Statement on the Authorisation of Earth Stations on Mobile Platforms

Statement

Publication date: 20 January 2014

Contents

Section 1

Summary

1.1 In August 2013 Ofcom published a consultation[1] setting out proposals to authorise the use of Earth Stations on Mobile Platforms (ESOMPs). In this Statement, we summarise the responses to our consultation and set out our decisions to authorise the use of radio equipment for ESOMPs operating in the frequency bands:

- 27.5 – 27.8185 GHz (transmit);
- 28.4545 – 28.8265 GHz (transmit);
- 29.4625 – 30 GHz (transmit);
- 17.3 – 20.2 GHz (receive).

1.2 Respondents to the consultation expressed a range of views, but on balance they gave broad support to our key proposals. Having considered the responses, we have concluded that we will authorise the use of ESOMPs in the UK, the Channel Islands and the Isle of Man by implementing a regulatory approach that is broadly in line with the proposals set out in the consultation. Consequently we will:

- Exempt land-based ESOMPs from the need to have a Wireless Telegraphy Act 2006 ('WT Act') licence;
- Make licensing available for aircraft- and ship-mounted ESOMPs by accepting applications to vary Aircraft and Ship Radio licences respectively, with no additional fee[2].

1.3 Based on the responses received, we have decided to modify some of the technical and regulatory conditions upon which land-based, aircraft-mounted and ship-mounted ESOMPs are authorised. These changes, which are reflected in the updated draft Interface Requirement shown in Annex 2, can be summarised as follows:

- To clarify that the authorisation framework applies to ESOMPs that operate to satellites in geostationary-satellite orbit (GSO);
- Removal of the requirement to obtain prior permission for the operation of an ESOMP terminal within an airfield; and
- To make reference to off-axis equivalent isotropically radiated power (e.i.r.p.) limits within the informative part of the draft Interface Requirement.

1.4 We expect to be able to accept applications to license ship-mounted ESOMPs by February 2014. We are working with the CAA (who issues WT Act licences for Aircraft on Ofcom's behalf) to make licensing for aircraft-mounted ESOMPs available in a similar timeframe. Lastly, we intend to publish a notice of proposals to make

[1] http://stakeholders.ofcom.org.uk/consultations/earth-stations-mobile-platforms
[2] Charging no fees is in line with current practice for Notice of Variation (NoV) to the Aircraft and Ship Radio licences.

regulations to implement our decision to exempt land-based ESOMPs from the need to have a WT Act licence in 2014. We expect the regulations covering the exemption from licensing for land-based ESOMPs to be in force by the summer of 2014.

Section 2

Introduction

2.1 On 15 August 2013 we published a consultation setting out proposals to authorise the use of Earth Stations on Mobile Platforms (ESOMPs) transmitting in the frequency bands 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz and receiving in the frequency band 17.3 – 20.2 GHz.

2.2 This Statement summarises the responses to that consultation and sets out our decision to proceed with the authorisation of ESOMPs in the UK and Crown Dependencies[3].

ESOMPs

2.3 ESOMPs are used to provide broadband backhaul links to moving vehicles such as aircraft, ships and trains. An ESOMP is a satellite earth station mounted on a moving vehicle, which uses the radio spectrum to provide connectivity via communication satellites that operate in the fixed-satellite service (FSS)[4]. When the ESOMP mounted on a moving vehicle is combined with on-board access technology, it will allow consumers who are travelling to have broadband connectivity over wide territories where alternative means of connectivity is limited.

2.4 Recent advances in stabilised antenna technology have allowed the development of earth station antennas capable of maintaining very stable pointing accuracy which allows the antenna to track the satellite in earth orbit even when the earth station is mounted on a rapidly moving platform. Recent work within Europe has led to the development of a harmonised equipment standard[5] and Decision[6] on the use and free circulation of ESOMPs.

2.5 Although other types of technology are already used to provide connectivity to aircraft, ships and land vehicles, the relatively large amount of spectrum that we have considered making available to ESOMPs means they would have the ability to provide links with higher capacity. Allowing their use would therefore help to satisfy the increasing demand from consumers to have higher-speed connections while on the move.

2.6 Several satellite operators have already launched or are planning to launch satellites in the 28 and 18 GHz bands (uplink and downlink bands respectively) to provide global broadband communications to users on land, at sea and in the air. ESOMPs represent a potentially valuable innovation and the development of a new market for mobile communications which will benefit UK citizens and consumers.

International regulatory context

2.7 In 2011, the European Conference of Postal and Telecommunications Administrations (CEPT) initiated work on the development of a European technical and regulatory framework for ESOMPs. Following the conclusion of this work, the

[3] The British Crown Dependencies are the Isle of Man, Jersey and Guernsey.
[4] The fixed-satellite service (FSS) is a type of radio service defined in Radio Regulations 1.21.
[5] ETSI EN 303 978
[6] ECC Decision (13)01

CEPT Electronic Communications Committee (ECC) published ECC Report 184[7] and ECC Decision (13)01[8] in March 2013. The Decision covers the harmonised use and free circulation of ESOMPs and sets out the technical requirements and limitations which should be observed to ensure that ESOMPs do not cause interference to other radio services. The material contained in the ECC Decision is based on the studies contained in ECC Report 184.

2.8 In parallel to the CEPT work, the European Telecommunications Standards Institute (ETSI) developed the harmonised standard ETSI EN 303 978 on ESOMPs, published in February 2013.

