of systems providing mobile satellite services (MSS);

(d) "CGC-facing terminal" means a mobile earth station installed on an aircraft which communicates with one or more CGCs forming part of a Mobile Satellite System;

(e) "dBm" means decibels of power referenced to one milliwatt;

(f) "e.i.r.p." means equivalent isotropic radiated power;

(g) "Inmarsat Ventures limited" means Inmarsat Ventures Limited, a company incorporated in England and Wales with number 03674573, whose registered office is situated at 99 City Road, London, EC1Y 1AX;

(h) "kHz" means kilohertz;

(i) "Mobile Satellite Systems" shall mean electronic communications networks and associated facilities capable of providing radio-communications services between a mobile earth station and one or more space stations, or between mobile earth stations by means of one or more space stations, or between a mobile earth

station and one or more complementary ground components used at fixed locations. Such a system shall include at least one space station. This is the definition used in Article 2 of Decision No 626/2008/EC of the European Parliament and of the Council of 30 June 2008 on the selection and authorisation of systems providing mobile satellite services (MSS);

(j) "MHz" means megahertz;

(k) "Radio Regulations" means the Radio Regulations made from time to time under Article 13 of the Constitution of the International Telecommunication Union;

(l) "Satellite-facing terminal" means a mobile earth station installed on an aircraft which communicates with one or more satellites forming part of a Mobile Satellite System.

Emergency locator transmitter

H.1 When operating on the emergency frequency (121.5 MHz) the equipment may operate 25 kHz channel spacing on these frequencies.

Emergency radio equipment

I.1 When operating on the auxiliary frequency for search and rescue operations (123.1 MHz) or the airport fire service frequency (121.6 MHz), the equipment may operate 25 kHz channel spacing on these frequencies.

Emergency radio equipment

E.1 For the Emergency Services Network Equipment, the following terms and conditions shall also apply:

(a) The Licensee may install and use Emergency Services Network ('ESN') radio equipment and Mobile SIM card aggregator equipment in the aircraft.

(b) The following definitions will apply:

i. "Mobile SIM card aggregator equipment" means a radio device that combines data streams by more than one mobile network to provide connection and increased data capacity; and

ii. "Emergency Services Network radio equipment" and "ESN radio equipment" mean the dedicated radio device used by public safety bodies for voice and data communications over the Emergency Services Network (ESN).

(c) The Mobile SIM card aggregator equipment and the ESN radio equipment may only be used:

i. when installed in an aircraft engaged in activities related to public safety;

ii. on the following frequencies:

837-842 MHz	1934.9-1944.9 MHz
842-852 MHz	1944.9-1959.7 MHz
852-862 MHz	1959.7-1979.7 MHz
1710.1-1715.9 MHz	880.1-885.1 MHz
1715.9-1721.7 MHz	890.1-902.5 MHz
1736.7-1781.7 MHz	885.1-890.1 MHz
	902.5-914.9 MHz

~~ESOMP~~ESIM - Installation and use of ~~Satellite~~ Earth Station(s) ~~on mobile platforms ("ESOMPs)~~ In Motion ("ESIMs") on board an aircraft

B.1 For the Earth Station(s) ~~on Mobile Platforms ("ESOMPS")~~ **In Motion ("ESIMs")** on board an aircraft for the purpose of providing wireless telegraphy links between the ~~ESOMP~~ ESIM and Satellite(s) (together the "~~ESOMP~~**ESIM** Equipment"), the following terms and conditions shall also apply:

(a) The ~~ESOMP~~ **ESIM** Equipment shall be operated on a 'non-interference non-protected' basis: that is, the use of the ~~ESOMP~~ **ESIM** Equipment shall not cause harmful interference to and shall not claim protection against harmful interference from any other radio communication service operating in accordance with Article 5 of the Radio Regulations, wherever that other service may be operating;

(b) Within the airspace of the UK, the Bailiwick of Jersey, the Bailiwick of Guernsey or the Isle of Man, the Licensee may operate the ~~ESOMP~~ **ESIM** Equipment only in the frequency bands identified below:

i. ~~27.5 - 27.8185 GHz, 28.4545 - 28.8265 GHz and 29.4625 - 30 GHz~~ **12.75 - 13.25 GHz and 27.5 - 30 GHz** for transmission **to geostationary satellites** (Earth-to-space)**;**

ii. 27.5 - 29.1 GHz and 29.5 - 30 GHz for transmission to non-geostationary satellites (Earth-to-space); and

iii. **10.70 - 10.95, 11.20 - 11.45 GHz and** 17.3 - 20.2 GHz for reception (space-to-Earth).

(c) Beyond the airspace of the UK, the Channel Islands and the Isle of Man, the Licensee may operate the ~~ESOMP~~ **ESIM** Equipment ~~in any part of the frequency band 27.5 - 30 GHz~~ **only in the frequency bands identified below:**

i. 12.75 - 13.25 GHz, and 27.5 – 30 GHz for transmission to geostationary satellites (Earth-to-space); and

ii. 27.5 – 29.1 GHz and 29.5 – 30 GHz for transmission to non-geostationary satellites (Earth-to-space).

(d) Within the airspace of an administration other than the UK, the Channel Islands or the Isle of Man, the ~~ESOMP~~ **ESIM** Equipment shall be used in accordance with the relevant regulations and authorisations of that administration;

(e) Means shall be used to allow transmissions of the ~~ESOMP~~ **ESIM** Equipment to be identified;

(f) The operation of the ~~ESOMP~~ **ESIM** Equipment shall comply with the essential requirements of the Radio Equipment Regulations 2017 and with the technical and operational criteria contained within the UK Interface Requirement 2093;

(g) The ~~ESOMP~~ **ESIM** Equipment must comply with (and be maintained in accordance with) the relevant performance specification(s) published by the operator(s) of the Satellite(s).

Interpretation

(a) "Earth Station" means a station for transmitting and receiving wireless telegraphy intended for communication with one or more satellites;

(b) "Radio Regulations" means the Radio Regulations made from time to time under Article 13 of the Constitution of the International Telecommunication Union;

(c) "UK Interface Requirement IR 2093" means the UK Interface Requirement 2093 - Earth Stations ~~on Moving Platforms (ESOMPs)~~ **In Motion (ESIMs)** published by Ofcom;

(d) all technical terms, unless the contrary intention appears, shall have the meaning assigned to them in the Radio Regulations;

(e) any reference in the Licence to ~~"Earth Station On Mobile Platforms" or "ESOMP"~~ **"Earth Station In Motion" or "ESIM"** shall be interpreted to include ~~"Earth Station In Motion" or "ESIM"~~ **"Earth Station On Mobile Platforms" or "ESOMP",** respectively, as appropriate.

Note - (these notes do not form part of the authorisation)

(a) This authorisation does not affect the requirement, where necessary, to obtain licences or authorisations under other legislation or from other countries prior to the installation or operation of an ~~ESOMP~~ **ESIM**, notably outside the territory of the UK, the Channel Islands and the Isle of Man. The Licensee is encouraged to seek its own independent professional advice in this respect.

(b) **Any operation of the ESIM Equipment in or over (or for the time being in or over) the United Kingdom or any of the Crown Dependencies (including, in each case in or over their territorial seas) should be in conjunction with a satellite operator authorised under a "Satellite (Earth Station Network) Licence".**

Mobile communications on aircraft

D.1 For the Mobile Communications on Aircraft (aircraft base transceiver station (aircraft BTS) and network control unit (NCU) (together, "the MCA Equipment")), as described in the Table 1, the terms and conditions below shall also apply:

Table 1

Type	Frequency	System
GSM 1800	1710-1785 MHz (uplink) 1805-1880 MHz (Downlink)	GSM complying with the GSM Standards as published by ETSI, in particular EN 301 502, EN 301 511 and EN 302 480, or equivalent specifications.
UMTS 2100 (FDD)	1920-1980 MHz (uplink) 2110-2170 MHz (Downlink)	UMTS complying with the UMTS Standards as published by ETSI, in particular EN 301 908-1, EN 301 908-2, EN 301 908-3 and EN 301 908-11 or equivalent specifications.
LTE 1800 (FDD)	1710-1785 MHz (uplink) 1805-1880 MHz (Downlink)	LTE complying with LTE Standards, as published by ETSI, in particular EN 301 908-1, EN 301 908-13, EN 301 908-14, and EN 301 908-15, or equivalent specifications.

(a) The relevant network must only be used for mobile communication services on aircraft;

(b) The relevant network shall be operated on a 'non-interference, non-protected' basis;

(c) The relevant network shall only be switched on when the aircraft is 3000 metres or more above the ground;

(d) The aircraft BTS shall only operate in the frequency bands listed in Table 1 of this condition;

(e) The aircraft BTS shall ensure that all apparatus connecting to the aircraft BTS complies with the operational requirements as specified in Regulation 5 of The Wireless Telegraphy (Mobile Communication Services on Aircraft) (Exemption) Regulations 2017. The operational requirements are:

i. the aircraft BTS, while in operation, shall limit the transmission power of all GSM apparatus to a nominal value of 0 dBm/200 kHz at all stages of communication, including initial access;

ii. the aircraft BTS, while in operation, shall limit the transmission power of all LTE apparatus in the 1800 MHz band to a nominal value of 5 dBm/5 MHz at all stages of communication; or

iii. the aircraft BTS, while in operation, shall limit the transmission power of all UMTS apparatus in the 2100 MHz band to a nominal value of -6 dBm/3.84 MHz at all stages of communication and the maximum number of users does not exceed 20; or

iv. where the e.i.r.p outside the aircraft emanating from the apparatus transmitting in the frequency bands specified in Table 2 below does not, at each of the heights above ground specified in Column 1 of that Table, exceed the value specified in each of Columns 2, 3 or 4 of that Table.

