Recognised Spectrum Access for Receive Only Earth Stations

Consultation

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About this document

This document is a consultation outlining Ofcom's proposals to extend Recognised Spectrum Access (RSA) to new frequency bands, intended to promote more efficient use of spectrum.

RSA is a means for Ofcom to take into account, within national spectrum planning, the use of frequencies used for the reception of services that do not need to be licensed.

In this instance, it relates to 'receive-only earth stations' (ROES), ground based satellite terminals which are used to receive signals from meteorological satellites, earth exploration satellites and space missions, but do not transmit.

In this consultation, we are proposing to make changes to RSA regulations relating to ROES. Specifically, we propose to make RSA for ROES available in two additional frequency bands, namely 7850 – 7900 MHz and 25.5 – 26.5 GHz.

This consultation closes on 6 November 2014.

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Section 1

Summary

1.1 This consultation proposes to introduce recognised spectrum access (RSA) for receive-only earth stations[1] (ROES) in two additional frequency bands. RSA is a regulatory mechanism that provides formal recognition of receive-only radio stations by allowing Ofcom to take them into account when planning spectrum use and assigning frequencies to other radio users.

1.2 The key proposals for consultation are to:

- Make RSA available for ROES in the frequency bands 7850 – 7900 MHz and 25.5 – 26.5 GHz;
- Charge fees for the grant of RSA for ROES in the 7850 – 7900 MHz band which are the same as the fees already charged for grants of RSA in the adjacent band 7750 – 7850 MHz, which are set on the basis of administered incentive pricing (AIP);
- Charge fees for the grant of RSA for ROES in the 25.5 – 26.5 GHz band that are set on the basis of AIP.

1.3 We propose to make RSA for ROES available in the two additional frequency bands to accommodate known demand from stakeholders. Both frequency bands are currently used by licensed fixed point-to-point microwave links and so there would be a need to coordinate the use of spectrum between ROES and fixed link users. The specific proposals are designed to encourage efficient use of the radio spectrum.

1.4 We welcome stakeholder feedback to this consultation document. The deadline to submit responses to Ofcom is 5pm on 6 November 2014. Information on Ofcom's consultation principles and how to respond to this consultation is provided in Annexes 1 to 3.

1.5 We expect to release a Statement on this consultation in March 2015 having taken into account stakeholder responses to our proposals. Subject to the responses, we plan to accompany the Statement with a Notice that sets out our specific proposals to amend regulations that apply to RSA for ROES. Following the period allowed for making representation on the proposals set out in the Notice, and subject to responses received on the draft regulations, we plan to publish a Statement in June 2015 to set out our final decision on the regulations. We expect the regulations to come into force in July/August 2015.

[1] An earth station is a station located either on the earth's surface or within the major portion of the Earth's atmosphere and intended for radio communication with one or more space stations.

Section 2

Introduction and Background

2.1 This section provides information on:

- our legal framework for managing the radio spectrum including RSA;
- the background on the introduction of RSA to date;
- spectrum fees and AIP;
- explanation of receive-only earth stations (ROES);
- impact assessment and equality impact assessment.

Legal framework for managing the radio spectrum

2.2 Section 8(1) of the Wireless Telegraphy Act 2006 (the "WT Act") makes it an offence for any person to establish or use any station for wireless telegraphy or to install or use any apparatus for wireless telegraphy except under and in accordance with a licence granted by us under that section.

2.3 However, licensing is reserved for equipment that we consider has the potential to cause harmful interference. Under section 8(4) of the WT Act, we have the duty to exempt from licensing any use of wireless telegraphy apparatus that we consider is not likely to cause harmful interference.

2.4 Receive-only equipment, such as receive-only earth stations, is licence exempt, being unlikely to cause harmful interference to other users of spectrum. However, RSA can provide these licence exempt users with an alternative form of spectrum holding, that can be applied for on a voluntary basis, as explained below.

2.5 Section 18 of the WT Act prescribes the circumstances relevant for a grant of RSA, namely:

- a person is proposing to use or to continue to use a station or apparatus for wireless telegraphy;
- the circumstances of the use are circumstances specified for the purposes of that section in regulations made by Ofcom;
- that use does not require a wireless telegraphy licence but will involve the emission of electromagnetic energy with a view to the reception of anything at places in the United Kingdom or in the territorial waters adjacent to the United Kingdom; and
- for the purposes of that section it is immaterial whether the emissions are from a place within the United Kingdom or from a place outside the United Kingdom.

2.6 Put simply, the grant of RSA would have the effect of requiring us, under section 20 of the WT Act, to take account of the use of radio frequencies by receiving equipment on a comparable basis to a licensed use. In other words, where for instance we

exercise a licensing function under section 8 of the WT Act, we would be under a duty to take into account the existence of any grant of RSA in respect of receive-only earth stations that is in force and the provisions imposing restrictions and conditions subject to which the grant has effect to the same extent as we would take into account a wireless telegraphy licence.

2.7 Section 27 of the WT Act empowers us to make regulations to provide for the conversion of a grant of RSA into a wireless telegraphy licence and vice versa.

2.8 In addition to specifying the above-mentioned circumstances of the use of RSA in regulations made by us, we also have powers to make regulations under Schedule 2 to the WT Act to prescribe the procedures in accordance with which an application for a grant of RSA must be determined. Such procedures would include provision for:

- time limits for dealing with applications for a grant of RSA;
- requirements which must be met before a grant is made; and
- the restrictions and conditions to which a grant may be made subject.

2.9 Under Schedule 2 to the WT Act, we also have powers to revoke and modify a grant of RSA.

2.10 Section 30 of the WT Act empowers us to make regulations to provide for rights and obligations under a grant of RSA to be tradable and convertible to rights and obligations under a WT licence (and vice versa).

2.11 Finally, section 21 of the WT Act empowers us to make regulations to prescribe fees payable for the making of a grant of RSA. Under section 22 of the WT Act, we may, if we think fit in the light (in particular) of our duties under section 3 of the WT Act, prescribe fees which would be greater than those that would be necessary for the purposes of recovering costs incurred by us in connection with our functions under the enactments relating to the management of the radio spectrum. Article 14 of Directive 2002/20/EC, as amended by Directive 2009/140/EC (the “Authorisation Directive”), requires fees for rights to use spectrum to be objectively justified, transparent, non-discriminatory and proportionate.

General description of RSA

2.12 If a service is unlikely to involve any undue interference with wireless telegraphy, then we are required by section 8 WT Act to exempt it from licensing[2]. This is the case for ROES.

2.13 In the case of licensed radio services, the licences provide information about the spectrum that the services use, such as locations and frequencies, which we can use to plan assignments to avoid harmful interference between radio equipment. Although users of receive-only apparatus, such as ROES, are not required to have a licence, the equipment is still susceptible to interference from other radio users.