2.9 Ofcom, representing the UK, played a significant role in the CEPT work in view of the benefit of having a common framework across Europe given the international environment that certain types of ESOMPs operate in. We feel that mutual recognition between Member States will facilitate the free movement of aircraft and ship mounted ESOMPs in Europe. We consider that the technical criteria specified in ECC Decision (13)01 provide an appropriate basis for authorising ESOMPs in the UK and this is what our technical authorisation framework is based on.

2.10 Because it is desirable for the CEPT work on ESOMPs to apply more widely, Ofcom is also supporting work within the International Telecommunication Union (ITU) to develop globally recognised requirements for their authorisation.

Our consultation

2.11 In our August 2013 consultation, we set out specific proposals for authorising the use of aircraft-mounted, ship-mounted and land-based ESOMPs that operate in frequency bands at around 28 GHz (for transmit) and 18 GHz (for receive). The proposals we made in the consultation can be summarised as follows:

- Radio equipment for land-based ESOMPs should be exempted from the need to have a Wireless Telegraphy Act 2006 licence;
- Radio equipment for aircraft- and ship-mounted ESOMPs should be licensed under the Wireless Telegraphy Act 2006;
- Licensing of aircraft-mounted ESOMPs should be done through variation of the Aircraft Radio licence issued on Ofcom's behalf by the Civil Aviation Authority (CAA) with no additional fee;
- Licensing of ship-mounted ESOMPs, administered by Ofcom, should be done through variation of the Ship Radio licence with no additional fee.

Legal framework

2.12 The applicable legal framework derives from our duties under both European and domestic legislation, specifically from:

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7 http://www.erodocdb.dk/doks/filedownload.aspx?fileid=3956&fileurl=http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP184.PDF

8 http://www.erodocdb.dk/doks/filedownload.aspx?fileid=3962&fileurl=http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC1301.PDF

- the Common Regulatory Framework for electronic communications networks and services, in particular, the Framework Directive and the Authorisation Directive; and

- the Communications Act 2003 (the "Communications Act") and the WT Act which transpose the provisions of those directives into national law.

Our general duties

2.13 Section 3(1) of the Communications Act provides that our principal duties in carrying out our functions are:

- 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.

2.14 In carrying out these duties, we are required, among other things, to secure a number of objectives such as the desirability of promoting competition, investment and innovation[9]. Ofcom is also required to have regard to the principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed[10].

2.15 Section 4 of the Communications Act requires Ofcom to act in accordance with the six Community requirements, which give effect to the requirements of Article 8 of the Framework Directive.

Our spectrum duties

2.16 In carrying out our general duties, we are required under the Communications Act to secure, in particular, the optimal use of the electromagnetic spectrum for wireless telegraphy[11], and to have regard to the different needs and interests of all persons who may wish to make use of the spectrum for wireless telegraphy[12].

2.17 In addition, in carrying out our spectrum functions under section 3(1) of the WT Act, we are required to have regard in particular to:

- the extent to which the electromagnetic spectrum is available for use, or further use, for wireless telegraphy;

- the demand for use of the spectrum for wireless telegraphy; and

- the demand that is likely to arise in future for the use of spectrum for wireless telegraphy.

2.18 Section 3(2) of the WT Act provides that Ofcom must also have regard to the desirability of promoting the efficient management and use of the spectrum for wireless telegraphy, the economic and other benefits that may arise from the use of

[9] Sections 3(4)(b) and (d) Communications Act 2003
[10] Section 3(3) Communications Act 2003
[11] Section 3(2)(a) Communications Act 2003
[12] Section 3(4)(f) Communications Act 2003

wireless telegraphy, and the development of innovative services and competition in the provision of electronic communications services.

Wireless telegraphy licences and licence exemption regulations

2.19 Under section 8(1) of the WT Act, it is an offence to establish, install or use wireless telegraphy ('WT') equipment in the UK except where such use is authorised either by the issue of an appropriate wireless telegraphy licence or where the use of such equipment is exempted from the need to hold such a licence by regulations made under section 8(3) of the WT Act. Section 8(4) of the WT Act requires that Ofcom must make regulations to exempt the use of WT equipment if the conditions in section 8(5) of the WT Act are met, including that the use of the equipment is not likely to involve undue interference. By way of section 119 of the WT Act, the requirement for Ofcom's authorisation extends to the use of radio apparatus on UK-registered ships and aircraft.

2.20 We aim wherever possible to reduce the regulatory burden upon our stakeholders (in this instance users of radio spectrum) and one way we can do this is, when appropriate, to exempt from licensing the use of specified equipment which is unlikely to cause undue interference to other legitimate users of the radio spectrum.

2.21 Whether the radio equipment is licensed or licence-exempt, UK regulations will normally refer to an Interface Requirement ('IR') which sets out the appropriate technical operational conformity requirements. The IR normally includes a cross-reference to any appropriate ETSI standard.

2.22 Section 9 of the WT Act gives us the power to grant wireless telegraphy licences subject to such terms as we think fit. Schedule 1(6) of the WT Act gives Ofcom a general discretion to vary wireless telegraphy licences and sets out the process that Ofcom must follow. In the case where a variation is proposed by the licensee, we are under no obligation (under the WT Act) to consult on the proposal.

Radio and Telecommunications Terminal Equipment

2.23 Most radio equipment must be compliant with the Radio and Telecommunications Terminal Equipment (R&TTE) Directive (Directive 99/5/EC) to reduce the risk of harmful interference. The R&TTE Directive has been implemented into UK law by the Radio Equipment and Telecommunications Terminal Equipment Regulations 2000 (SI 2000/730) as amended. Compliance with the relevant ETSI harmonised standard (where there is one which has been endorsed as a 'harmonised standard' by the European Commission[13]) presumes that the equipment conforms with the essential requirements of the R&TTE Directive and the use of these standards has proved a popular method for manufacturers and suppliers to ensure compliance.