(f) Apparatus receiving within the frequency bands 925 - 960 MHz and 2110 - 2170 MHz shall be prevented from attempting to register to networks on the ground either:

i. by the deployment of an NCU, which raises the noise floor inside the cabin; or
ii. by sufficient fuselage shielding to further attenuate the signal entering and leaving the fuselage.

(g) The relevant network shall operate such that the total e.i.r.p of the network control unit outside the aircraft for the frequency band 925-960 MHz does not, at each height above ground specified in Column 1 of Table 3 below, exceed the value specified in Column 2 of that Table;

(h) The relevant network shall operate such that the total e.i.r.p of the aircraft BTS outside the aircraft for the frequency band 1805-1880 MHz does not, at each height above ground specified in Column 1 of Table 3 below, exceed the value specified in Column 3 of that Table;

(i) The relevant network shall operate such that the total e.i.r.p of the network control unit and the aircraft BTS outside the aircraft for the frequency band 2110-2170 MHz does not, at each height above ground specified in Column 1 of Table 3 below, exceed the value specified in Column 4 of that Table;

(j) Where the NCU operates in a frequency band listed in the heading of Columns 2 to 5 of Table 4, below, the relevant network shall operate such that the total e.i.r.p outside the aircraft does not, at each height above the ground specified in Column 1 of that Table and at each of those frequency bands, exceed the value specified in Columns 2 to 5 of that Table;

(k) The relevant network shall comply with the ETSI Standards listed in Table 1 above.

Ofcom may also permit the use of equivalent standards. If such standards become available, Ofcom will amend this provision to make reference to them;

(l) Operation of the relevant network within the territory of administrations other than the UK, Isle of Man, Guernsey or Jersey, or their respective territorial sea, or radio equipment on board an aircraft registered within the territory of administrations other than the UK, Isle of Man, Guernsey or Jersey, is subject to the regulations and authorisations of those administrations.

Table 2

Height above ground (in metres)	Maximum e.i.r.p, defined outside the aircraft, resulting from the GSM apparatus in dBM/channel	Maximum e.i.r.p, defined outside the aircraft, resulting from the LTE apparatus in dBM/channel	Maximum e.i.r.p, defined outside the aircraft, resulting from the UMTS apparatus in dBM/channel
	1800 MHz	1800 MHz	2100 MHz
3000	-3.3	1.7	3.1
4000	-1.1	3.9	5.6
5000	0.5	5	7
6000	1.8	5	7
7000	2.9	5	7
8000	3.8	5	7

Table 3

Height above ground (in metres)	Maximum e.i.r.p, of the network control unit outside the aircraft for the frequency band 925-960 MHz, (in dBm per 3.84 MHz	Maximum e.i.r.p, of the aircraft BTS outside the aircraft for the frequency band 1805-1880 MHz (in dBM per 200 KHz)	Maximum e.i.r.p, of the network control unit and the aircraft BTS outside the aircraft for the frequency band 2110-2170 MHz, (in dBM per 3.84 MHz)
3000	-6.2	-13	1.0
4000	-3.7	-10.5	3.5
5000	-1.7	-8.5	5.4
6000	-0.1	-6.9	7.0
7000	1.2	-5.6	8.3
8000	2.3	-4.4	9.5

Table 4

Height above ground (in metres)	Maximum e.i.r.p, of the network control unit outside the aircraft BTS outside the aircraft for the frequency band 460-470 MHz, (in dBm per 1.25 MHz	Maximum e.i.r.p, of the network control unit and the aircraft BTS outside the aircraft for the frequency band 791-821 MHz, (in dBm per 10 MHz)	Maximum e.i.r.p, of the network control unit and the aircraft BTS outside the aircraft for the frequency band 1805-1880 MHz, (in dBm per 200 KHz)	Maximum e.i.r.p, of the network control unit and the aircraft BTS outside the aircraft for the frequency band 2570-2690 MHz, (in dBM per 4.75 MHz)
3000	-17	-0.87	-13	1.9
4000	-14.5	1.63	-10.5	4.4
5000	-12.6	3.57	-8.5	6.3
6000	-11	5.15	-6.9	7.9
7000	-9.6	6.49	-5.6	9.3
8000	-8.5	7.65	-4.4	10.4

Interpretation

(a) "aircraft BTS" means a base transceiver station located in an aircraft;

(b) "apparatus" means wireless telegraphy apparatus;

(c) "dBm" means decibels of power referenced to one milliWatt;

(d) "e.i.r.p" means equivalent isotropic radiated power;

(e) "ETSI" means the European Telecommunications Standards Institute;

(f) "GSM apparatus" means apparatus used for an electronic communications network that complies with standards developed for the Global System for Mobile Communications (also known as GSM) referred to in regulation 5(2)(a) of the The Wireless Telegraphy (Mobile Communication Services on Aircraft) (Exemption) Regulations 2017;

(g) "kHz" means kilohertz;

(h) "LTE apparatus" means apparatus used for an electronic communications network that complies with standards developed for Long Term Evolution (also known as LTE) referred to in regulation 5(2)(c) of the The Wireless Telegraphy (Mobile Communication Services on Aircraft) (Exemption) Regulations 2017;

(i) "MHz" means megahertz;

(j) "mobile communication services on aircraft" means electronic communications services provided by an undertaking to enable airline passengers to use public electronic communications networks during flight without establishing direct connections with electronic communications networks based on land;

(k) "network control unit" or "NCU" mean equipment located in an aircraft that ensures that signals transmitted by ground based mobile electronic communication systems are not detectable within the

cabin by raising the noise floor inside the cabin in mobile communication receive bands;

(l) "public electronic communications network" has the meaning given to it by section 151(1) of the Communications Act 2003;

(m) "relevant network" means an electronic communications network that includes an aircraft BTS and a network control unit;

(n) "signal" has the meaning given to it by section 32(10) of the Communications Act 2003;

(o) "the 1800 MHz band" means the 1710-1785 MHz frequency band (for the uplink from the apparatus to the aircraft BTS) and the 1805-1880 MHz frequency band (for the downlink from the aircraft BTS to the apparatus);

(p) "the 2100 MHz band" means the 1920-1980 MHz frequency band (for the uplink from the apparatus to the aircraft BTS) and the 2110-2170 MHz frequency band (for the downlink from the aircraft BTS to the apparatus); and

(q) "UMTS apparatus" means apparatus used for an electronic communications network that complies with standards developed for Universal Mobile Telecommunications System (also known as UMTS) referred to in regulation 5(2)(b) of the The Wireless Telegraphy (Mobile Communication Services on Aircraft) (Exemption) Regulations 2017.

Maritime radio equipment and SAR aircraft MMSI

F.1 For the Maritime radio equipment/SAR aircraft MMSI, the following terms and conditions shall also apply:

(a) Subject to the terms and conditions below, the Licensee may:

i. install and use maritime radio apparatus operating in the frequency bands in Table 1 below;

ii. identify the aircraft with the MMSI at the top of the Licence.

(b) The MMSI must not be used to identify any other station.

(c) Any use of the MMSI to identify the aircraft must be in accordance with applicable provisions of the GMDSS or the AIS.

(d) If the MMSI is used to identify the aircraft for the purposes of an automatic identification system as provided for by ITU Recommendation ITU-R M.1371 (as amended from time to time), it must be used in accordance with applicable provisions of that Recommendation.

(e) Anyone who operates the radio equipment on a maritime frequency must hold or be under the supervision of a person who holds, a recognised maritime radio operator certificate for the GMDSS.

Table 1

Frequencies or bands	Terms and conditions of use
415 KHz to 535 KHz	Use of these maritime frequencies must be in accordance of applicable provisions of the GMDSS
1,605 KHz to 4,000 KHz	
4,000 KHz to 27,500 KHz	
156 MHz to 174 MHz	International maritime channels only. Use must be in accordance with applicable provisions of the GMDSS
156.000 MHz to 160.600 MHz	Use must be as directed by the Maritime Coastguard Agency.
1,654.5 MHz to 1,646.5 MHz	Satellite EPIRB operation
9,200 MHz to 9,500 MHz	Use is for SARTs
1,626.5 MHz to 1,660.5 MHz	Use is for mobile satellite
1,525 MHz to 1,559 MHz	Use is for mobile satellite receive frequencies
9,300 MHz to 9,500 MHz	Use is for radar or radar target enhancer
2,900 MHz to 3,100 MHz	
138.700 MHz	For use when 123.1 MHz is unavailable
282.800 MHz	For use as combined scene of search and rescue
243.000 MHz	
418.6125 MHz to 419.6125 MHz	Use must be as directed by the Maritime Coastguard Agency.
408.6125 MHz to 409.6125 MHz	

Interpretation

(a) “maritime radio apparatus” means either

i. radio apparatus approved for use by way of the Merchant Shipping (Marine Equipment) Regulations 2016 (as amended); or

ii. radio apparatus that operates in conformity with an Interface Requirement applicable to maritime radio equipment and published by Ofcom.

(b) "MMSI" means a Maritime Mobile Service Identity (MMSI) and is a unique nine-digit number for identifying aircraft;

(c) "GMDSS" means The Global Maritime Distress and Safety System (GMDSS). It is a maritime communications system used for passing both routine and safety, urgency and distress messages to and from vessels;

(d) "AIS" means Automatic identification systems (AIS). AIS is a communications system using four worldwide channels in the VHF maritime mobile band, for the exchange of navigation data.