2.14 RSA was introduced in the Communications Act 2003 in order to provide a mechanism to give formal recognition to receive-only radio services and to complement licensing by providing an alternative form of spectrum holding that can

[2] This requirement is in line with Article 5(1) of the EU Authorisation Directive (Directive 2002/20/EC), as recently amended by Directive 2009/140/EC.

be made tradable. RSA provides a mechanism for us to obtain information on where receive-only earth stations are, thus allowing us to take them into account when planning spectrum use and assigning frequencies to other radio users. The relevant provisions of RSA have since been consolidated in sections 18 to 26 of the WT Act.

2.15 We have power to make regulations to make RSA available in selected frequency bands in which this would help us manage the spectrum more effectively in the interests of UK citizens and consumers. The use of RSA in a particular frequency band will help us ensure that the operators of receive-only radio equipment can continue to provide valuable services with enhanced confidence about the levels of interference they can expect to receive.

2.16 RSA also enables the application of incentives to maximise the benefits to society from the use of the associated frequency bands. RSA may be made tradable, which maximises the benefit to society by making the spectrum available to the highest value user. In addition, fees for RSA may be set on the basis of administered incentive pricing (AIP) to encourage users of receive-only earth stations to make the most efficient use of the spectrum possible.

Background on the introduction of RSA

2.17 The first RSA regulations, the Wireless Telegraphy (Recognised Spectrum Access) Regulations 2007, were made for radio astronomy (RAS) and came into force in March 2007[3]. To date, Ofcom has issued six RSA grants for RAS covering various frequency bands at the six sites listed in The Wireless Telegraphy (Limitation of Number of Grants of Recognised Spectrum Access) Order 2007[4].

2.18 Following a consultation in 2010[5], we made RSA regulations for ROES, the Wireless Telegraphy (Recognised Spectrum Access for Satellite Receive-Only Earth Stations) Regulations 2011, which came into force in December 2011[6]. Currently, there are five sites that have RSA grants for ROES in one or more of the frequency bands 1690 – 1710 MHz, 3600 – 4200 MHz and 7750 – 7850 MHz.

2.19 Both RSA for ROES and RAS are tradable in accordance with the Wireless Telegraphy (Recognised Spectrum Access and Licence) (Spectrum Trading) Regulations 2009[7], as subsequently amended by the Wireless Telegraphy (Recognised Spectrum Access and Licence) (Spectrum Trading) (Amendment) Regulations 2011[8] and the Wireless Telegraphy (Recognised Spectrum Access and Licence) (Spectrum Trading) (Amendment) (No.2) Regulations 2011[9].

2.20 In a report[10] published by Ofcom, it is explained that the introduction of RSA for RAS has resulted in the lifting of constraints on use of frequency bands by other services and has also opened up the possibility for permitting more services to use the bands.

2.21 In addition to RSA for receive-only applications such as ROES and RAS, we have also introduced the concept of Crown RSA to release spectrum to the market for

[3] http://www.legislation.gov.uk/uksi/2007/393/made
[4] http://www.legislation.gov.uk/uksi/2007/394/contents/made
[5] http://stakeholders.ofcom.org.uk/consultations/rsa-roes/
[6] http://www.legislation.gov.uk/uksi/2011/2763/contents/made
[7] http://www.legislation.gov.uk/uksi/2009/17/contents/made
[8] http://www.legislation.gov.uk/uksi/2011/440/contents/made
[9] http://www.legislation.gov.uk/uksi/2011/2761/contents/made
[10] http://stakeholders.ofcom.org.uk/consultations/rsa/rsa_radio_astronomy/

commercial use in bands that are predominantly used or managed by Crown bodies and are thus not subject to WT Act licensing.

Spectrum fees and AIP

2.22 Ofcom has duties under the Communications Act 2003 and the WT Act to secure optimal use of the radio spectrum and to promote the efficient use of spectrum. Administered incentive pricing (AIP) promotes optimal use. This is because, under a system of AIP, spectrum fees reflect the opportunity cost of the spectrum resource that licensees or RSA grant holders are currently using or could potentially make use of. AIP-based fees create incentives for spectrum users to use spectrum more efficiently. If the value of the spectrum is less to them than the opportunity cost of its use, they will have an incentive to transfer it to another user that may be able to generate greater value from it or to relinquish it to Ofcom to reassign. Hence, AIP will promote optimal use of spectrum by creating incentives that result in access being granted to those users who can generate greater benefits from it and who value it more highly.

2.23 The fees for RSA for ROES are calculated on the basis of AIP.

Explanation of ROES

2.24 A receive-only earth station is a type of radio apparatus that is designed to receive radiocommunication signals from one or more space stations. Earth stations can operate within several types of satellite service as defined in the Radio Regulations. Some information and background about the relevant services that are allocated in the frequency bands that are subject to this consultation are given below.

7850 – 7900 MHz

Meteorological-Satellite (MetSat) Service

2.25 Receive-only earth stations that operate in the MetSat service receive information, relating to the characteristics of the Earth and its natural phenomena, transmitted by meteorological satellites.

2.26 The MetSat service is predominantly used for reception of information regarding global and regional weather patterns and is used by meteorological organisations such as the Meteorological Office to provide weather forecasts and early warnings of adverse conditions, such as storms and floods. The information is used to provide valuable services to the public, aviation, government, private and other sectors.

2.27 RSA for ROES is already available in the 7750 – 7850 MHz frequency band. This 100 MHz of spectrum is currently used by non-geostationary meteorological satellites to downlink raw data on the earth's weather, climate and environment that has been collected by instruments and sensors on board the satellites. The next generation of meteorological satellites currently under development will incorporate higher resolution sensors to improve forecasts of the weather and climate. These next generation satellites will require more bandwidth to downlink the increased amount of data collected by their instruments. To accommodate the additional bandwidth requirement, the World Radiocommunication Conference 2012 (WRC-12) allocated an additional 50 MHz of spectrum between 7850 and 7900 MHz to the MetSat service.

25.5-26.5 GHz

Earth Exploration-Satellite Service (EESS)

2.28 Receive-only earth stations that operate in the EESS receive information, relating to the characteristics of the Earth and its natural phenomena, transmitted by earth exploration satellites. EESS satellites contain sophisticated scientific instruments and sensors that make a variety of measurements including ozone depletion, atmospheric humidity and temperature, clouds and precipitation, surface temperature, soil moisture, sea ice thickness and glaciology.

2.29 The data collected by EESS satellites is used to provide a diverse set of societal benefits including weather and climate monitoring, agriculture, disaster monitoring and relief and also to further human endeavors such as mapping and population monitoring.

2.30 The 25.5 – 26.5 GHz band is used by the latest generation of EESS satellites that require wideband downlinks to transmit the large amount of data collected by high resolution sensors used on board the satellites.