2.24 Interface requirements (IRs) for radio equipment provide a link between the requirements of the R&TTE Directive and the use of national radio spectrum. UK IRs describe the minimum technical specifications, such as power limits and frequency bands, which are necessary to avoid interference between services.

[13] See http://ec.europa.eu/enterprise/policies/european-standards/harmonised-standards/rtte/index_en.htm

Structure of this document

2.25 The remainder of this document is structured as follows:

- Section 3 – Summary of the responses to our consultation together with Ofcom's assessment
- Section 4 – Summary of Ofcom's decision
- Annex 1 – List of respondents
- Annex 2 – Revised draft Interface Requirement

Section 3

Review of Responses

Overview

3.1 In our August 2013 consultation, we asked four questions in relation to our proposals for authorising radio equipment for ESOMPs:

- *Question 1) Do you agree that Ofcom should authorise the use of ESOMPs in the UK in the frequency bands 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz?*
- *Question 2) Do you agree with Ofcom's proposal to exempt from licensing the establishment, installation and use of land-based ESOMP equipment that transmits in the frequency bands 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz?*
- *Question 3) Do you agree that ESOMP equipment mounted on aircraft or ships should be licensed to transmit in the frequency bands 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz using the existing Notice of Variation process?*
- *Question 4) Do you agree with the proposed technical provisions given in the Draft Interface Requirement and Draft NoVs?*

3.2 We received 16 responses to the consultation from a variety of stakeholders including, but not limited to: satellite operators, service providers, trade associations, equipment manufacturers and technology companies. One of the responses we received was submitted to us on a confidential basis. The 15 non-confidential responses can be found on our website[14] and the names of those respondents are listed in Annex 1 of this document.

3.3 Overall, there was broad support for authorising the use of ESOMPs in the proposed frequency bands. Given the nature of the responses to the consultation and the range of issues raised, our consideration of them is set out in the following sub-sections:

- Principle of allowing the use of ESOMPs
- Type of satellite (GSO or NGSO)
- Protection of other satellites
- e.i.r.p. limit and airport clearance
- Use of additional bands
- Licensed or licence-exempt

[14] http://stakeholders.ofcom.org.uk/consultations/earth-stations-mobile-platforms/?showResponses=true

- Who should be licensed
- Crown dependencies and overseas territories
- Non-UK registered aircraft and ships
- Harmonisation and band segmentation
- Alternate users
- Health and safety
- Compliance and enforcement

Summary of responses

Principle of allowing the use of ESOMPs

3.4 Of the 15 non-confidential responses to the consultation:

- 12 supported the principle of allowing the use of ESOMPs in the bands proposed (Arqiva, Association of Train Operating Companies, Avanti Communications Group plc, Concur, Echostar, ESOA and GVF, Eutelsat SA, Inmarsat, Intellect and UK Space, O3b Networks, OnAir Switzerland SARL, ViaSat Satellite Holdings Ltd);
- two did not express a view (Samsung Electronics UK and NATS); and
- one did not support the principle (Electro-Sensitivity UK).

3.5 Those that supported the principle expressed a number of views on why ESOMPs should be allowed to use the frequency bands proposed.

3.6 Concur said that the availability of high-speed internet access on planes and trains would benefit business travellers by giving them access to range of innovative communications services.

3.7 Echostar said that there is substantial consumer interest in these types of applications particularly from commercial and private broadband users. In addition, these types of services will facilitate and speed the interchange of data and other communications services that are vital to ships, crew and passengers and cannot be met solely in the Mobile Satellite Service bands.

3.8 OnAir Switzerland SARL foresees an increase in the use of in-flight services as well as demand for higher data rates. To meet this need, OnAir intends to deploy improved and evolved services that will take advantage of increased bandwidth, global coverage and higher system capacity offered by satellite networks operating in the Ka band. Those services will use ESOMPs mounted on aircraft. Using this band will extend and enrich the existing on-board service and experience.

3.9 Eutelsat SA said that the authorisation of ESOMPs would allow satellite operators to meet the need for greater broadband speed, capacity and efficiency. The authorisation of ESOMPs will facilitate the implementation of new projects such as the Eutelsat Air Access service which intends to provide internet access to airline passengers during their flights.

3.10 ESOA, GVF, Intellect and UK Space said that geostationary-satellite orbit ESOMP services are planned for commercial launch in the UK in early 2014, and hence request that Ofcom implement the proposed procedures and any legislative changes as soon as possible.

3.11 Inmarsat said that its new constellation of Ka-band satellites called Global Xpress is planned to offer broadband communications worldwide on land, at sea and in the air. Global Xpress is designed to respond to the continuously increasing demand for globally available mobile broadband in a way that maximises the benefits for citizens and consumers.

3.12 Although O3b Networks supported the principle of allowing the use of ESOMPs, this was on the assumption that our proposals to authorise the use of ESOMPs would apply to those which operate to satellites that are either in geostationary-satellite orbit ('GSO') or non-geostationary-satellite orbit ('NGSO'). This matter is covered in the next sub-section.

3.13 Electro-Sensitivity UK did not support the authorisation of ESOMPs, saying that WiFi and mobile phone signals should not be allowed in trains, buses or aircraft for reasons of health and safety. This matter is covered in the sub-section below titled "Health and Safety".