WAS/WiFi – installation and use of a satellite earth station and wireless access points on board the aircraft

C.1 For the Wireless Access Point equipment and Satellite Earth Station on Aircraft, as described in Table 1 below (together, “the WAS/WiFi Equipment”), the terms and conditions below shall also apply:

Table 1

	Equipment description	Frequency Range	
		From	To
1	Wireless Access Point	2412 MHz	2472 MHz
2	Wireless Access Point	2457 MHz	2472 MHz
3	Wireless Access Point	5150 MHz	5350 MHz
4	Wireless Access Point	5470 MHz	5730 MHz
5	Wireless Access Point	5725 MHz	5850 MHz
6	Wireless Access Point	5925 MHz	6425 MHz
7	Satellite Earth Station on Aircraft	14 GHz	14.5 GHz

C.2 In relation to the use of the Wireless Access Point apparatus, described in rows 1 to 6 of Table 1 ("the Wireless Access Point apparatus") above:

(a) The Licence does not authorise the use of the Wireless Access Point apparatus described in rows 1 and 6 of Table 1 above when the Aircraft is in or over (or for the time being in or over) the United Kingdom or any of the Crown Dependencies (including, in each case, their territorial seas). Such use must be in accordance with applicable exemption regulations;

(b) The use of the Wireless Access Point apparatus, described in rows 1 to 6 of Table 1 above must be in conformity with applicable provisions of Interface Requirement IR 2030, published by Ofcom;

C.3 In relation to the use of the Satellite Earth Station **(referred to elsewhere as an ESIM or Earth Station In Motion)**, described in row 7 of the table above ("the Satellite Earth Station"), the following shall apply:

(a) When the Aircraft is in or over (or for the time being in or over) the United Kingdom or any of the Crown Dependencies (including, in each case their territorial seas) the Satellite Earth Station may be used only if authorised to do so under a "Satellite (Earth Station Network) Licence" issued to the operator of the earth station network;

(b) The Satellite Earth Station may transmit with an e.i.r.p. no greater than 55 dBW;

(c) If operating to a geostationary satellite, the Satellite Earth Station must employ a stabilised platform and must maintain a pointing accuracy +/− 0.2 degrees towards the relevant geostationary satellite throughout transmissions;

(d) At angles greater than or equal to 2.5 degrees from the antenna main beam axis, the e.i.r.p. of the Satellite Earth Station, if operating to a geostationary satellite, shall not exceed 20 dBW/40 kHz;

(e) All transmissions from the Satellite Earth Station must be clearly identifiable;

(f) The Satellite Earth Station must at all times operate such that it conforms to Interface Requirement IR 2077, published by Ofcom;

(g) The Satellite Earth Station shall meet the conditions given in footnotes 5.504B, 5.504C, 5.508A and 5.509A of the Radio Regulations so as not to cause harmful interference to terrestrial fixed and radio astronomy stations.

C.4 The following conditions apply to all of the WAS/WiFi Equipment:

(a) When in or over (or for the time being in or over) a country other than the United Kingdom or any of the Crown Dependencies, the WAS/WiFi Equipment may be used only as permitted or directed by the authorities in that country;

(b) The Licensee may not claim protection from interference caused to any of the WAS/WiFi Equipment by any authorised use of radio;

(c) The WAS/WiFi Equipment must at all times be operated such that it does not cause harmful interference to other authorised uses of radio anywhere in the world. For the avoidance of doubt, this includes other authorised uses of radio on the surface of the

Earth, in the air or in space;

(d) If the Licensee or the captain of the Aircraft (or the person for the time being in charge of the Aircraft) becomes aware that the operation of the WAS/WiFi Equipment is causing harmful interference to any other authorised use of radio, he must switch the WAS/WiFi Equipment off or take such other measures as may be necessary to cause the harmful interference to cease;

(e) The Licensee or the captain of the Aircraft (or the person for the time being in charge of the aircraft) must cause the operation of the WAS/WiFi Equipment to be modified or restricted or closed down permanently or temporarily if, in the reasonable opinion of a person authorised by Ofcom it is causing or contributing to harmful interference to any other authorised use of radio.

Interpretation

(a) "the WAS/WiFi Equipment" means all of the equipment listed in Table 1 above;

(b) "the Aircraft" means the aircraft bearing the Aircraft Registration at the top of the Licence;

(c) "the Licence" means this Aircraft Radio Licence; and

(d) "the Station" means the aircraft station of the Aircraft and any apparatus for wireless telegraphy associated with it.

Note (these notes do not form part of the authorisation)

(a) In or over the UK or Crown Dependencies the WAS/WiFi Equipment must be used under and in accordance with the terms and conditions of applicable exemption regulations or a "Satellite (Earth Station Network) Licence" (issued by Ofcom to the operator of the earth station network), as may apply. It is the responsibility of the operator or the captain of the aircraft to ensure that the WAS/WiFi Equipment is properly authorised.

A4. Draft Ship radio licence terms and conditions

Schedule 3 – Special channels and radio equipment

MMSIs for certain devices

1. Where a device in column 1 of the table, below, is used under the Licence, it must be identified with an MMSI in the format in column 2.

Type of device	Format of MMSI
Hand-held DSC transceiver	2359nnnnn
AIS-SART	970XXYYYY
MOB-DSC or MOB-AIS	972XXYYYY
EPIRB-AIS	974XXYYYY

Notes to the table

(i) MMSIs for hand-held DSC transceivers will in the future changed to a new format

(ii) Where they each occur in column 2, 'XX' indicates a code that identifies the manufacturer of the device and 'YYYY' is a unique number assigned by the manufacture to the individual device.

(iii) An MMSI for an AIS-SART, MOB-DSC, MOB-AIS or EPIRB-AIS is not supplied by Ofcom but by the manufacturer, who will programme it into the device.

'Channel 31' equipment

2. Where apparatus is used on the duplex channel operating on ship transmit frequency 157.55 MHz c/w 162.15 MHz ("Channel 31" and "Channel 31 equipment"), the following conditions apply.

(a) Channel 31 equipment may be used only under a Ship Radio Licence and not a Ship Portable Radio Licence.

(b) Channel 31 equipment is to be used on a 'No-Interference No-Protected' basis. Use of this channel must not cause harmful interference to and may not claim protection from, other authorised use of radio.

(c) Channel 31 equipment may not be used unless the vessel is farther than 30 nautical miles from the low water line along the Coast of the United Kingdom, Channel Islands or the Isle of Man.

(d) Channel 31 equipment must in all other respects comply with Schedule 1 Paragraph 9 of the Licence.

(e) If used on vessels covered by the Safety of Life at Sea Convention, Channel 31 equipment must comply with IEC 60945, published in August 2002 by the International Electrotechnical Commission, the relevant requirements of which for the purposes of the Licence are Clause 4.5.1 as relevant to Clause 9 (Interference - Electromagnetic Compatibility), Clause 4.5.2 as relevant to Clause 11.1 (Acoustic noise and signals), and Clause 4.5.3 as relevant to Clause 11.2 (Compass safe distance); and

(f) Use of Channel 31 equipment within the territorial waters of administrations other than the United Kingdom, Channel Islands or the Isle of Man is subject to applicable regulations and authorisations of those administrations.

(g) Insofar as it applies in this Licence to the installation and use of Channel 31 equipment, "IEC 60945" means the Fourth Edition published in August 2002 of the International Electrotechnical Commission Standard – "Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results"

Automatic Transmitter Identification System ('ATIS')

3. Where apparatus is installed or used to operate pursuant to the Regional Arrangement on Radiocommunication Service on Inland Waterways ("ATIS equipment"), the following terms and conditions shall apply.

    (a) ATIS equipment may be used only under a Ship Radio Licence and not a Ship Portable Radio Licence.

    (b) ATIS equipment shall comply with and be used in accordance with the technical and operational criteria detailed in The Regional Arrangement on the Radiocommunication Service on Inland Waterways ("the RAINWAT Arrangement");

    (c) ATIS equipment may be used only on inland waterways in Contracting Administrations to the RAINWAT Arrangement;

    (d) Use of ATIS equipment within the jurisdiction of any administration other than the United Kingdom, Channel Islands or the Isle of Man is subject to regulation of that administration;

    (e) Insofar as it applies in this licence to the installation and use of ATIS equipment, "ATIS equipment" includes any ATIS equipment or facility;

    (f) ATIS equipment must not be used in the United Kingdom, Channel Islands or the Isle of Man (including their territorial seas); and

    (g) ATIS equipment must conform to the essential requirements of the Radio Equipment Regulations 2017 (SI 2017/1206) and Commission Decision 2000/637/EC.

Mobile Communication on board Ships

4. Where a Ship base transceiver station used for supporting mobile communication services on board ships is installed or used, the following terms and conditions shall apply.

    (a) The ship base transceiver station must only operate –

(i) where it forms part of a GSM system, in the 900 MHz band or the 1800 MHz band;

(ii) where it forms part of a LTE system, in the 1800 MHz band or the 2600 MHz band; and

(iii) where it forms part of an UMTS system in the 1900/2100 MHz band

(b) The ship base transceiver must only be used –

(i) for mobile communication services on board ships;

(ii) where it forms part of GSM system or an UMTS system, when the ship is two nautical miles or more from the baseline; and

(iii) where it forms part of a LTE system, when the ship is four nautical miles or more from the baseline.

(c) The ship base transceiver station must control the apparatus so that it operates with a maximum radiated output power which is no greater than –

(i) Where it forms part of a GSM system –

- 5 dBm in the 900 MHz band; and
- 0 dBm in the 1800 MHz band;

(ii) where it forms part of a LTE system, 0 dBm in the 1800 MHz band and in the 2600 MHz band; and

(iii) where it forms part of an UMTS system, 0 dBm for each 5 MHz in the 1900/2100 MHz band.