Space Research Service (SRS)

2.31 The SRS involves communication by radio with spacecraft or other objects in space that are used for scientific or technological research purposes. A receive-only earth station operating in the SRS is designed to receive communications from transmitters on board stations such as deep space probes or low-earth orbiting space stations and telescopes.

2.32 The frequency band 25.5 -26.5 GHz is used by the SRS to support various missions including lunar, Lagrangian and other near-Earth space research missions.

Impact Assessment and Equality Impact Assessment

2.33 The analysis presented in section 3 of this document represents an impact assessment, as defined in section 7 of the Communications Act 2003.

2.34 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. This consultation sets out the potential impacts for stakeholders and the reasons for our proposals for introducing RSA for ROES in additional bands. For further information about our approach to impact assessments see the guidelines “Better policy-making: Ofcom’s approach to impact assessment”[11].

2.35 Ofcom is separately required by statute to assess the potential impact of all our functions, policies, projects and practices on the following equality groups: age, disability, gender, gender reassignment, pregnancy and maternity, race, religion or belief and sexual orientation. Equality Impact Assessments (EIAs) also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity. We have not identified any particular impact of our proposals in relation to the identified equality groups. Specifically, we do not consider the impact of the proposals in this consultation to be to the detriment of any particular group within society. Nor have we

[11] http://www.ofcom.org.uk/about/policies-and-guidelines/better-policy-making-ofcoms-approach-to-impact-assessment/

seen the need to carry out separate EIAs in relation to the additional equality groups in Northern Ireland: religious belief, political opinion and dependants. This is because we anticipate that our proposals will not have a differential impact in Northern Ireland compared to consumers in general.

Document Structure

2.36 The remainder of this document is structured as follows:

- Section 3 sets out our proposals for making RSA available for ROES in the frequency bands 7850 – 7900 MHz and 25.5 – 26.5 GHz;
- Section 4 summarises the consultation questions associated with our proposals;
- Section 5 provides our anticipated next steps, following this consultation.

Section 3

Proposals for RSA for Receive-Only Earth Stations (ROES)

3.1 This section sets out our proposals for the grant of RSA for receive-only earth stations (ROES) in the bands 7850 – 7900 MHz and 25.5 – 26.5 GHz. The following sub-sections are structured as follows:

- Overview of our proposals for RSA for ROES in the bands 7850 – 7900 MHz and 25.5 – 26.5 GHz
- The case for introducing RSA for ROES in the proposed frequency bands
- Technical and geographic parameters
- Fees for grant of RSA for ROES in the proposed frequency bands
- Term of grant
- Tradability and conversion
- Publication of information
- Process for granting RSA for ROES
- Implications for granting RSA

Overview of our proposals for RSA for ROES in the frequency bands 7850 – 7900 MHz and 25.5 – 26.5 GHz

3.2 We propose to make RSA available for ROES in the frequency bands 7850-7900 MHz and 25.5 – 26.5 GHz. The structure of the proposed grants of RSA for ROES in the proposed frequency bands would be largely the same as that already applied to RSA for ROES in the existing bands 1690 – 1710 MHz, 3600 – 4200 MHz and 7750 – 7850 MHz.

3.3 An applicant for a grant of RSA would need to supply the technical characteristics of the ROES including location, frequencies, bandwidth and the maximum single-entry interference level that the ROES can tolerate. Ofcom would then carry out a detailed examination of predicted levels of interference into the ROES from licensed transmitters that use the same frequency bands, namely fixed point-to-point microwave links. A decision on whether to grant a new RSA to a receive-only earth station would be dependent on the tolerable interference level not being exceeded by fixed link transmissions that have already been licensed at the time of application for the RSA.

3.4 Once an RSA has been granted, Ofcom would take this into account when considering new or amended licence applications for fixed links in the same frequency band. A new or amended fixed link would only be licensed if the predicted levels of interference did not exceed the tolerable levels associated with existing grants of RSA for ROES.

3.5 The main features of RSA for receive-only earth stations that apply to RSA in the existing frequency bands would also apply to RSA in the proposed frequency bands. These features are as follows:

- we would have a statutory duty under section 20 of the WT Act to take account of the existence of a grant of RSA when making other assignments in the same way as we would in respect of a licence. For example, we would plan to limit the levels of licensed emissions that might interfere with a receiver covered by a grant of RSA;
- RSA cannot be mandatory, even in bands in which it has been made available. It will remain perfectly lawful to operate receive-only earth stations without RSA;
- according to our current proposals, the holders of a RSA grant in the proposed frequency bands will have to pay to Ofcom a fee; their RSA grants will be tradable and convertible into licences.

3.6 Similar provisions would apply to the issue, variation and revocation of grants of RSA as apply to licences.

3.7 In making RSA available, receive-only earth station sites would access the spectrum on the same first come, first served basis as the currently licensed fixed links in the same frequency bands.

The case for introducing RSA for ROES in the proposed frequency bands

3.8 The reason we propose to make RSA for ROES available in the two additional frequency bands 7850 – 7900 MHz and 25.5 – 26.5 GHz is to respond to known demand from a small number of stakeholders planning to use earth stations to provide downlinks for future satellite and space missions. We are aware of one stakeholder who plans to use a ROES in the band 7850 – 7900 MHz for meteorological purposes at a site in Devon. There is also interest from some stakeholders to use ROES at two or three sites in the 25.5 – 26.5 GHz band to support future European EESS projects.

3.9 Currently, these two frequency bands are used in the UK by fixed point-to-point microwave links, which are licensed on a first-come, first-served basis. Without a means of recognising the existence and protection requirements of ROES, operators would run the risk of receiving interference from licensed fixed links.

3.10 This interference could seriously undermine the utility of the earth stations. Not only could this represent a problem for the operators with sunk investments in their earth station, it could represent a sub-optimal use of spectrum. Although the use of spectrum by receive-only earth stations is passive, their use of the spectrum is as legitimate as the active use of the same frequencies by licensed fixed link transmitters.

3.11 In general, creating circumstances in which more services can secure their spectrum access will increase the flexibility with which spectrum can be used. To the extent that additional services are higher value, this can increase the value created through use of the spectrum. In this context, we note that some of the services that receive-only earth station are likely to provide reflect high value use (some of which support safety of life services). However, it is important in this context that all users face

equivalent incentives to use the spectrum efficiently – and this can be achieved through the application of AIP-based fees. Furthermore, the application of spectrum trading for RSA will maximise the benefit to society by making the spectrum available to the highest value user.

Question 1) Do you agree that Ofcom should make RSA for receive-only earth stations (ROES) available in the frequency bands 7850 – 7900 MHz and 25.5 – 26.5 GHz? What is the source and scale of demand you foresee for the use of ROES in these bands?

Technical and geographic parameters

3.12 Given the susceptibility of interference to a receiving earth station, it is necessary to ensure sufficient technical and geographic separation between a ROES and transmitting fixed link stations operating within the same frequency band.