Ofcom response

3.14 Ofcom notes the broad support for the authorisation of ESOMPs. We recognise the benefits that this technology would provide to consumers and citizens that wish to have high-speed connectivity to a range of communications services while travelling. Our proposed light-touch approach for the authorisation of ESOMPs will minimise the regulatory burden for operators and users and thus should help to facilitate the take up of these new innovative services.

Type of satellite (GSO or NGSO)

3.15 Although O3b Networks was generally supportive of our proposals to authorise ESOMPs, this was on the assumption that our proposals would apply to ESOMPs that operate to satellites that are either in GSO or NGSO.

3.16 Other respondents felt that our proposed regulations needed to be more specific on the type(s) of satellite to which an ESOMP would be authorised to operate. Arqiva, Avanti, ESOA, GVF, Inmarsat, Intellect and UK Space said that they supported the authorisation of ESOMPs that operate only to satellites in GSO.

Ofcom response

3.17 We confirm that our proposed authorisation framework is applicable to ESOMPs that operate only to satellites in GSO, since this decision is in line with the recommendations of ECC Decision (13)01 and ETSI harmonised standard EN 303 978 which only apply to GSP satellites. Ofcom is currently supporting the development of a European regulatory framework for ESOMPs operating to NGSO satellites. Until the technical and regulatory conditions for NGSO ESOMPs are agreed, it would be premature to consider the authorisation of these terminals in the UK.

3.18 In order to clarify that our decision will apply to ESOMPs operating to satellites in GSO (as opposed to NGSO), we have made changes to the draft Interface Requirement as shown in Annex 2.

Protection of other satellites

3.19 Both Arqiva and Avanti Communications plc requested that the authorisation framework on ESOMPs make reference to certain technical limitations set out in ETSI standard EN 303 978.

3.20 Arqiva said that to ensure technical coexistence of ESOMPs and earth station teleports, further technical parameters will need to be included in addition to an e.i.r.p. limit, notably regarding directionality and off axis emissions. Arqiva felt that explicit reference to ETSI EN 303 978 to be sufficient to address this need.

3.21 Avanti Communications plc said there is a significant risk that ESOMPs operating with GSO systems would not be able to meet from time to time or from location to location – due to poor pointing, platform tilts, grating lobes etc – certain parameters and technical characteristics which have been stipulated in the ETSI standard. If so, this would create significant harmful interference risks to adjacent or nearby GSO satellite systems operating with FSS earth stations. Avanti Communications plc proposes that to mitigate this risk, the UK Interface Requirement on ESOMPs should mandate the following technical provisions set out in ETSI EN 303 978:

- Off-axis e.i.r.p. emission density within the band
- Antenna pointing and polarisation alignment

Ofcom response

3.22 To market equipment freely within the European Union, manufacturers must demonstrate that the equipment meets the essential requirements of the R&TTE Directive[15], including avoiding harmful interference. Where equipment complies with a relevant ETSI harmonised standard which has been endorsed by the European Commission there is a presumption that it conforms with the essential requirements of the R&TTE Directive, but manufacturers are free to choose any technical solution to demonstrate compliance with the R&TTE Directive. Although the application of harmonised ETSI standards is the most popular method to demonstrate compliance, manufacturers are free to use an alternate route such as the submission of a technical file to a Notified Body[16].

3.23 It is also important to note that the management of interference between satellite networks is governed by ITU procedures and specific limits on interference are unique to each coordination agreement between satellite operators. We would not want to impose specific limits on interference from ESOMPs to neighbouring satellite networks because this removes flexibility that can be achieved during bilateral coordination, including the possibility for satellite operators to agree more relaxed limits on a case-by-case basis.

[15] Radio and Telecommunications Terminal Equipment (R&TTE) Directive (Directive 99/5/EC)
[16] A Notified Body is a certification, inspection or testing organisation designated by a EU Member State to perform the Attestation of Conformity of products – see Article 11 of the R&TTE Directivewithin the scope of a New Approach Directive.

3.24 Nevertheless, Ofcom agrees that the protection of neighbouring satellite networks is an important issue and so we have decided to make reference to the ETSI off-axis e.i.r.p. emission density limits within the informative part of the draft Interface Requirement (see Annex 2).

e.i.r.p. limit and airport clearance

3.25 In our consultation, we proposed to limit the maximum e.i.r.p. of an ESOMP terminal to a value of 55 dBW (decibel watt). We also proposed to add text in the informative part of the draft Interface Requirement to state that the Civil Aviation Authority (CAA) requires that prior to operation of ESOMP equipment within the perimeter fence of airfields, permission is obtained from either the CAA or the appropriate airport authority.

3.26 In its response, OnAir Switzerland SARL requested that the maximum allowed e.i.r.p. is increased to 60 dBW in line with the maximum limit set out in ECC Decision (13)01.

3.27 In addition, NATS said it has concerns with the practicality of implementing a process to obtain prior permission for the operation of an ESOMP terminal within an airfield. In particular, such a process for notification and approval lacks sufficient detail. As examples, no indications are given as to whether this is a one-off notification for each equipped aircraft, a notification each time the aircraft is to arrive at a given airport, and how much notice is required. NATS' concern is that this lack of clarity could give rise to significant workload and distraction for the contact points, which include NATS employees, with potentially multiple notifications being received per day.