(d) Where the ship base transceiver station forms part of a GSM system, the ship base transceiver station must comply with the following requirements—

(i) must only use indoor antennas when the ship is between two and twelve nautical miles from the baseline;

(ii) must operate such that there is a maximum power density in external areas of the ship of –80 dBm for each 200 kHz with reference to a 0 dBi measurement antenna gain;

(iii) must mitigate interference using the following techniques or other techniques which provide at least an equivalent mitigation of interference—

- the receiver sensitivity and disconnection threshold (as described in the GSM standards TS 144 018[98] and TS 148 008[99] published by ETSI) of the apparatus is—
- when the ship is between two and three nautical miles from the baseline, equal to or higher than –70 dBm for each 200 kHz; and
- when the ship is between three and twelve nautical miles from the baseline, equal to or higher than –75 dBm for each 200 kHz;
- discontinuous transmission (as described in the GSM standard TS 148 008 published by ETSI) is activated in the uplink from the

[98] ETSI TS 144 018 (version 14.1.0) published on 11 April 2017.
[99] TSI TS 148 008 (version 14.0.0) published on 6 April 2017.

apparatus to the ship base transceiver station; and

- the timing advance (as described in the GSM standard TS 144 018 published by ETSI) is set to the minimum.

(e) Where the ship base transceiver station forms part of a LTE system, the ship base transceiver station must comply with the following requirements—

- must only use indoor antennas when the ship is between four and twelve nautical miles from the baseline; and
- must only use bandwidth which is no greater than 5 MHz (duplex) for each of the 1800 MHz band or the 2600 MHz band;
- must operate such that—
  - its emissions on board the ship's deck must be equal to or less than –98 dBm for each 5 MHz;
  - when the ship is between four and twelve nautical miles from the baseline, the quality criteria are equal to or higher than –83 dBm for each 5 MHz;
  - the selection timer is set to 10 minutes;
  - the timing advance parameter is set according to a cell range for the distributed antenna system that is equal to 400 metres;
  - the user inactivity release timer is set to 2 seconds; and
  - its carrier centre frequency must not be aligned with electronic networks based on land.

(f) Where the ship base transceiver station s forms part of a system, the ship base transceiver station must comply with the following requirements—

(i) must only use indoor antennas when the ship is between two and twelve nautical miles from the baseline;

(ii) must only use bandwidth which is no greater than 5 MHz (duplex);

(iii) must operate such that—

- its emissions on board the ship's deck must be equal to or less than –102 dBm for each 5 MHz;
- when the ship is between two and twelve nautical miles from the baseline, the quality criteria are equal to or higher than –87 dBm for each 5 MHz;
- the selection timer is set to 10 minutes;
- the timing advance parameter is set according to a cell range for the distributed antenna system that is equal to 600 metres;
- the user inactivity release timer is set to 2 seconds; and
- its carrier centre frequency must not be aligned with electronic communications networks based on land.

(g) The ship base transceiver station must not cause or contribute to undue interference to any wireless telegraphy.

5. This authorisation does not affect the requirement, where necessary, to obtain licences or authorisations under other legislation or from other countries prior to the installation or

operation of a ship base transceiver station, in particular outside United Kingdom, Channel Islands or the Isle of Man territorial waters. The Licensee is encouraged to seek its own independent professional advice in this respect.

6. Insofar as it applies in this licence to the installation and use of Mobile Communication on board Ships equipment:

   (a) "**apparatus**" means wireless telegraphy apparatus;

   (b) "**baseline**" means the baseline for measuring the breadth of the territorial waters under the United Nations Convention on the Law of the Sea[100];

   (c) "**dBi**" means decibels of power referenced to the gain of an isotrope antenna;

   (d) "**dBm**" means decibels of power referenced to one milliWatt;

   (e) "**ETSI**" means the European Telecommunications Standards Institute;

   (f) "**GSM system**" means an electronic communications network that complies with the GSM standards EN 301 502[101] and EN 301 511[102] published by ETSI;

   (g) "**kHz**" means kilohertz;

   (h) "**LTE system**" means an electronic communications network that complies with the LTE standards EN 301 908–1[103], EN 301 908–13[104] and EN 301 908–14[105] published by ETSI;

   (i) "**MHz**" means megahertz;

   (j) "**mobile communication services on board ships**" means electronic communications services provided by an undertaking to enable persons on board a ship to communicate via public electronic communications networks using a GSM system, LTE system or UMTS system without establishing direct connections with electronic communications networks based on land;

   (k) "**public electronic communications network**" has the meaning given to it by section 151(1) of the Communications Act 2003[106];

   (l) "**quality criteria**" mean the values broadcast by a ship base transceiver station specifying the minimum required received signal level in the cell (as expressed in dBm) required for access by the apparatus to that cell;

   (m) "**selection timer**" means the values set by a ship base transceiver station relating to the frequency of which the apparatus seeks to establish direct connections with a public network based on land (also known as the Public Land Mobile Network selection timer);

   (n) "**ship base transceiver station**" means a mobile pico-cell located on a ship supporting mobile communication services on board ships;

   (o) "**signal**" has the meaning given to it by section 32(10) of the Communications Act

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[100] Cmnd. 8941
[101] EN 301 502(version 12.5.2) published in OJEU No C149, 12.5.2017, p.13
[102] EN 301 511 (version 9.0.2) published in OJEU No C149, 12.5.2017, p.14
[103] EN 301 908–1 (version 11.1.1) published in OJEU No C149, 12.5.2017, p 15.
[104] EN 301 908–13 (version 11.1.1) published in OJEU No C149, 12.5.2017, p 16.
[105] EN 301 908–14 (version 11.1.2) published in OJEU No C149, 12.5.2017, p 16.
[106] 2003 c.21.

2003;

(p) "**the 900 MHz band**" means the 880–915 MHz frequency band (for the uplink from the apparatus to the ship base transceiver station) and the 925–960 MHz frequency band (for the downlink from the ship base transceiver station to the apparatus);

(q) "**the 1800 MHz band**" means the 1710–1785 MHz frequency band (for the uplink from the apparatus to the ship base transceiver station) and the 1805–1880 MHz frequency band (for the downlink from the ship base transceiver station to the apparatus);

(r) "**the 1900/2100 MHz band**" means the 1920–1980 MHz frequency band (for the uplink from the apparatus to the ship base transceiver station) and the 2110–2170 MHz frequency band (for the downlink from the ship base transceiver station to the apparatus);

(s) "**the 2600 MHz band**" means the 2500–2570 MHz frequency band (for the uplink from the apparatus to the ship base transceiver station) and the 2620–2690 MHz frequency band (for the downlink from the ship base transceiver station to the apparatus);

(t) "**timing advance parameter**" means the values set by a ship base transceiver station relating to the parameter needed to calculate the delay in the conveyance of signals transmitted from the ship base transceiver station to the apparatus;

(u) "**UMTS system**" means an electronic communications network that complies with the UMTS standards EN 301 908–1, EN 301 908–2[107] and EN 301 908–3[108] published by ETSI; and

(v) "**user inactivity release timer**" means the values set by a ship base transceiver station relating to the duration in which it will determine the apparatus as being inactive when no signals are transmitted between the ship base transceiver station and the apparatus (also known as the Radio Resource Control user inactivity release timer).

Earth Stations ~~on Moving Platforms or 'ESOMPs'~~ In Motion or 'ESIMs'

7. Where sending and receiving Earth Station(s) ~~on Mobile Platforms ("ESOMPs")~~ **In Motion ("ESIMs")** for the purpose of providing wireless telegraphy links between the ~~ESOMP~~ **ESIM** and Satellite(s) (together "~~ESOMP~~ **ESIM** Equipment") is installed or used on the Ship to which this licence refers, the following terms and conditions shall apply.

   (a) ~~ESOMP~~ **ESIM** equipment may be used only under a Ship Radio Licence and not a Ship Portable Radio Licence.

   (b) The ~~ESOMP~~ **ESIM** Equipment shall be operated on a 'non-interference non-protected' basis, that is, use of ~~ESOMP~~ **ESIM** equipment must not cause harmful interference to and may not claim protection from, other authorised use of radio

[107] EN 301 908–2 (version 11.1.1) published in OJEU No C149, 12.5.2017, p 15.
[108] EN 301 908–3 (version 11.1.3) published in OJEU No C149, 12.5.2017, p 16.

operating in accordance with Article 5 of the Radio Regulations, wherever that other service may be operating;

(c) Within the territorial seas of the United Kingdom, Channel Islands or the Isle of Man, the licensee may operate ~~ESOMP~~ **ESIM** Equipment only in the frequency bands identified below:

(i) ~~27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30~~ **27.5-27.9405 GHz, 28.4545-28.9485 GHz, and 29.4625-30 GHz** for transmission **to geostationary satellites** (Earth-to-space);

(ii) **27.5-27.9405 GHz, 28.4545-28.9485 and 29.5-30 GHz for transmission to non-geostationary satellites (Earth-to space); and**

(iii) **10.70 - 10.95, 11.20 - 11.45 GHz, and** 17.3 – 20.2 GHz for reception (space-to-Earth).

(d) Outwith the territorial seas of the UK, the Channel Islands and the Isle of Man, the licensee may operate ~~ESOMP~~ **ESIM** Equipment ~~in any part of the frequency band 27.5 – 30 GHz~~ **only in the frequency bands identified below:**

(i) **for transmission to geostationary satellites (Earth-to-space) 12.75 – 13.25 GHz, and 27.5 – 30 GHz; and**

(ii) **for transmission to non-geostationary satellites (Earth-to-space) 27.5 – 29.1 GHz, and 29.5 – 30 GHz.**

(e) **Outwith the territorial seas of the UK, the Channel Islands and the Isle of Man, prior agreement is required from the relevant costal state before the ESIM Equipment may be operated within the following specified distances from the shoreline of that relevant coastal state:**

(i) **158km in the 12.75-13.25 GHz frequency band; and**

(ii) **70km in 27.5-30 GHz frequency band.**

(f) Within the territorial seas of an administration other than the UK, the Channel Islands or the Isle of Man, ~~ESOMP~~ **ESIM** Equipment shall be used in accordance with the relevant regulations and authorisations of that administration;

(g) Means shall be used to allow transmissions of ~~ESOMP~~ **ESIM** Equipment to be identified.