3.13 To allow Ofcom to carry out the necessary technical coordination, we propose that applicants for the grant of RSA for ROES in the bands 7850 – 7900 MHz and 25.5 – 26.5 GHz shall supply information consistent with the information which needs to be supplied for the grant of RSA in the existing bands 1690 – 1710 MHz, 3600 – 4200 MHz and 7750 – 7850 MHz, namely the following information:

- geographic location of the ROES;
- performance characteristics of the ROES antenna including diameter, gain and reference radiation pattern;
- the associated satellite and corresponding pointing angles (azimuth and elevation);
- characteristics of the radio emissions to be received including centre frequency, bandwidth and polarisation; and
- the maximum interference level that the ROES can tolerate.

3.14 In line with RSA for ROES in existing frequency bands, we intend to consider long-term interference propagation mechanisms using the methodology contained in the latest version of Recommendation ITU-R P.452.

Fees for grant of RSA for ROES in the proposed frequency bands

Proposed approach

3.15 Since the proposed grant of RSA to receive-only earth stations in the bands 7850 – 7900 MHz and 25.5 – 26.5 GHz will establish broadly similar rights to those held by existing licensed services in the band, we consider that receive-only earth station operators should pay equivalent fees, set using the principles of AIP.

3.16 There are two ways in which we could set fees for RSA in the additional bands:

- Set fees at a level which corresponds to fees that already apply to other associated spectrum users;

- Delay the introduction of RSA for ROES in the proposed bands until the completion of a full fee review.

3.17 We believe the former approach is more appropriate. Ofcom is currently undertaking a separate review of fees for fixed links and satellite earth stations which will consider the bands in which RSA for ROES is available and so we are minded not to carry out a review as part of this consultation whilst a separate review is taking place.

3.18 Delaying the introduction of RSA would postpone the benefits of providing access to the proposed frequency bands.

3.19 The fee proposals below should therefore be seen in light of the need to create a pragmatic interim approach which the full fee review is likely to revise.

Derivation of fees

3.20 Our proposed benchmark for deriving fees for RSA in the two additional frequency bands is the fees that are already charged for RSA for ROES in other bands. Our proposals for each of the bands, 7850 – 7900 MHz and 25.5 – 26.5 GHz, are detailed in the following sub-sections.

3.21 In each case, we propose to use the same fees structure that applies to RSA for ROES in existing frequency bands. This involves listing several different fee amounts with corresponding levels of single-entry interference that the ROES is able to tolerate. This allows the user to make choices about the level of interference that they are willing to pay for. It also allows the user to factor in any local interference shielding (e.g. from trees, fences or buildings) that in reality would provide additional interference mitigation to that which is considered in Ofcom's coordination software.

3.22 In line with the existing fees structure that applies to RSA for ROES in existing frequency bands, we propose to apply fees in a way that encourages geographic co-location of ROES and hence minimises the impact on other spectrum users. We propose to achieve this by charging fees based on the total bandwidth applied for at a given site, irrespective of the number of receive-only terminals. A site is to be defined as any location within 500 metres of a central location specified by the applicant. Furthermore, we propose that the minimum fee for a grant of RSA at a site is £500.

7850 – 7900 MHz

3.23 This band is adjacent to one of the bands that is already available for RSA for ROES, namely 7750 – 7850 MHz. The receive-only earth stations that are intended to use this new frequency range are likely to have the same characteristics and provide the same types of services to those that use the adjacent RSA band. Furthermore, the alternate user that ROES would share with in the new frequency band is also fixed links. For these reasons, we consider that the value of spectrum that ROES would use in the new band is the same as that in the existing RSA for ROES band. We therefore propose to charge fees for a grant of RSA for ROES in the band 7850 – 7900 MHz band at the same level as is already charged in the existing band, as shown in the table below.

Table 3.1 – Proposed fees for RSA for ROES in the band 7850 – 7900 MHz

	Single-Entry Interference		
	-156 dBW/MHz to less than -146 dBW/MHz	-146 dBW/MHz to less than -136 dBW/MHz	-136 dBW/MHz or higher
Fee/MHz	**£46**	**£33**	**£23**

25.5 – 26.5 GHz

3.24 In the July 2010 consultation on the introduction of RSA for ROES[12], we used the fees for RSA in the 3600 – 4200 MHz band as a basis for deriving fees for RSA in other bands. To ensure consistency in approach, we propose to use the same benchmark for deriving fees in the 25.5 – 26.5 GHz band. The fees charged for RSA for ROES in the 3600 – 4200 MHz band are as follows:

Table 3.2 – Fees for RSA for ROES in the band 3600 – 4200 MHz

	Single-Entry Interference			
	-161 dBW/MHz to less than -159 dBW/MHz	-159 dBW/MHz to less than -149 dBW/MHz	-149 dBW/MHz to less than -139 dBW/MHz	-139 dBW/MHz or higher
Fee/MHz	**£20**	**£17**	**£9**	**£4**

3.25 In using the 3600 – 4200 MHz band as a benchmark, there are three considerations that we need to make to derive the appropriate fee for the 25.5 – 26.5 GHz band:

- The change in frequency from around 4000 MHz to 26 GHz and the relative change in value of the bands;
- The values of single-entry interference (in dBW/MHz) and whether these are appropriate for the band 25.5 – 26.5 GHz;
- The type of ROES use in the 25.5 – 26.5 GHz band – i.e. whether the ROES operates with a satellite in geostationary satellite orbit (GSO) or non-geostationary satellite orbit (NGSO).

3.26 To address the change in frequency, we propose to scale the fee amount by using the associated band factors that are used in the fixed link fee algorithm[13]. The purpose of these band factors is to reflect the differences in the value of bands according to the degree of frequency congestion. The fixed link band factors for the frequency ranges 3600 – 4200 MHz and 24.50 – 29.06 GHz are 1.0 and 0.26 respectively, which gives a ratio of 0.26. Applying this ratio gives the following intermediate fees (i.e. amounts derived on the basis of a band factor adjustment), rounded to the nearest £, for the 25.5 – 26.5 GHz band:

[12] http://stakeholders.ofcom.org.uk/consultations/rsa-roes/
[13] See Statutory Instrument 2011 No.1128, Schedule 3: http://www.legislation.gov.uk/uksi/2011/1128/contents/made

Table 3.3 – Intermediate fees for RSA for ROES in the band 25.5 – 26.5 GHz

	Single-Entry Interference			
	-161 dBW/MHz to less than -159 dBW/MHz	-159 dBW/MHz to less than -149 dBW/MHz	-149 dBW/MHz to less than -139 dBW/MHz	-139 dBW/MHz or higher
Fee/MHz	**£5**	**£4**	**£2**	**£1**

3.27 We now consider whether the values of single-entry interference (in dBW/MHz) used for the band 3600 – 4200 MHz are appropriate for the band 25.5 – 26.5 GHz. Based on published figures[14] for certain types of earth station, values of long-term single-entry interference for the 25.5 – 26.5 GHz band range from -152 to -139 dBW/MHz. In practice, we could expect some earth stations to require interference protection at levels lower than -152 dBW/MHz. For example, an earth station with a relatively low receiving system noise temperature of 90 Kelvin would require protection from interference at a level of -159 dBW/MHz (assuming an interference-to-noise ratio, I/N, of -10 dB).