Ofcom response

3.28 Ofcom proposed to limit the e.i.r.p. of a single ESOMP terminal to a maximum of 55 dBW to facilitate electromagnetic compatibility ('emc') with certain sites including airfields where sensitive aeronautical systems operate. At radiated powers up to 55 dBW, there is an acceptably low risk that an ESOMP terminal will present an emc hazard to these sensitive sites.

3.29 If we were to allow the use of ESOMPs that transmit with e.i.r.p. greater than 55 dBW, there would be a need to carry out individual site clearance to ensure the terminals do not pose a risk of emc interference to sensitive sites. Because ESOMP terminals operate while in motion, site clearance of each individual terminal would need to be carried out over a prescribed route or area, rather than at fixed positions, making the task quite complex to achieve. Not only does this create additional regulatory burdens, but it would also be difficult to enforce in practice.

3.30 For these reasons, and in view of maintaining a light-touch regulatory approach, we are unable to authorise the use of ESOMPs that transmit with an e.i.r.p. greater than 55 dBW. However we acknowledge these comments and we will continue to consider ways of increasing flexibility in the use of ESOMPs in collaboration with our site clearance stakeholders.

3.31 Furthermore, we have considered NATS' concerns on the proposed requirement to obtain prior permission from the CAA or airport authority before operating an ESOMP terminal (transmitting at a maximum e.i.r.p. of 55 dBW) within the perimeter fence of an airport. We can confirm that the CAA has agreed to remove this requirement and consequently we have revised the draft Interface Requirement as shown in Annex 2.

Use of additional bands

3.32 ViaSat Satellite Holdings Ltd believes that, in addition to the bands proposed in the consultation, aircraft-mounted ESOMPs should also be allowed access to the remaining FSS frequencies in the range 27.5 – 30 GHz. Use of those bands would be on the condition that ESOMP transmissions meet the pfd mask defined in ECC Decision(13)01, or alternatively if ESOMP operators have coordinated the use of the those frequencies with fixed service networks in the UK.

Ofcom response

3.33 In our consultation, we proposed to authorise the use of ESOMPs in the UK that transmit in the frequency bands 27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz. These bands are already available in the UK for other types of satellite earth station uplinks, including Permanent Earth Stations and uncoordinated High Density Fixed Satellite Service (HDFSS) terminals.

3.34 Other portions of the band 27.5 – 30 GHz are licensed (by award, following auctions in 2000 and 2008) on a technology and service neutral basis. Information about these licence holders can be found on the Wireless Telegraphy Register (WTR)[17].

3.35 We are unable to extend the authorisation of ESOMPs in the UK beyond the frequencies proposed in our consultation because we consider there to be a risk of interference to other licensed radio users. It should be noted, however, that many of the spectrum licences awarded in parts of the band 27.5 – 30 GHz are tradable, which allows all or part of the licence rights and associated obligations to be transferred or leased to another party. The UK Plan for Frequency Authorisation (UKPFA)[18] shows which spectrum licences are tradable and the Ofcom website provides further information about spectrum trading[19].

3.36 It should also be noted that operation of ESOMPs outwith UK territory will be permitted across the band 27.5 – 30 GHz subject to not causing harmful interference to other radio communication services. Harmful interference can be prevented by ensuring that ESOMP transmissions meet the limits on power flux density (pfd) contained in ECC Decision (13)01. Reference to these pfd limits is made in the draft IR (see Annex 2).

Licensed or licence-exempt

3.37 ViaSat Satellite Holdings Ltd, ESOA, GVF, Intellect and UK Space said that licence exemption, as indicated in ECC Decision 13(01), could be considered as an authorisation approach for aircraft and ship mounted ESOMPs, although none of these respondents expressed a strong view. Eight other respondents agreed with our proposal to license the use of ESOMP equipment mounted on aircraft and ships.

Ofcom Response

3.38 In our consultation, we considered whether or not aircraft and ship mounted ESOMPs should be licensed under the Wireless Telegraphy Act 2006 or exempt from the need to have a licence.

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[17] http://spectruminfo.ofcom.org.uk/spectrumInfo/licences
[18] http://spectruminfo.ofcom.org.uk/spectrumInfo/ukpfa
[19] http://stakeholders.ofcom.org.uk/spectrum/spectrum-trading/

3.39 The Radio Regulations, in the case of aircraft and ships, and the ICAO Chicago Convention, in the case of aircraft, both require that radio apparatus on board is licensed. One reason for this is that radio equipment has the potential to cause interference to other radio users in other countries. Furthermore, a licensed approach will facilitate the inspection of the ESOMP equipment by foreign authorities when it is being used in countries outside the UK and Crown Dependencies.

3.40 In order to comply with our international treaty obligations, the use of ESOMP apparatus on aircraft and ships registered in the UK and Crown Dependencies needs to be licensed.

Who should be licensed

3.41 NATS said there are aspects of the draft ESOMP licence requirements that appear to be beyond the control of the aircraft licensee. For example parameters such as frequencies in use and emission characteristics may be under the control of the satellite network operator rather than the aircraft Captain. NATS said it is not clear how responsibility under the WT Act for these aspects might be extended to the satellite network operator.

Ofcom response

3.42 As part of our consultation we considered whether to license the aircraft/ship operator or the service/network operator. Although the service/network operator will be in control of specific ESOMP characteristics including frequency channels and emissions, it is the aircraft or ship operator who (through the captain and crew) has ultimate responsibility for the operation of the equipment. Under the Radio Regulations, the captain of an aircraft or ship is answerable for any use (or misuse, including undue interference) of radio equipment installed onboard. For UK registered aircraft and ships, the captain is legally liable under the WT Act (as amended)[20].