(h) The operation of ~~ESOMP~~ **ESIM** Equipment shall comply with the essential requirements of the Radio Equipment Regulations (SI 2017/1206) and with the technical and operational criteria contained within the UK Interface Requirement 2093.

(i) Insofar as it applies in this licence to the installation and use of ~~ESOMP~~ **ESIM** equipment:

(i) "**Earth Station**" means a station for transmitting and receiving wireless telegraphy intended for communication with one or more satellites;

(ii) "**Radio Regulations**" means the most recent version of the International Telecommunication Union Radio Regulations made under Article 13 of the Constitution of the International Telecommunication Union; and

(iii) "**UK Interface Requirement IR 2093**" means the UK Interface Requirement 2093 – Earth Stations ~~on Mobile Platforms (ESOMPs)~~ **In Motion (ESIMs)** published by Ofcom in accordance with the Radio Equipment ~~Directive~~ **Regulations 2017**.

(j) This does not affect the requirement, where necessary, to obtain licences or authorisations under other legislation or from other countries before installing or operating an ESOMP, in particular outside the territory of the UK, the Channel Islands and the Isle of Man.

Notes

i) **Nothing in this licence removes any other obligations that the Licensee or partner satellite operator may have in relation to satellite filings made under the ITU Radio Regulations. This includes a requirement that operations may only take place within 158km of the shoreline in the frequencies 12.75-13.25 GHz and 70km of the shoreline in 27.5-30 GHz with prior agreement of the relevant coastal state. For the UK, prior agreement is given only to those frequencies listed for operation within the UK territorial waters.**

ii) **Any operation of the ESIM Equipment within the territorial seas of the United Kingdom, Channel Islands or the Isle of Man should be in conjunction with an operator authorised under a "Satellite (Earth Station Network) Licence".**

Earth Station on a Vessel ('ESV')

8. Where sending and receiving Earth Station(s) on board a vessel for the purpose of providing wireless telegraphy links between the ESV and Geostationary Satellite(s) ("ESV equipment") is installed or used on the Ship, the following terms and conditions shall apply.

(a) ESV equipment may be used only under a Ship Radio Licence and not a Ship Portable Radio Licence.

(b) The Licensee must identify all transmission using the ESV terminal identity number

(c) The ESV equipment may operate only on the following frequencies:

(i) ESV (space-to-Earth) operation limited to 10.70 – 11.70 GHz for reception

(ii) ESV (space-to-Earth) operation limited to 12.50 – 12.75 GHz for reception

(d) The ESV equipment must be operated on a "non-Interference Non-Protected" basis. That is, use of the ESV equipment must not cause harmful interference to and may not claim protection from, other authorised use of radio operating in accordance with Article 5 of the Radio Regulations, wherever that other service may be operating;

(e) The ESV equipment must not be operated when the vessel is within one nautical mile of United Kingdom, Channel Islands or the Isle of Man land or within an area listed in Schedule 3 to the Associated ESV Network Operator Licence, without specific permission from both the relevant Maritime Port Authority and Ofcom, except as permitted under Schedule 4 to the Associated ESV Network Operator Licence;

(f) The ESV equipment must comply with the appropriate essential requirements of the Radio Equipment Regulations (SI 2017/1206);

(g) The ESV equipment must comply with IEC 60945, published in August 2002 by the International Electrotechnical Commission, the relevant requirements of which for the purposes of this Licence are:

(i) Clause 4.5.1 as relevant to Clause 9 (Interference - Electromagnetic Compatibility);

(ii) Clause 4.5.2 as relevant to Clause 11.1 (Acoustic noise and signals); and

(iii) Clause 4.5.3 as relevant to Clause 11.2 (Compass safe distance)

(h) The maximum power may not exceed 39 dBW/40 kHz e.i.r.p. (53 dBW e.i.r.p. total per channel) from any individual ESV.

(i) The vessel may transmit a maximum of two 14.0 to 14.25 GHz channels up to a total of 56 dBW e.i.r.p. under this Licence.

(j) Where the ESV equipment is operating between one nautical mile and four nautical miles of United Kingdom, Channel Islands or the Isle of Man land, the minimum elevation angle used by the ESV must exceed 7 degrees

(k) Where the ESV equipment is operating within one nautical mile of United Kingdom, Channel Islands or the Isle of Man land, the minimum elevation angle used by the ESV must exceed 15 degrees.

(l) The ESV equipment must employ a parabolic dish with a minimum diameter of 0.6m.

(m) The antenna must operate in accordance with Recommendation ITU-R S.580-6

(n) The ESV shall employ a stabilised platform with the ability to maintain a pointing accuracy +/- 0.2 degrees towards the geo-stationary satellite throughout transmissions;

(o) Operation of the ESV equipment within the territorial waters of administrations other than the United Kingdom, Channel Islands or the Isle of Man is subject to the relevant regulations and authorisations of those administrations; and

(p) Insofar as it applies in the Licence to the installation and use of ESV equipment:

(i) "**Associated ESV Network Operator Licence**" means the Earth Station/s on Vessel/s (ESV) Network Operator Licence No. ESV Licence No.[e.g. ESV0001] issued by Ofcom to Network operator licensee e.g. Telenor Satellite Network on Date of issue of Network licence [full date] under the Act;

(ii) "**Earth Station**" means a station for transmitting and receiving wireless telegraphy located on the surface of the earth and intended for communication with one or more satellites;

(iii) "**Geostationary Satellite**" means a satellite having the earth as its primary body and which remains approximately in a fixed position relative to the earth;

(iv) "**IEC 60945**" means the Fourth Edition published in August 2002 of the International Electrotechnical Commission Standard – "Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test results";

(v) "**Radio Equipment Regulations**" means Statutory Instrument 2017/1206;

(vi) "**Recommendation ITU-R S. 580-6**" means the Recommendation S.580-6 published in January 2004 by the International Telecommunication Union; and

(vii) "**Radio Regulations"** means the most recent version of the International Telecommunication Union Radio Regulations made under Article 13 of the Constitution of the International Telecommunication Union.

Satellite Earth Station equipment in the Ku band (14–14.5 GHz)

9. In relation to the use of Earth Station equipment ("ES equipment"), **referred to elsewhere as an ESIM or Earth Station In Motion**, installed or used on the Ship to which this licence refers and transmitting on frequencies between 14-14.5 GHz (Earth to space), the following terms and conditions shall apply:

   (a) The ES equipment may be used only under a Ship Radio Licence and not a Ship Portable Radio Licence.

   (b) The ES Equipment shall be operated on a 'non-interference non-protected' basis, that is, use of ES equipment must not cause harmful interference to and may not claim protection from, other authorised use of radio operating in accordance with Article 5 of the Radio Regulations, wherever that other service may be operating;

   (c) When the ship is within the territorial seas of the United Kingdom, Channel Islands or the Isle of Man, the ES equipment may be used only if authorised to do so under a "Satellite (Earth Station Network) Licence" issued to the operator of the earth station network;

   (d) The ES equipment may transmit with an e.i.r.p. no greater than 55 dBW;

   (e) If operating to a geostationary satellite, the ES equipment must employ a stabilised platform and must maintain a pointing accuracy +/− 0.2 degrees towards the relevant geostationary satellite throughout transmissions;

   (f) At angles greater than or equal to 2.5 degrees from the antenna main beam axis, the e.i.r.p. of the ES equipment, if operating to a geostationary satellite, shall not exceed 20 dBW/40 kHz;

   (g) All transmissions from the ES equipment must be clearly identifiable;

   (h) The ES equipment must at all times operate such that it conforms to UK IR 2077;

   (i) Operation of ES equipment within the territorial waters of administrations other than the United Kingdom, Channel Islands or the Isle of Man is subject to the relevant regulations and authorisations of those administrations.

   (j) Insofar as it applies in this licence to the installation and use of ES equipment:

      (i) "**Satellite (Earth Station Network) Licence**" means the licence issued by Ofcom to the satellite network operator under the WT Act;

      (ii) "**Earth Station**" means a station for transmitting and receiving wireless telegraphy located on the surface of the earth and intended for communication with one or more satellites;

(iii) "**Geostationary Satellite**" means a satellite having the earth as its primary body and which remains approximately in a fixed position relative to the earth;

(iv) "**UK IR 2077**" means the UK Interface Requirement 2077 – Satellite Earth Station Networks, published by Ofcom in accordance with the Radio Equipment ~~Directive~~ **Regulations 2017**.