3.28 We therefore propose to use values of single-entry interference in the range -159 to -139 dBW/MHz, split into three separate ranges as shown in the table below.

Table 3.4 – Proposed values of single-entry interference for RSA for ROES in the band 25.5 – 26.5 GHz

Single-Entry Interference		
-159 dBW/MHz to less than -149 dBW/MHz	-149 dBW/MHz to less than -139 dBW/MHz	-139 dBW/MHz or higher

3.29 Finally, we are aware that the band 25.5 – 26.5 GHz is used for ROES that operate either to satellites in GSO or NGSO. ROES operating to NGSO satellites track the satellite across the sky and therefore will operate down to low elevation angles relative to the horizon. This means they are more susceptible to interference from terrestrial radio systems and hence have potential to impact on spectrum use over a wide geographical area. In contrast, ROES operating to GSO satellites will point in a fixed direction with generally higher elevation angles and so have less geographical impact on other users of spectrum.

3.30 We note that fees for RSA for ROES in the band 3600 – 4200 MHz were derived on the basis of ROES operating to satellites in GSO. Therefore we propose to derive the fees for ROES operating to GSO satellites in the band 25.5 – 26.5 GHz from a combination of the values in tables 3.3 and 3.4, as follows:

[14] Recommendation ITU-R SA.1027-4.

Table 3.5 – Proposed fees for RSA for ROES operating to GSO satellites in the band 25.5 – 26.5 GHz

	Single-Entry Interference		
	-159 dBW/MHz to less than -149 dBW/MHz	-149 dBW/MHz to less than -139 dBW/MHz	-139 dBW/MHz or higher
Fee/MHz	**£4**	**£2**	**£1**

3.31 To derive the appropriate fee for ROES operating to NGSO satellites in the band 25.5 – 26.5 GHz, we propose to consider the relative difference in geographical area impacted by ROES operating to GSO satellites and ROES operating to NGSO satellites. We then take the ratio of the two areas and apply this to the fee levels contained in table 3.5 to derive the appropriate fee for ROES operating to NGSO satellites.

3.32 The detailed methodology for calculating the impact areas is contained in Annex 4. It is shown that the ratio of the area impacted by a ROES operating to GSO satellite to a ROES operating to NGSO satellite is 1:5. Applying this factor to the fees in table 3.5 gives the proposed fees as shown in the table below.

Table 3.6 – Proposed fees for RSA for ROES operating to NGSO satellites in the band 25.5 – 26.5 GHz

	Single-Entry Interference		
	-159 dBW/MHz to less than -149 dBW/MHz	-149 dBW/MHz to less than -139 dBW/MHz	-139 dBW/MHz or higher
Fee/MHz	**£20**	**£10**	**£5**

3.33 In a situation where a single site for RSA contains both ROES operating to GSO and NGSO satellites, we propose to charge the highest fee amount for a given bandwidth.

3.34 Some examples of the fees that would be charged for RSA for ROES, based on the proposals above, are shown in Annex 5.

Question 2) Do you agree with the approach proposed to set fees for the grant of RSA for receive-only earth stations (ROES) in the bands 7850 – 7900 MHz and 25.5 – 26.5 GHz?

Term of grant

3.35 To be consistent with RSA for ROES in the existing bands, we propose that RSA for ROES should be granted for a rolling one-year term with no fixed end date but subject to a 5-year period of notice of revocation (except where necessary in the interests of national security, in the interests of safety of the public or public health, to comply with an international obligation or a direction from the Secretary of State). We consider that this would give sufficient security to RSA-holders while providing necessary flexibility for us to intervene to change use of the band if necessary and justified for spectrum management reasons.

Tradability and conversion

3.36 The WT Act empowers us to make regulations to make RSA tradable and for grants of RSA to be converted into WT licences and vice versa. In line with RSA for ROES in the existing bands, we propose to allow trading and conversion of grants of RSA for ROES in the two additional proposed bands.

3.37 We consider that the ability to trade grants of RSA and convert between WT licences and grants of RSA will help promote optimal use of the spectrum by enabling spectrum to be used for whichever type of radio service is most beneficial for society.

3.38 We propose to allow trading and conversion of grants of RSA for ROES under the same procedure for trading that already applies for RSA for ROES in other frequency bands, as set out in the Wireless Telegraphy (Recognised Spectrum Access and Licence) (Spectrum Trading) Regulations 2009[15] (as subsequently amended in 2011[16].

3.39 In summary, under these regulations it would be possible to:

- trade a grant of RSA in its entirety for a higher value application or partially by geographical area or frequency;
- undertake an outright trade in which the rights and obligations pass exclusively to the purchaser or a concurrent trade in which both parties enjoy rights to access the spectrum.

Publication of information

3.40 The availability of information about spectrum holdings that are tradable is desirable, not only to improve the effectiveness of spectrum trading in the bands, but also to assist other spectrum users in developing future plans for their use of spectrum. Publication of information about spectrum trades is required by the EU Framework Directive 2002/21/EC[17].

3.41 The detail that we publish has been decided following consultation and provides information that will be helpful, while avoiding publishing commercially or otherwise sensitive information. We publish information about assignments in the WT Register[18] (the WTR) and information about trades in the Transfer Notification Register[19] (the TNR).

3.42 In line with our policy, we intend to publish information about grants of RSA.

Process for granting RSA for ROES

3.43 We propose to treat applications for a grant of RSA for ROES in the proposed bands using the same general process as applies for ROES in the existing frequency bands. In considering applications for a grant of RSA, we will examine the application

[15] http://www.legislation.gov.uk/uksi/2009/17/contents/made
[16] See footnotes 8 and 9 above
[17] See Article 9(b) of Directive 2002/21/EC, as amended by Directive 2009/140/EC: http://europa.eu/legislation_summaries/information_society/legislative_framework/l24216a_en.htm#amendingact
[18] http://spectruminfo.ofcom.org.uk/spectrumInfo/licences
[19] http://spectruminfo.ofcom.org.uk/spectrumInfo/trades

against our database of licensed fixed point-to-point microwave links, in order to assess the predicted interference into the ROES.

3.44 Where the predicted interference level is below the acceptable threshold requested by the applicant, then a grant of RSA will be made and the ROES will be entered into our database and taken into account when we consider subsequent licence applications for fixed links.