3.43 For these reasons, we have decided that the aircraft/ship operator must have WT Act licences to use the ESOMP equipment on board the aircraft or ship.

Crown dependencies and overseas territories

3.44 Avanti Communications Group plc believes that the potential establishment of regulations for ESOMPs in the Crown Dependencies and British Overseas Territories (e.g. Cayman Island, Bermuda etc) is a matter for those jurisdictions and not within the scope of this Ofcom consultation. Avanti requested Ofcom to clarify this matter consistent with applicable legislation and Ofcom's terms of reference.

Ofcom response

3.45 Some provisions of the WT Act have been extended to the Channel Islands and the Isle of Man by separate Statutory Instruments[21]. When we developed our proposals

[20] Section 105(2) provides that, in relation to offences under sections 11, 35-38, 46-48, 58 and 60 of the WT Act: "Where the offence is committed in relation to a station or apparatus on board or released from a ship or aircraft, the captain or person for the time being in charge of the ship or aircraft is guilty of the offence (as well as anyone who is guilty of it apart from this subsection)."

[21] SI 2006/3324 – Wireless Telegraphy (Jersey) Order 2006
SI 2006/3325 – Wireless Telegraphy (Guernsey) Order 2006
SI 2007/278 – Wireless Telegraphy (Isle of Man) Order 2007

for the authorisation of ESOMP radio equipment, we asked the island authorities if they wanted the authorisation framework to apply also in those areas. Following their approval, we can confirm that the licence exemption regulations for land-based ESOMPs and authorisation framework for licensing aircraft- and ship-mounted ESOMPs will apply to the United Kingdom of Great Britain and Northern Ireland (UK), the Channel Islands and the Isle of Man.

3.46 The establishment of regulations in British Overseas Territories is a matter for those jurisdictions.

Non-UK registered aircraft and ships

3.47 Eutelsat SA noted that licensing of aircraft and ship mounted ESOMPs would only apply to UK registered aircraft or ships and that non UK registered aircraft or ships should be authorised to operate in UK territory without further requirement. Eutelsat SA said that clarification of this point would need to appear in the final regulatory text applicable to ESOMPs in the UK.

Ofcom response

3.48 As Eutelsat SA notes, our regulations for licensing aircraft and ship mounted ESOMPs would apply only to aircraft and ships that are registered in the UK or Crown Dependencies. A UK WT Act licence for ESOMPs will not be required for aircraft and ships registered in other countries.

3.49 However, when an ESOMP mounted on an aircraft or ship registered in another country operates in the territory of the UK or Crown Dependencies, its operation shall be in accordance with the Wireless Telegraphy (Visiting Ships and Aircraft) Regulations 1998 (SI 1998/2970), which require that all apparatus on board a visiting ship or visiting aircraft shall be so used as not to interfere with the emitting or receiving of any wireless telegraphy. In practice, we consider that operation in accordance with the draft Interface Requirement (shown in Annex 2) would ensure that ESOMPs would not cause interference.

3.50 As noted in our consultation, Ofcom is supporting work within the International Telecommunication Union (ITU) to develop globally recognised requirements for the authorisation of ESOMPs.

Harmonisation and band segmentation

3.51 Samsung Electronics UK questioned whether the lack of commitment amongst CEPT countries to implement ECC Decision (13)01, covering the harmonised use and free circulation of ESOMPs, would lead to a well harmonised use of the spectrum in 27.5 – 29.5 GHz. Inspection of the implementation status in the European Communications Office (ECO) showed that only seven other CEPT countries (aside from the UK) had committed to implement ECC Decision (13)01. Of those seven, six countries identified that they will only partially implement this Decision.

3.52 In addition Samsung observes that the 27.5 – 29.5 GHz band is segmented in a non-contiguous way between the Fixed Service and the Fixed Satellite Service in accordance with the amended ECC Decision (05)01 and that the Fixed Service parts are assigned under BFWA[22] licensing in the UK. Samsung questioned whether the

[22] Broadband Fixed Wireless Access

segmentation arrangement leads to the optimum utilisation for both the Fixed Satellite Service operations and the operations of other services in the band.

Ofcom response

3.53 The likely reason that relatively few administrations have so far committed to implement the ECC Decision on ESOMPs is because the Decision is new and administrations have either not yet considered its implementation or had the opportunity to notify its implementation status to the ECO. By making these bands available for ESOMPs, Ofcom is facilitating market access for this new technology. As the technology grows and matures, more countries are expected to implement similar authorisation approaches.

3.54 Nonetheless, there is evidence which suggests that the spectrum in the range 27.5 – 29.5 GHz is already well harmonised not only throughout Europe but also around the world. Within Europe, 27 countries have implemented ECC Decision (05)01 which segments this band between terrestrial fixed services and uncoordinated earth stations of the FSS. A further six countries have either partly implemented the Decision or are committed to its implementation. Although the UK has not formally signed this Decision, we have implemented an arrangement in the UK which broadly follows it. In addition, the band segmentation adopted in Europe is consistent with No. 5.516B of the international Radio Regulations (see also Resolution 143), which identifies similar frequency ranges within 27.5 – 29.5 GHz for use by high-density applications in the FSS.