A5. Draft Interface Requirement 2077

UK Interface Requirement 2077

Satellite Earth Station Networks

Contents

Section

1. References

[1]	EN 301 428	Satellite Earth Stations and Systems (SES); Harmonized EN for Very Small Aperture Terminal (VSAT); Transmit-only, transmit/receive or receive-only satellite earth stations operating in the 11/12/14 GHz frequency bands covering essential requirements under article 3.2 of Directive 2014/53/EU
[2]	EN 302 186	Satellite Earth Stations and Systems (SES); Harmonized EN for satellite mobile Aircraft Earth Stations (AESs) operating in the 11/12/14 GHz frequency bands covering essential requirements under article 3.2 of Directive 2014/53/EU
[3]	EN 302 448	Satellite Earth Stations and Systems (SES); Harmonized EN for tracking Earth Stations on Trains (ESTs) operating in the 14/12 GHz frequency bands covering essential requirements under article 3.2 of Directive 2014/53/EU
[4]	EN 302 977	Satellite Earth Stations and Systems (SES); Harmonized EN for Vehicle-Mounted Earth Stations (VMES) operating in the 12/14 GHz frequency bands covering essential requirements under article 3.2 of Directive 2014/53/EU
[5]	EN 301 360	Satellite Earth Stations and Systems (SES); Harmonized EN for Satellite Interactive Terminals (SIT) and Satellite User Terminals (SUT) transmitting towards geostationary satellites in the 27,5 GHz to 29,5 GHz frequency bands covering essential requirements under article 3.2 of Directive 2014/53/EU
[6]	EN 301 459	Satellite Earth Stations and Systems (SES); Harmonized EN for Satellite Interactive Terminals (SIT) and Satellite User Terminals (SUT) transmitting towards satellites in geostationary orbit in the 29,5 GHz to 30,0 GHz frequency bands covering essential requirements under article 3.2 of Directive 2014/53/EU
[7]	EN 301 489-12	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 12: Specific conditions for Very Small Aperture Terminal, Satellite Interactive Earth Stations operated in the frequency ranges between 4 GHz and 30 GHz in the Fixed Satellite Service (FSS)
[8]	EN 300 673	Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for Very Small

		Aperture Terminal (VSAT), Satellite News Gathering (SNG), Satellite Interactive Terminals (SIT) and Satellite User Terminals (SUT) Earth Stations operated in the frequency ranges between 4 GHz and 30 GHz in the Fixed Satellite Service (FSS)
[9]	EN 303 979	Satellite Earth Stations and Systems (SES); Harmonised Standard for Earth Stations on Mobile Platforms (ESOMP) transmitting towards satellites in non-geostationary orbit, operating in the 27,5 GHz to 29,1 GHz and 29,5 GHz to 30,0 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU
[10]	EN 303 980	Satellite Earth Stations and Systems (SES); Harmonised Standard for fixed and in-motion Earth Stations communicating with non-geostationary satellite systems (NEST) in the 11 GHz to 14 GHz frequency bands covering essential requirements of article 3.2 of Directive 2014/53/EU
[11]	**EN 303 978**	**Satellite Earth Stations and Systems (SES); Earth Stations on Mobile Platforms (ESOMP) communicating with satellites in geostationary orbit, operating in the 27,5 GHz to 30,0 GHz and 17,3 GHz to 20,2 GHz frequency bands; Harmonised Standard for access to radio spectrum**

2. Foreword

2.1 The Radio Equipment Regulations 2017 (SI 2017/1206) set out the obligations on economic operators for placing radio equipment on the market. This UK Interface Requirement 2077 contains the requirements for licensing satellite earth station networks in the specified frequency bands.

2.2 It is required by the Wireless Telegraphy Act 2006 that no radio equipment is installed or used in the UK except under the authority of a licence granted by or otherwise exempted by regulations made by Ofcom. It is a condition of such a licence or exemption regulations as appropriate that, in order to be installed or used in the UK, the equipment must meet the minimum requirements specified in this UK Interface Requirement 2077 for the stated equipment types and for the stated frequency bands.

2.3 This UK Interface Requirement 2077 will be revised as necessary, for example to follow:

i) current technology developments for reasons related to the effective and appropriate use of the spectrum in particular maximising spectrum utilisation; and

ii) changes to the available spectrum allocated for satellite earth station networks.

2.4 All UK Interface Requirements are published and made available free of charge from the Ofcom website.

2.5 Further information on this UK Interface Requirement can be obtained from the contacts provided in section 5 of this document.

3. Minimum requirements for operation

3.1 The minimum requirements in this document are made for reasons related to the effective and appropriate use of the radio spectrum, in particular maximising spectrum utilisation.

3.2 This UK Interface Requirement 2077 gives a high level description of how the spectrum is used for satellite earth station networks. It does not prescribe technical interpretation of the 'essential requirements' of the Radio Equipment Regulations 2017.

3.3 This UK Interface Requirement 2077 therefore stipulates the necessary equipment parameters for the licensing of satellite earth station. Tables 3.1 and 3.2 contain the relevant equipment parameters. These together with the 'essential requirements' detailed in Regulation 6 of Radio Equipment Regulations 2017 constitute the minimum equipment requirements for earth station networks.

3.4 The technical parameters specified in this UK Interface Requirement 2077 are applied to achieve the desired level of compatibility within the satellite earth station networks and with other radiocommunications services, whilst promoting enterprise, innovation and competition.

3.5 This UK Interface Requirement 2077 provides the necessary technical information which facilitates access to the satellite earth station networks spectrum by making clear the assumptions that are made in planning the use of the satellite earth station networks spectrum. It is not the intention of this UK Interface Requirement 2077 to duplicate or impose any additional 'essential requirements' of the Radio Equipment Regulations 2017 on products. Any specified parameters within this document are for the purpose of identifying product options and not as a national de facto product requirement.

Table 3.1: Minimum requirements for the use of Satellite Earth Station Networks operating with Geostationary satellites		
Mandatory (1-10)		
1	Radiocommunication Service	Fixed-Satellite Service
2	Application	Satellite Earth Station Network
3	Frequency band	Land ~~and maritime~~ stations: 14.0 – 14.5 GHz[109], 27.5 – ~~27.8185~~ **27.9405** GHz, 28.4545 – ~~28.8265~~ **28.9485** GHz and 29.4625 – 30 GHz[110]. **Maritime stations:** **12.75 – 13.25 GHz[111],** 14.0 – 14.5 GHz[112], ~~27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz[113]~~**27.5 – 30 GHz[114]**. Aeronautical stations: **12.75 – 13.25 GHz[115],** 14.0 – 14.47 GHz, ~~27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz[116]~~**27.5 – 30 GHz[117].**
4	Channeling	n/a
5	Modulation/Occupied bandwidth	n/a
6	Direction/Separation	n/a
7	Transmit power/Power density	e.i.r.p from a single terminal ≤ 55 dBW[118].
8	Channel access and occupation rules	n/a
9	Authorisation regime	Light Licence
10	Additional essential requirements	n/a
Informative (11-14)		

[109] The elevation angle of the terminal shall be higher than 5°
[110] The elevation angle of the terminal shall be higher than 3°. **This requirement applies to the whole Ka-band frequencies, covering 27.5 – 30 GHz.**
[111] **The elevation angle of the terminal shall be higher than 3°**
[112] The elevation angle of the terminal shall be higher than 5°
[113] ~~The elevation angle of the terminal shall be higher than 3°~~
[114] **The elevation angle of the terminal shall be higher than 3°**
[115] **The elevation angle of the terminal shall be higher than 3°**
[116] ~~The elevation angle of the terminal shall be higher than 3°~~
[117] **The elevation angle of the terminal shall be higher than 3°**
[118] Terminals transmitting with e.i.r.p. > 55 dBW require individual clearance by the UK administration and registration of the terminal(s) against the licence

11	Frequency planning assumptions	~~n/a~~ **Use of 10.70 – 10.95 GHz, 11.20 – 11.45 GHz, and 17.3 – 20.2 GHz for reception is unprotected.**
12	Reference	Harmonised Standards EN 301 428 [1]; EN 302 186 [2]; EN 302 448 [3]; EN 302 977 [4]; EN 301 360 [5]; EN 301 459 [6]; EN 301 489-12 [7]; EN 300 673 [8]; **EN 303 978 [11]**
13	Remarks	**Note 1:** Prior to operation of an earth station within the perimeter fence of an aerodrome, permission must be obtained from the relevant aerodrome authority. **Note 2:** For terminals transmitting with e.i.r.p. > 55 dBW, individual clearance is only usually possible when the terminal is located at a fixed location. **Note 3:** In the bands 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz, land stations that transmit with e.i.r.p. ≤ 55 dBW are exempt from licensing (see UK Interface Requirement 2066). **Note 4: In the frequency band 12.75 - 13.25 GHz, where the Licensee operates an aeronautical or maritime ESIM (Earth Station In Motion) with a geostationary satellite orbit network, the Licensee shall comply with the technical provisions for operation (excluding requirements which apply exclusively to the notifying administration) contained in WRC-23 Resolution 121, as in force in March 2026.** **Note 5: In the frequency band 27.5 - 29.5 GHz, where the Licensee operates an aeronautical or maritime ESIM with a geostationary satellite orbit network, the Licensee shall comply with the technical provisions for operation (excluding requirements which apply exclusively to the notifying administration) contained in WRC-19 Resolution 169, as in force in March 2026.**

		Note 6: In the frequency band 29.5 - 30 GHz, where the Licensee operates an aeronautical or maritime ESIM with a geostationary satellite orbit network, the Licensee shall comply with the technical provisions for operation (excluding requirements which apply exclusively to the notifying administration) contained in WRC-23 Resolution 156, as in force in March 2026.
14	Notification Number	2022/7009/XI

Table 3.2: Minimum requirements for the use of Satellite Earth Station Networks operating with Non-geostationary satellites		
Mandatory (1-10)		
1	Radiocommunication Service	Fixed-Satellite Service
2	Application	Satellite Earth Station Network
3	Frequency band	Land ~~and maritime~~ stations : 14.0 – 14.5 GHz[119], 27.5 – ~~27.8185~~ **27.9405** GHz, 28.4545 – ~~28.8265~~ **28.9485** GHz and 29.5 – 30 GHz[120] **Maritime stations:** 14.0 – 14.5 GHz[121], ~~27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.5 – 30 GHz[122]~~ **27.5 – 29.1 GHz and 29.5 – 30 GHz[123]** Aeronautical stations: 14.0 – 14.47 GHz, **27.5 – 29.1 GHz and 29.5 – 30 GHz[124]**
4	Channeling	n/a
5	Modulation/Occupied bandwidth	n/a
6	Direction/Separation	n/a
7	Transmit power/Power density	e.i.r.p from a single terminal ≤ 55 dBW[125]
8	Channel access and occupation rules	n/a
9	Authorisation regime	Light licence
10	Additional essential requirements	n/a
Informative (11-14)		
11	Frequency planning assumptions	~~n/a~~ **Use of 10.70 – 10.95 GHz, 11.20 – 11.45 GHz, and 17.3 – 20.2 GHz for reception is unprotected.**
12	Reference	**Harmonised Standards** EN 303 979 **[9]**; EN 303 980 **[10]**

[119] The elevation angle of the terminal shall be higher than 5°.