3.45 Where the predicted interference level is above the acceptable threshold, then we will consult with the applicant and either:

- grant an RSA limited by an alternative level of predicted interference, if acceptable to the applicant; or
- not grant an RSA.

3.46 A sample grant of RSA for ROES is shown in Annex 6.

Implications for granting RSA

3.47 A logical consequence of providing formal recognition to receive-only earth station sites via grant of RSA is that it will preclude the licensing of those applications that would interfere with the receive-only earth station sites and vice versa. Hence, the introduction of RSA has the potential to reduce the remaining pool of spectrum and locations available to other users. As a consequence of opening up access of a band to new users, it is likely that the existing users will see an increase in competition for the same spectrum resource; but this is efficient, provided there are appropriate incentives, such as AIP based fees and trading, for all users to promote efficient use of spectrum.

3.48 The existing users of the bands 7850 – 7900 MHz and 25.5 – 26.5 GHz are operators of fixed point-to-point microwave links. There are nearly 200 links in the band 7850 – 7900 MHz and nearly 2900 links in the band 25.5 – 26.5 GHz. The majority of these links are bi-directional (i.e. two-way) point-to-point links.

3.49 Sharing of frequency bands by earth stations and fixed links is quite common in bands below about 30 GHz and Ofcom has experience of coordinating and assigning the use of frequencies between the two types of user. Our records show that there are very few cases where we have not been able to assign a fixed link in a given frequency band due to the presence of a nearby earth station. The expected number of receive-only earth stations in the two additional frequency bands is expected to be very low and so we expect there to be very little additional constraint on fixed links and other potential users of the bands.

3.50 Provided that we set the fee payable by the holders of a grant of RSA at the appropriate level to reflect the opportunity cost of the spectrum used and provide for trading, the mix of earth stations and fixed links in the bands should approximate to the optimal use of the band. This is because all licensed users or holders of a grant of RSA will be subject to fees that reflect the value of the alternative services and higher value users will be able to gain access to the spectrum through the market.

Question 3) Do you have any other comments on the process or conditions that we propose to apply to RSA for receive-only earth stations (ROES) in the bands 7850 – 7900 MHz and 25.5 – 26.5 GHz?

Section 4

Summary of questions

Question 1) Do you agree that Ofcom should make RSA for receive-only earth stations (ROES) available in the frequency bands 7850 – 7900 MHz and 25.5 – 26.5 GHz? What is the source and scale of demand you foresee for the use of ROES in these bands?

Question 2) Do you agree with the approach proposed to set fees for the grant of RSA for receive-only earth stations (ROES) in the bands 7850 – 7900 MHz and 25.5 – 26.5 GHz?

Question 3) Do you have any other comments on the process or conditions that we propose to apply to RSA for receive-only earth stations (ROES) in the bands 7850 – 7900 MHz and 25.5 – 26.5 GHz?

Section 5

Next Steps

5.1 We expect to release a Statement on this consultation in March 2015 having taken into account stakeholder responses to our proposals. Subject to the responses, we plan to accompany the Statement with a Notice that sets out our specific proposals to amend regulations that apply to RSA for ROES. Following the period allowed for making representations on the proposals set out in the Notice, and subject to responses received on the draft regulations, we plan to publish a Statement in June 2015 to set out our final decision on the regulations. We expect the regulations to come into force in July/August 2015.

Annex 1

Responding to this consultation

How to respond

A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 6 November 2014**.

A1.2 Ofcom strongly prefers to receive responses using the online web form at http://stakeholders.ofcom.org.uk/consultations/recognised-spectrum-access-receive-only-earth-stations/ , as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 3), to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web form questionnaire.

A1.3 For larger consultation responses - particularly those with supporting charts, tables or other data - please email RSA@ofcom.org.uk attaching your response in Microsoft Word format, together with a consultation response coversheet.

A1.4 Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation.

James Richardson
03:60
Spectrum Policy Group
Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA

Fax: 020 7981 3990

A1.5 Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.

A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together in Section 4. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

Further information

A1.7 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact James Richardson on 020 7981 3154.

Confidentiality

A1.8 We believe it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all

responses on our website, www.ofcom.org.uk, ideally on receipt. If you think your response should be kept confidential, can you please specify what part or whether all of your response should be kept confidential, and specify why. Please also place such parts in a separate annex.

A1.9 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.

A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website at http://www.ofcom.org.uk/about/accoun/disclaimer/

Next steps

A1.11 Following the end of the consultation period, Ofcom intends to publish a statement and notice on draft regulations in March 2015.

A1.12 Please note that you can register to receive free mail Updates alerting you to the publications of relevant Ofcom documents. For more details please see: http://www.ofcom.org.uk/static/subscribe/select_list.htm

Ofcom's consultation processes

A1.13 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.

A1.14 If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at consult@ofcom.org.uk . We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, who are less likely to give their opinions through a formal consultation.

A1.15 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Graham Howell, Secretary to the Corporation, who is Ofcom's consultation champion:

Graham Howell
Ofcom
Riverside House
2a Southwark Bridge Road
London SE1 9HA

Tel: 020 7981 3601

Email Graham.Howell@ofcom.org.uk

Annex 2

Ofcom's consultation principles

A2.1 Ofcom has published the following seven principles that it will follow for each public written consultation:

Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. 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

A2.3 We will be clear about who we are consulting, why, on what questions and for how long.

A2.4 We will make the consultation document as short and simple as possible with a summary of no more than two pages. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened Plain English Guide for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.5 We will consult for up to 10 weeks depending on the potential impact of our proposals.

A2.6 A person within Ofcom will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. Ofcom's 'Consultation Champion' will also be the main person to contact with views on the way we run our consultations.

A2.7 If we are not able to follow one of these principles, we will explain why.

After the consultation

A2.8 We think it is important for everyone interested in an issue to see the views of others during a consultation. We would usually publish all the responses we have received on our website. In our statement, we will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

Annex 3

Consultation response cover sheet

A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, www.ofcom.org.uk.

A3.2 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.

A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.

A3.4 We strongly prefer to receive responses via the online web form which incorporates the coversheet. If you are responding via email, post or fax you can download an electronic copy of this coversheet in Word or RTF format from the 'Consultations' section of our website at www.ofcom.org.uk/consult/.

A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we don't have to edit your response.

Cover sheet for response to an Ofcom consultation

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 ☐

Whole response ☐

Part of the response ☐

Name/contact details/job title ☐

Organisation ☐

If there is no separate annex, 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)?

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 seeks to publish responses on receipt. 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)

Annex 4

Derivation of Fees proposed for ROES operating to NGSO satellites in the band 25.5 – 26.5 GHz

A4.1 This annex sets out how we propose to derive the appropriate fees for ROES operating to NGSO satellites in the band 25.5 – 26.5 GHz.