3.55 Although ECC Decision (05)01 segments the 27.5 – 29.5 GHz band in a non-contiguous way between terrestrial systems and uncoordinated earth stations, we consider that our arrangements in the UK allow for optimal and flexible use of the spectrum. Firstly, the awarded parts of the band are licensed on a technology and service neutral basis which allows use by any type of application (including ESOMPs) and not only BFWA applications. Secondly, we consider that use of the remaining parts of the bands by uncoordinated earth stations will not prevent future use, on an unprotected basis, of those bands by other fixed / mobile applications employing mitigation techniques that allow them to avoid interference from uncoordinated transmitting earth stations including HDFSS[23] and ESOMPs.

Alternate users

3.56 Samsung Electronics UK noted that the frequency range 27.5 – 29.5 GHz is also allocated in the Radio Regulations to the Mobile Service on a global basis and believes that the possibility in this range for high frequency, high capacity mobile broadband applications will increase in the coming years with the development of new mobile technologies for next generation mobile services.

Ofcom response

3.57 Ofcom notes this observation but does not see this as a reason not to authorise a potentially valuable use of the spectrum now.

[23] High Density Fixed Satellite Service

Health and safety

3.58 Electro-Sensitivity UK said that WiFi and mobile phone signals should not be allowed in trains, buses or aircraft for reasons of health and safety. In its response, Electro-Sensitivity UK refers to the potential health effects on people by exposure to electromagnetic radiation. For example, it argued that a percentage of bus drivers will have their attention limited by being irradiated by WiFi etc throughout their shift, adding to the risk of accident. It also suggested that commuters and regular travellers will suffer chronic exposure, compromising their long-term health. Additionally, it said that exposure to electromagnetic radiation is a disabling problem for those suffering with the condition of electro-sensitivity. Electro-Sensitivity UK also said that research suggests that high frequencies at 18 – 30 GHz are associated with DNA damage and epigenetic effects, with results including cancers and genetic changes.

Ofcom response

3.59 Our proposals have the effect of removing a regulatory barrier to the deployment and operation of ESOMPs, which is done with reference to avoiding harmful interference with wireless telegraphy. Ofcom regulates the use of electromagnetic spectrum but does not have any duties related to the recommendations for exposure to EMF emissions. We do not set emission safety levels and we have neither the expertise nor the remit to participate in matters concerning biological or health research. Responsibility for health issues, including those related to electromagnetic radiation, rests with the Health Protection Agency (HPA). The HPA has a statutory duty to give advice to Government on Electro-Magnetic-Fields (EMF) and health; this includes assessing the state of scientific knowledge and publishing guidelines for the safe exposure to EMF.

3.60 The choice of whether to deploy and operate ESOMP equipment is a matter for the operator of the moving vehicle such as an aircraft, ship or train. It should also be noted that our proposals in the August 2013 consultation were related to the use of ESOMPs for delivering backhaul links to moving platforms such as aircraft, ships or trains, and not to the use of WiFi or mobile phones within those moving vehicles.

Compliance and enforcement

3.61 Arqiva noted that neither the NoV nor the draft Interface Requirement set out how to monitor and enforce compliance with policy and licence obligations at UK airspace and UK waters boundaries.

Ofcom response

3.62 Ofcom has powers under the Wireless Telegraphy Act to enforce licence conditions and also has powers under the Wireless Telegraphy (Visiting Ships and Aircraft) Regulations 1998 to take action if there is a breach of the requirements of those regulations, such as where there is interference.

Section 4

Ofcom Decision

4.1 Having considered the responses to our consultation, we have decided to proceed with the authorisation of Earth Stations on Mobile Platforms in the UK and Crown Dependencies on the following basis:

- Radio equipment for land-based ESOMPs will be exempt from the need to have a Wireless Telegraphy Act 2006 licence;
- Radio equipment for aircraft and ship mounted ESOMPs will be licensed under the Wireless Telegraphy Act 2006;
- Licensing of aircraft-mounted ESOMPs will be done through variation of the Aircraft Radio licence issued on Ofcom's behalf by the Civil Aviation Authority (CAA) with no additional fee;
- Licensing of ship-mounted ESOMPs, administered by Ofcom, will be done through variation of the Ship Radio licence with no additional fee; and
- ESOMPs shall operate in accordance with the technical parameters set out in the draft Interface Requirement 2093.

4.2 We have made some changes to the technical specifications contained in the draft Interface Requirement shown in Annex 2. A summary of these changes is as follows:

- To clarify that the authorisation framework applies to ESOMPs that operate to satellites in geostationary-satellite orbit (GSO);
- To clarify the frequency ranges for operation within and outwith UK territory.
- Removal of the requirement to obtain prior permission for the operation of an ESOMP terminal within an airfield; and
- To make reference to off-axis equivalent isotropically radiated power (e.i.r.p.) limits within the informative part of the draft Interface Requirement.

4.3 We expect to be able to accept applications to license ship-mounted ESOMPs by February 2014. We are working with CAA (who issues WT Act licences for Aircraft on Ofcom's behalf) to make licensing for aircraft-mounted ESOMPs available in a similar timeframe. Lastly, we intend to publish a notice of proposals to make regulations to implement our decision to exempt land-based ESOMPs from the need to have a WT Act licence in 2014. We expect the regulations covering the exemption from licensing for land-based ESOMPs to be in force by the summer of 2014.

Annex 1

List of Respondents

A1.1 Ofcom received 16 responses to the August 2013 consultation, one of which was submitted to us on a confidential basis. The 15 non-confidential responses can be found on our website[24]. A list of the 15 non-confidential respondents is shown below.