[120] The elevation angle of the terminal shall be higher than 3°. **This requirement applies to the whole Ka-band frequencies, covering 27.5 – 30 GHz.**

[121] **The elevation angle of the terminal shall be higher than 5°.**

~~[122] The elevation angle of the terminal shall be higher than 3°~~

[123] **The elevation angle of the terminal shall be higher than 3°. This requirement applies to the whole Ka-band frequencies, covering 27.5 – 30 GHz.**

[124] **The elevation angle of the terminal shall be higher than 3°. This requirement applies to the whole Ka-band frequencies, covering 27.5 – 30 GHz.**

[125] Terminals transmitting with e.i.r.p. > 55 dBW require individual clearance by the UK administration and registration of the terminal(s) against the licence.

13	Remarks	**Note 1**: Prior to operation of an earth station within the perimeter fence of an aerodrome, permission must be obtained from the relevant aerodrome authority. **Note 2:** For terminals transmitting with e.i.r.p. > 55 dBW, individual clearance is only usually possible when the terminal is located at a fixed location. **Note 3:** The earth stations operating with non-geostationary satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations. **Note 4: In the frequency bands 27.5 - 29.1 GHz and 29.5 - 30 GHz, where the Licensee operates an aeronautical or maritime ESIM with a non-geostationary satellite orbit network, the Licensee shall comply with the technical provisions of operation (excluding requirements which apply exclusively to the notifying administration) contained in WRC-23 Resolution 123, as in force in March 2026.**
14	Notification Number	2022/7009/XI

4. Additional performance parameters

(informative)

4.1 None specified

5. Contact details

Ofcom Spectrum Licensing, PO Box 1285 Warrington, WA1 9GL

Tel: 020 7981 3131

Email: spectrum.licensing@ofcom.org.uk

Website: https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences/satellite-earth/earth-stations

6. Document history

Version	Date	Changes
0.1	Jan 2009	Draft Published
1.0	May 2009	Final document published
2.0	July 2010	Transmit power level change
3.0	January 2018	Included Non-Geostationary use
4.0	January 2023	Access to 14-14.5 GHz (up to 14.47 GHz for aeronautical)
4.1	September 2023	Added maritime Non-geostationary use
5.0	**TBC 2026**	**Revised to:** - **add frequency bands, including new Ku-band frequencies for GSO operations with aeronautical and maritime ESIMs, and additional Ka-band frequencies for both GSO and NSGO operations with land, maritime and aeronautical ESIMs** - **replace legacy ECC Decision references with applicable ITU WRC Resolutions for aeronautical and maritime ESIM operations** - **add references to relevant ETSI harmonised standards applicable to the updated frequency bands.**

A6. Draft Interface Requirement 2093

Interface Requirement 2093

Earth Stations in Motion (ESIM)

Contents

Section

1. Foreword

1.1 The Radio Equipment Regulations 2017 (SI 2017/1206) set out the obligations on economic operators for placing radio equipment on the market. This UK Interface Requirement contains the requirements for the authorisation and use of Earth Stations in Motion (ESIMs) in the specified frequency bands.

1.2 It is required by the Wireless Telegraphy Act 2006 that no radio equipment is installed or used in the UK except under the authority of a licence granted by or otherwise exempted by regulations made by Ofcom. It is a condition of such a licence or exemption regulations as appropriate that the equipment must meet the minimum requirements specified in this UK Interface Requirement for the stated equipment types and for the stated frequency bands.

1.3 The requirements given in the main body of this UK Radio Interface Requirement apply to the authorisation of ESIMs.

1.4 This UK Radio Interface Requirement will be revised as necessary, for example to follow:

i) current technology developments for reasons related to the effective and appropriate use of the spectrum in particular maximising spectrum utilisation; and

ii) changes to the available spectrum allocated for ESIMs.

1.5 All UK Radio Interface Requirements will be published and will be made available free of charge from the Ofcom website.

1.6 Further information on this UK Radio Interface Requirement can be obtained from the enquiry contact given at the back of this document.

2. Minimum requirements for operation within the UK

2.1 The minimum requirements in this document are made for reasons related to the effective and appropriate use of the radio spectrum, in particular, maximising spectrum utilisation.

2.2 This UK Radio Interface Requirement gives a high level description of how the spectrum in the UK is used for Earth Stations in Motion (ESIMs). It does not prescribe technical interpretation of the 'essential requirements' of the Radio Equipment Regulations 2017.

2.3 This UK Radio Interface Requirement therefore stipulates the necessary equipment parameters for the authorisation of ESIMs in the UK. Tables 2.1 and 2.2 contain the relevant equipment parameters. These together with the 'essential requirements' detailed in Regulation 6 of Radio Equipment Regulations 2017 constitute the minimum equipment requirements for ESIMs within the UK.

2.4 The technical parameters specified in the UK Radio Interface Requirement are applied to achieve the desired level of compatibility within the spectrum for ESIMs and with other radiocommunications services, whilst promoting enterprise, innovation and competition.

2.5 This UK Radio Interface Requirement provides the necessary technical information which facilitates access to the ESIMs spectrum by making clear the assumptions that are made in planning the use of ESIMs in the UK. It is not the intention of this UK Radio Interface Requirement to duplicate or impose any additional 'essential requirements' of the Radio Equipment Regulations 2017 on products. Any specified parameters within this document are for the purpose of identifying product options and not as a national de facto product requirement.

Table 2.1: Minimum requirements for the use of Earth Stations in Motion (ESIMs) transmitting to satellites in geostationary orbit		
Mandatory (1-11)		
1	Radiocommunication Service	Fixed-Satellite Service
2	Application	Earth Stations in Motion (ESIMs)
3	Frequency band	**Land stations:** 27.5 – ~~27.8185~~ **27.9405** GHz, 28.4545 – ~~28.8265~~ **28.9485** GHz and 29.4625 – 30 GHz for operation in UK territory. 27.5 – 30 GHz for operation outside UK territory. **Maritime and aeronautical stations:** **12.75 – 13.25 GHz, 27.5 – 30.0 GHz**
4	Channelling	-
5	Modulation/Occupied bandwidth	-
6	Direction/Separation	-
7	Transmit power/Power density	e.i.r.p from a single terminal ≤ 55 dBW[126].
8	Channel access and occupation rules	-
9	Authorisation regime	Licence exempt – for land-based ESIMs **compliant with IR2066**. Licensed – for ESIMs mounted on aircraft or ships.
10	Additional essential requirements	Operation with geostationary satellites
Informative (11-15)		
11	Frequency planning assumptions	Use of **10.70 – 10.95 GHz, 11.20 – 11.45 GHz,** and 17.3 – 20.2 GHz for reception is unprotected.
12	Planned changes	-
13	Reference	ETSI EN 303 978**, ETSI EN 302 186**
14	Notification	2022/7008/XI
15	Remarks	**Note 1: For land stations,** unless otherwise agreed through bilateral coordination of satellite networks, the limits on off-axis e.i.r.p. emission density within the band specified in section 4.2.3 of ETSI EN 303 978 may be used to ensure that transmissions from ESIMs protect other satellite networks. ~~**Note 2:** The limitations on power flux density (pfd) contained in ECC Decision (13)01 may be used to ensure that transmissions from aircraft and ship~~

[126] The elevation angle of the antenna shall be higher than 3 degrees.

		~~mounted ESIMs protect terrestrial services, where appropriate.~~ **Note 2: In the frequency band 12.75 - 13.25 GHz, where the Licensee operates an aeronautical or maritime ESIM with a geostationary satellite orbit network, the Licensee shall comply with the technical provisions of operation (excluding requirements which apply exclusively to the notifying administration) contained in WRC-23 Resolution 121, as in force in March 2026.** **Note 3: In the frequency band 27.5 - 29.5 GHz, where the Licensee operates an aeronautical or maritime ESIM with a geostationary satellite orbit network, the Licensee shall comply with the technical provisions of operation (excluding requirements which apply exclusively to the notifying administration) contained in WRC-19 Resolution 169, as in force in March 2026.** **Note 4: In the frequency band 29.5 - 30 GHz, where the Licensee operates an aeronautical or maritime ESIM with a geostationary satellite orbit network, the Licensee shall comply with the technical provisions of operation (excluding requirements which apply exclusively to the notifying administration) contained in WRC-23 Resolution 156, as in force in March 2026.**

Table 2.2: Minimum requirements for the use of Earth Stations in Motion (ESIMs) transmitting to satellites in non-geostationary orbit		
Mandatory (1-11)		
1	Radiocommunication Service	Fixed-Satellite Service
2	Application	Earth Stations in Motion (ESIMs)
3	Frequency band	**Land stations:** 27.5 – ~~27.8185~~ **27.9405** GHz, 28.4545 – ~~28.8265~~ **28.9485** GHz and 29.5 – 30 GHz for operation in UK territory. 27.5 – 29.1 GHz and 29.5 – 30 GHz for operation outside UK territory. **Maritime and aeronautical stations:** **27.5 – 29.1 GHz and 29.5 – 30.0 GHz**
4	Channelling	-
5	Modulation/Occupied bandwidth	-
6	Direction/Separation	-
7	Transmit power/Power density	e.i.r.p from a single terminal ≤ 55 dBW[127]
8	Channel access and occupation rules	-
9	Authorisation regime	Licensed – for land-based, **aircraft** and ship mounted ESIMs.
10	Additional essential requirements	Operation with non-geostationary satellites
Informative (11-15)		
11	Frequency planning assumptions	Use of 17.3 – 20.2 GHz for reception is unprotected.
12	Planned changes	-
13	Reference	ETSI EN 303 979
14	Notification Number	2022/7008/XI
15	Remarks	**Note 1:** The earth stations operating with non-geostationary satellites shall ensure compliance with the equivalent power flux-density limitations specified in Article 22 of the ITU Radio Regulations. ~~**Note 2:** The limitations on power flux density (pfd) contained in ECC Decision (15)04 may be used to ensure that transmissions from ship mounted ESIMs protect terrestrial services, where appropriate.~~

[127] The elevation angle of the antenna shall be higher than 3 degrees.