A4.2 In section 3 of this consultation, we proposed to consider the difference in geographical area impacted by spectrum used by ROES operating to GSO satellites and ROES operating to NGSO satellites, to derive the appropriate fees for a grant of RSA for ROES operating to NGSO satellites in the band 25.5 – 26.5 GHz. The methodology and derivation of the proposed fees is described below.

A4.3 To determine the size of the geographical area impacted by a ROES we must first consider a typical source of interference – in this case a typical 26 GHz fixed point-to-point microwave link. From Ofcom's database of licensed fixed links, a typical fixed link transmitter has the following characteristics:

Table A4.1 – Typical parameters of a fixed link transmitter in the 26 GHz band

Antenna height above ground (m)	25
Antenna gain (dBi)	36.6
Transmit Power (dBW)	-16.9
Channel Spacing (MHz)	28

A4.4 Similarly, we must also establish the typical parameters of ROES operating to GSO satellites and a ROES operating to NGSO satellites. For each type of ROES, we consider the same basic antenna characteristics and interference threshold. The only difference is the pointing characteristics of the antennas.

A4.5 As explained in section 3 of this consultation, the proposed fee for a grant of RSA for ROES would cover any number of earth stations at a given site, where a site is defined as any location within 500 metres of a central location specified by the applicant. Therefore, in considering the impact of ROES use at a site, we must consider a typical scenario where a single ROES at a site has the ability to operate to more than one satellite.

A4.6 In the case of ROES operating to GSO satellites, we consider a scenario where one ROES has flexibility to point to three different GSO satellites located at 30 degrees longitude west, 0 degrees longitude and 30 degrees longitude east. For ROES operating to NGSO satellites, we consider one ROES that has the ability to track the satellite down to a minimum elevation angle of 5 degrees at any point above the horizon. We consider only one ROES in the NGSO case because our coordination algorithms consider single-entry interference and so the area impacted by one ROES is the same as the area impacted by multiple ROES located at a site.

A4.7 The typical parameters of each type of ROES are shown in the following two tables.

Table A4.2 – Typical parameters of a ROES operating to GSO satellite at 26 GHz

Antenna height above ground (m)	5
Antenna gain (dBi)	53
Antenna radiation pattern	Recommendation ITU-R S.580-6[20]
Single-entry interference level (dBW/MHz)	-149
Satellite orbital positions (degrees longitude)	-30, 0, +30 [21]

Table A4.3 – Typical parameters of a ROES operating to NGSO satellite at 26 GHz

Antenna height above ground (m)	5
Antenna gain (dBi)	53
Antenna radiation pattern	Recommendation ITU-R S.580-6[22]
Single-entry interference level (dBW/MHz)	-149
Minimum elevation angle (degrees)	5[23]
Antenna gain towards horizon (dBi)	11.5

A4.8 To assess the impact of each type of ROES on the typical fixed link, we consider the worst case, long-term interference (20%) impact area around the earth station using the radio propagation model in Recommendation ITU-R P.452-15, assuming smooth-earth diffraction. For each case, we assume that the fixed link interfering transmitter is pointing directly at the ROES. The results are shown in the two figures below.

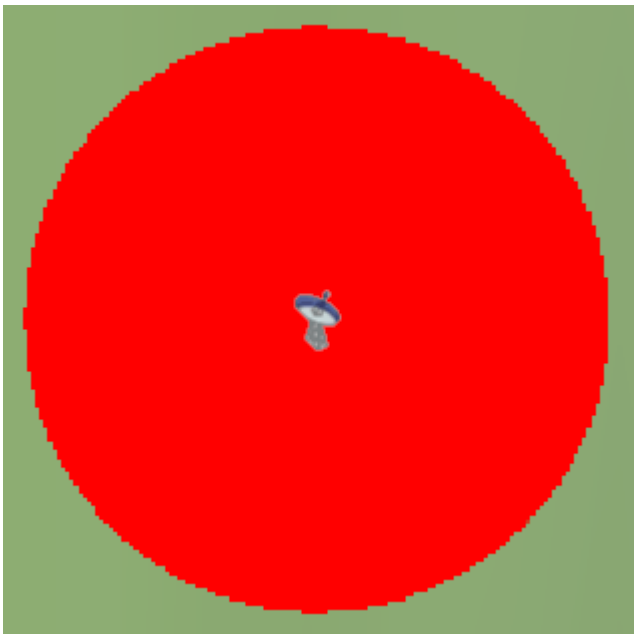
A4.9 In each figure, the ROES is positioned in the middle of the drawing and the area coloured red shows the geographical impact area. The impact area is the area within which a typical fixed link transmitter would exceed the required single-entry interference level of the ROES.

Figure A4.1 – Impact area of a ROES operating to GSO satellite at 26 GHz

Area impacted = 716 km^2

[20] http://www.itu.int/rec/R-REC-S/recommendation.asp?lang=en&parent=R-REC-S.580
[21] An earth station pointing to a GSO satellite located at -30 or +30 degrees longitude equates to an elevation angle of approximately 24 degrees.
[22] http://www.itu.int/rec/R-REC-S/recommendation.asp?lang=en&parent=R-REC-S.580
[23] See Recommendation ITU-R SA.1027-4.

Figure A4.2 – Impact area of a ROES operating to NGSO satellite at 26 GHz



Area impacted = 3604 km^2

A4.10 The results of this analysis show that the geographical area impacted by a ROES operating to NGSO satellites (3604 km^2) is approximately five times bigger than the area impacted by a ROES operating to GSO satellites (716 km^2). We therefore propose that the relative spectrum fee for RSA for ROES operating to NGSO satellites should be five times greater than the fee for a ROES operating to GSO satellites.

A4.11 Taking the proposed fees already derived for ROES operating to GSO satellites (see section 3, table 3.5), we then derive fees for ROES operating to NGSO satellites, as shown in the table below.

Table 4.4 - Derived fees for RSA for ROES operating to NGSO satellites in the band 25.5 – 26.5 GHz

	Single-Entry Interference		
	-159 dBW/MHz to less than -149 dBW/MHz	-149 dBW/MHz to less than -139 dBW/MHz	-139 dBW/MHz or higher
Fee/MHz	**£20**	**£10**	**£5**

Annex 5

Examples of fees for grants of RSA for ROES

A5.1 The following table provides three examples of the fees that would be charged for the grant of RSA for ROES based on the proposals in this consultation.

A5.2 Each example represents a single RSA grant that covers a site where ROES are being used. Each row of data (ROES 1, ROES 2 etc) represents a unique combination of frequency range and required single-entry interference level. A row does not necessarily represent a unique earth station. For example, ROES 2 and ROES 4 in Example 3 could represent the same earth station that has the ability to operate over two different frequency ranges, perhaps to two different GSO satellites. This is consistent with the proposals in section 3 of this consultation whereby fees would be charged based on the total bandwidth applied for at a given site, irrespective of the number of receive-only terminals.