Non-confidential Responses

Arqiva

Association of Train Operating Companies

Avanti Communications Group plc

Concur

Echostar

Electro-Sensitivity UK

European Satellite Operators Association (ESOA) and Global VSAT Forum (GVF)

Eutelsat SA

Inmarsat

Intellect and UK Space

NATS

O3b Networks

OnAir Switzerland SARL

Samsung Electronics UK

ViaSat Satellite Holdings Ltd

[24] http://stakeholders.ofcom.org.uk/consultations/earth-stations-mobile-platforms/?showResponses=true

Annex 2

Revised Draft Interface Requirement

DRAFT

IR 2093 - UK Interface Requirement 2093

Earth Stations on Mobile Platforms (ESOMPs)

Publication date: xx xxxxx xxxx
98/34/EC Notification number: 2013/464/UK

Contents

Section 1

References

[1]	ETSI EN 303 978 V1.1.2	Satellite Earth Stations and Systems (SES); Harmonized EN for Earth Stations on Mobile Platforms (ESOMP) transmitting towards satellites in geostationary orbit in the 27,5 GHz to 30,0 GHz frequency bands covering the essential requirements of article 3.2 of the R&TTE Directive
[2]	ECC Decision (13)01	The harmonised use, free circulation and exemption from individual licensing of Earth Stations On Mobile Platforms (ESOMPs) within the frequency bands 17.3-20.2 GHz and 27.5-30.0 GHz

Section 2

Foreword

2.1 The Radio Equipment and Telecommunications Terminal Equipment Directive 99/5/EC (R&TTE Directive) was implemented in the United Kingdom (UK) on the 8 April 2000 by The Radio Equipment and Telecommunications Terminal Equipment Regulations 2000, Statutory Instrument 2000 No. 730. In accordance with Articles 4.1 and 7.2 of Directive 1999/5/EC, this UK Interface Requirement contains the requirements for the authorisation and use of Earth Stations on Mobile Platforms (ESOMPs) in the specified frequency bands.

2.2 Nothing in this UK Radio Interface Requirement shall preclude the need for equipment to comply with Directive 1999/5/EC.

2.3 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 for the stated equipment types and for the stated frequency bands. Nothing in this UK Interface Requirement shall preclude equipment from being placed on the market in the UK that complies with the 'essential requirements' specified in Directive 1999/5/EC.

2.4 The requirements given in the main body of this UK Radio Interface Requirement will apply to the licensing of aircraft and ship mounted ESOMPs and to the licence-exemption of land-based ESOMPs.

2.5 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 Earth Stations on Mobile Platforms.

2.6 All UK Radio Interface Requirements notified under Directive 1998/34/EC will be published and will be made available free of charge from the Ofcom web-site at http://stakeholders.ofcom.org.uk/spectrum/technical/interface-requirements/.

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

Section 3

Minimum requirements for operation within the UK

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 Radio Interface Requirement gives a high level description of how the spectrum in the UK is used for ESOMPs. It does not prescribe technical interpretation of the ‘essential requirements’ of Directive 1999/5/EC.

3.3 This UK Radio Interface Requirement therefore stipulates the necessary equipment parameters for the authorisation of ESOMPs in the UK. Table 3.1 contains the relevant equipment parameters. These taken together with the ‘essential requirements’ detailed in Article 3.2 of Directive 1999/5/EC constitute the minimum requirements for the installation and use of ESOMPs within the UK. Nothing in this UK Interface Requirement shall preclude equipment from being placed on the market in the UK that complies with the ‘essential requirements’ specified in Directive 1999/5/EC.

3.4 The technical parameters specified in the UK Radio Interface Requirement are applied to achieve the desired level of compatibility between ESOMPs and other radiocommunications services, whilst promoting enterprise, innovation and competition.

3.5 This UK Radio Interface requirement provides the necessary technical information which facilitates access to spectrum for the installation and use of ESOMPs by making clear the assumptions that are made in planning the use of the spectrum for ESOMPs in the UK. It is not the intention of this UK Radio Interface Requirement to duplicate or impose any additional ‘essential requirements’ of the Directive 1999/5/EC 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 Earth Stations on Mobile Platforms transmitting to satellites in geostationary orbit		
Mandatory (1-10)		
1	Frequency band(s) for operation in UK territory Frequency band for operation outwith UK territory	27.5 – 27.8185 GHz, 28.4545 – 28.8265 GHz and 29.4625 – 30 GHz 27.5 – 30 GHz
2	Radiocommunication Service	Fixed-Satellite Service
3	Application	Earth Stations on Mobile Platforms (ESOMPs)
4	Channelling	n/a
5	Modulation / Occupied bandwidth	n/a
6	Direction / Separation	n/a
7	/Maximum Transmit Power / Power Density	e.i.r.p. from a single terminal ≤ 55 dBW[25]
8	Channel access and occupation rules	n/a
9	Authorisation regime	Licence exempt – for land-based ESOMPs. Licensed – for ESOMPs mounted on aircraft or ships.
10	Additional essential requirements	n/a
Informative (11-13)		
11	Frequency planning assumptions	Use of 17.3 – 20.2 GHz for reception is unprotected.
12	Planned changes	n/a
13	Reference	ETSI EN 303 978 V1.1.2
14	Notification	2013/464/UK
15	Remarks	**Note 1:** 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 V1.1.2 may be used to ensure that transmissions from ESOMPs 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 mounted ESOMPs protect terrestrial services, where appropriate.

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

Section 4

Additional performance parameters

(informative)

None specified

Section 5

Contact details

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Section 6

Document history

Version	*Date*	*Changes*
0.1	14 August 2013	Draft published
1.0	xxx	Document published