		Note 2: In the frequency bands 27.5 - 29.1 GHz and 29.5 - 30 GHz, where the Licensee operates an aeronautical or maritime ESIM with a non-geostationary satellite orbit network, the Licensee shall comply with the technical provisions of operation (excluding requirements which apply exclusively to the notifying administration) contained in WRC-23 Resolution 123, as in force in March 2026.

3. Additional performance parameters

(informative)

3.1 None specified

4. References

	Reference	Reference description
[1]	ETSI EN 303 978 V2.1.2	Satellite Earth Stations and Systems (SES); Harmonised Standard for Earth Stations on Mobile Platforms (ESOMP) transmitting towards satellites in geostationary orbit, operating in the 27,5 GHz to 30,0 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU.
[2]	ETSI EN 303 979 V2.1.2	Satellite Earth Stations and Systems (SES); Harmonised Standard for Earth Stations on Mobile Platforms (ESOMP) transmitting towards satellites in non-geostationary orbit, operating in the 27,5 GHz to 29,1 GHz and 29,5 GHz to 30,0 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU.
[3]	ECC Decision (13)01	ECC Decision of 8 March 2013 on the use, free circulation, and exemption from individual licensing of Earth stations on mobile platforms (ESOMPs) in the frequency bands available for use by uncoordinated FSS Earth stations within the ranges 17.3-20.2 GHz and 27.5-30.0 GHz.
[4]	ECC Decision (15)04	ECC Decision of 3 July 2015 on the harmonised use, free circulation and exemption from individual licensing of Land, Maritime and Aeronautical Earth Stations On Mobile Platforms (ESOMPs) operating with NGSO FSS satellite systems in the frequency ranges 17.3-20.2 GHz, 27.5-29.1 GHz and 29.5-30.0 GHz.
[5]	**ETSI EN 302 186 V2.2.1**	**Satellite Earth Stations and Systems (SES); Satellite mobile Aircraft Earth Stations (AESs) operating in the 11/12/14 GHz frequency bands; Harmonised Standard for access to radio spectrum.**

5. Contact details

Ofcom Spectrum Licensing Team

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6. Document history

Version	Date	Changes
0.1	14 August 2013	Draft published
1.0	February 2014	Document published
2.0	January 2018	Includes non-geostationary use Replaced R&TTE Directive 1999/5/EC and Directive 98/34/EC with Radio Equipment Directive (Directive 2014/53/EU) and Directive (EU) 2015/1535 respectively.
2.1	June 2021	Format update
3.0	March 2023	Revised to make licence exemption apply only to ESIM terminals that operate with geostationary satellites.
4.0	**TBC 2026**	**Revised to:** - **add frequency bands, including new Ku-band frequencies for GSO operations with aeronautical and maritime ESIMs, and additional Ka-band frequencies for both GSO and NGSO operations with land, maritime and aeronautical ESIMs** - **replace legacy ECC Decision references with applicable ITU WRC Resolutions for aeronautical and maritime ESIM operations** - **add references to relevant ETSI harmonised standards applicable to the updated frequency bands.**

A7. Responding to this consultation

How to respond

A7.1 Ofcom would like to receive views and comments on the issues raised in this document, by 5pm on 11 August 2026.

A7.2 You can download a response form from here. You can return this by email or post to the address provided in the response form.

A7.3 If your response is a large file, or has supporting charts, tables or other data, please email it to esims@ofcom.org.uk, as an attachment in Microsoft Word format, together with the cover sheet. This email address is for this consultation only and will not be valid after 11 August 2026.

A7.4 We welcome responses in formats other than print, for example an audio recording or a British Sign Language video. To respond in BSL:

- send us a recording of you signing your response. This should be no longer than 5 minutes. Suitable file formats are DVDs, wmv or QuickTime files; or
- upload a video of you signing your response directly to YouTube (or another hosting site) and send us the link.

A7.5 We will publish a transcript of any audio or video responses we receive (unless your response is confidential)

A7.6 We do not need a paper copy of your response as well as an electronic version. We will acknowledge receipt of a response submitted to us by email.

A7.7 You do not have to answer all the questions in the consultation if you do not have a view; a short response on just one point is fine. We also welcome joint responses.

A7.8 It would be helpful if your response could include direct answers to the questions asked in the consultation document. The questions are listed at Annex 10. It would also help if you could explain why you hold your views, and what you think the effect of Ofcom's proposals would be.

A7.9 If you want to discuss the issues and questions raised in this consultation, please contact the team by email at esims@ofcom.org.uk .

Confidentiality

A7.10 Consultations are more effective if we publish the responses before the consultation period closes. This can help people and organisations with limited resources or familiarity with the issues to respond in a more informed way. So, in the interests of transparency and good regulatory practice, and because we believe it is important that everyone who is interested in an issue can see other respondents' views, we usually publish responses on the Ofcom website at regular intervals during and after the consultation period.

A7.11 If you think your response should be kept confidential, please specify which part(s) this applies to and explain why. Please send any confidential sections as a separate annex. If

you want your name, address, other contact details or job title to remain confidential, please provide them only in the cover sheet, so that we don't have to edit your response.

A7.12 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and try to respect it. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.

A7.13 To fulfil our pre-disclosure duty, we may share a copy of your response with the relevant government department before we publish it on our website.

A7.14 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's intellectual property rights are explained further in our Terms of Use.

Next steps

A7.15 Following this consultation period, Ofcom plans to publish a statement in Q3 2026/27

A7.16 If you wish, you can register to receive mail updates alerting you to new Ofcom publications.

Ofcom's consultation processes

A7.17 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex 8.

A7.18 If you have any comments or suggestions on how we manage our consultations, please email us at consult@ofcom.org.uk. We particularly welcome ideas on how Ofcom could more effectively seek the views of groups or individuals, such as small businesses and residential consumers, who are less likely to give their opinions through a formal consultation.

A7.19 If you would like to discuss these issues, or Ofcom's consultation processes more generally, please contact the corporation secretary:

Corporation Secretary
Ofcom
Riverside House
2a Southwark Bridge Road
London SE1 9HA
Email: corporationsecretary@ofcom.org.uk

A8. Ofcom's consultation principles

Ofcom has seven principles that it follows for every public written consultation:

Before the consultation

1. Wherever possible, we will hold informal talks with people and organisations before announcing a big consultation, to find out whether we are thinking along the right lines. If we do not have enough time to do this, we will hold an open meeting to explain our proposals, shortly after announcing the consultation.

During the consultation

2. We will be clear about whom we are consulting, why, on what questions and for how long.
3. We will make the consultation document as short and simple as possible, with an overview of no more than two pages. We will try to make it as easy as possible for people to give us a written response.
4. When setting the length of the consultation period, we will consider the nature of our proposals and their potential impact. We will always make clear the closing date for responses.
5. A person within Ofcom will be in charge of making sure we follow our own guidelines and aim to reach the largest possible number of people and organisations who may be interested in the outcome of our decisions. Ofcom's Consultation Champion is the main person to contact if you have views on the way we run our consultations.
6. If we are not able to follow any of these principles, we will explain why.

After the consultation

7. We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish the responses on our website at regular intervals during and after the consultation period. After the consultation we will make our decisions and publish a statement explaining what we are going to do, and why, showing how respondents' views helped to shape these decisions.

A9. Consultation coversheet

Basic details

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

Confidentiality

Please tick below what part of your response you consider is confidential, giving your reasons why

- Nothing ☐
- Name/contact details/job title ☐
- Whole response ☐
- Organisation ☐
- Part of the response ☐

If you selected 'Part of the response', please specify which parts:

If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

Yes ☐ No ☐

Declaration

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom aims to publish responses at regular intervals during and after the consultation period. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name Signed (if hard copy)

A10. Consultation questions

Please tell us how you came across this consultation.

- ☐ Email from Ofcom
- ☐ Saw it on social media
- ☐ Found it on Ofcom's website
- ☐ Found it on another website
- ☐ Heard about it on TV or radio
- ☐ Read about it in a newspaper or magazine
- ☐ Heard about it at an event
- ☐ Somebody told me or shared it with me
- ☐ Other (please specify)

Question 1: Do you agree with our proposal to make spectrum available for aeronautical and maritime ESIMs connecting with GSO satellites in 12.75-13.25 GHz, in line with the ITU framework?

Question 2: Do you agree with our proposal to make additional spectrum available for aeronautical and maritime ESIMs connecting with GSO and NGSO satellites in Ka band (authorisations across 27.5-30 GHz), in line with the ITU framework?

Question 3: Do you agree with our proposed technical conditions for ensuring co-existence?

Question 4: Do you agree with our proposed amendments to the Earth Station Network, Aircraft radio, and Ship radio licence products to extend the authorisation for aeronautical and maritime ESIMs connecting to GSO and NGSO satellites?

Question 5: Do you agree with our proposal to reflect these changes in the relevant Interface Requirements?

Question 6: Do you have any other comments on our overall approach to authorising ESIMs in these frequencies, and implementing this in our licensing framework?