Table A5.1 – Example fees for grants of RSA for ROES

	Frequency range	Type of use (GSO or NGSO)	Required single-entry interference level (dBW/MHz)	Annual RSA fee
Example 1:				
ROES 1	7850 – 7900 MHz	-	-140	£2,050
ROES 2	25.5 – 25.6 GHz	GSO	-156	
Example 2:				
ROES 1	7850 – 7890 MHz	-	-147	£3,640
ROES 2	26.0 – 26.5 GHz	GSO	-141	
ROES 3	26.1 – 26.5 GHz	GSO	-152	
Example 3:				
ROES 1	7850 – 7870 MHz	-	-136	£7,860
ROES 2	25.5 – 25.8 GHz	GSO	-144	
ROES 3	25.7 – 26.0 GHz	NGSO	-156	
ROES 4	26.0 – 26.5 GHz	GSO	-146	
Notes: Example 1: (50 MHz at £33/MHz) + (100 MHz at £4/MHz) = £2,050 Example 2: (40 MHz at £46/MHz) + (100 MHz at £2/MHz) + (400 MHz at £4/MHz) = £3,640 Example 3: (20 MHz at £23/MHz) + (700 MHz at £2/MHz) + (300 MHz at £20/MHz) = £7,860				

Annex 6

Sample RSA Grant

Wireless Telegraphy Act 2006

Notification of RECOGNISED SPECTRUM ACCESS (RSA) grant by the Office of Communications ("Ofcom") under section 18 of the Wireless Telegraphy Act 2006 ("the Act")

Product Code	
RSA grant reference number	
RSA	
RSA grant holder	
RSA grant holder address	
Date of granting	
RSA start date	
RSA renewal date	
Fee payment date	

PART 1 - GENERAL

1. In granting this Recognised Spectrum Access ("RSA") the Office of Communications ("Ofcom") recognises the use of frequencies in the electromagnetic spectrum in Schedule 1 by

<Organisation and address>

for wireless telegraphy subject to the conditions and restrictions in the terms below.

RSA Term

2. This grant of RSA shall commence on <date> and continue in force unless revoked by Ofcom in accordance with paragraph 3.

Revocation and Variation of RSA

3. Pursuant to Schedule 2 to the Act Ofcom may only revoke this RSA:
   a. at the request of, or with the consent of the grantee; or
   b. with 5 years notice served on the grantee; or
   c. immediately (subject to the procedures in the Act) if it appears to Ofcom to be necessary or expedient to revoke the RSA for the purposes of complying with a direction by the Secretary of State given to Ofcom under section 5 of the Act, or under sections 5 and 132 of the Communications Act 2003; or

d. immediately (subject to the procedures in the Act) in accordance with any international statutory obligations placed on Ofcom under European Community or other agreement which may affect the spectrum recognised; or
e. if there has been a failure to pay the fee prescribed in accordance with paragraph 8; or
f. if there has been a material breach of any of the terms of this RSA by the grantee; or
g. if, in connection with the transfer or proposed transfer of rights and obligations arising by virtue of this RSA, there has been a breach of any provision of any regulations made by Ofcom under the powers conferred by section 30 of the Act.

4. The grantee may surrender all or part of this RSA at any time during the term.

5. Where Ofcom exercises its power to revoke or vary this RSA in accordance with Schedule 2 to the Act, the grantee shall be notified in writing.

Changes

6. This RSA is transferable.

7. The RSA grantee must give immediate notice to Ofcom in writing of any changes in the details of the name and address from that recorded above.

RSA Fees

8. The grantee shall pay Ofcom the relevant sums as provided in the fee regulations made from time to time under section 21 of the Act, payable;
    h. on or before the date of this RSA; and
    i. on or before the payment date shown on this RSA for subsequent payments or such other date or dates as shall be notified in writing to the holder (if this RSA Grant is renewable),

    in accordance with those fee regulations and any relevant terms of this RSA, failing which Ofcom may revoke this grant of RSA.

9. If this RSA is surrendered or revoked, no refund, whether in whole or in part of any amount which is due under the terms of this RSA or provided for in any regulations made by Ofcom under section 21 of the Act will be made, except at the absolute discretion of Ofcom and in accordance with those regulations.

PART 2 – RECOGNISED SPECTRUM USE

Recognised location of spectrum use

10. The spectrum use recognised by this RSA is at the locations of the wireless telegraphy stations which are specified in Schedules 1.

Recognised purpose of spectrum use

11. This RSA applies in relation to receive-only use of the electromagnetic spectrum for wireless telegraphy at ground level at the locations specified in Schedules 1.

Recognised frequencies

12. The frequency bands of use recognised in this RSA are specified in Schedules 1.

Recognised interference levels

13. At the input to the receivers of the stations identified in Schedule 1, the recognised maximum long term single entry level of interference, arising from other authorised users who operate within the recognised frequencies identified in column 3 of Schedule 1, is set out in column 4 of Schedule 1 (the "single entry interference level").

14. In recognising use of the radio spectrum by the grantee, Ofcom undertakes to take the RSA into account when carrying out the functions referred to in section 20(1) of the Act to the same extent as Ofcom would take into account a wireless telegraphy licence with terms, provisions and limitations making equivalent provision and, in that regard, subject to paragraphs 15 and 16, when granting wireless telegraphy licences under section 8 of the Wireless Telegraphy Act 2006 and making grants of recognised spectrum access under the Act, Ofcom will not authorise transmissions

    a. Where the effect of such a grant would be to increase the level of radio emissions received at the input to the receiver of the station whose location is stated in Schedule 1, above the single entry interference level set out in column 4 of Schedule 1.

15. Notwithstanding paragraph 14, Ofcom will authorise transmissions by grant of a wireless telegraphy licence or by a grant of recognised spectrum access where it appears to Ofcom to be requisite or expedient to do so -
    a. in the interests of national security, or

b. for the purposes of complying with a European Community obligation of the United Kingdom or with any international agreement or arrangement to which the United Kingdom is a party;
c. for the purposes of complying with a direction by the Secretary of State given to Ofcom under section 5 of the Communications Act 2003 or section 5 of the Wireless Telegraphy Act 2006.

16. Nothing in this grant of RSA provides any undertaking in relation to any interference (including harmful interference) which may arise from factors and sources outside Ofcom's control including, without limitation, natural phenomena such as atmospheric pressure, unlicensed users, users outside the United Kingdom and licence exempt use.

Interpretation

17. In this grant of RSA:
    a. "wireless telegraphy" has the meaning set out in section 116 of the Act
    b. "dBW/MHz" means decibels relative to one Watt of power per bandwidth of one Megahertz of frequency

Schedule 1

RSA Grant No		**Grant version date**		**Payment Interval**	*1 Year*

RSA Centre Point	

Earth Station Name	**Earth Station NGR**	**Recognised frequencies MHz**		**Single entry interference level (dBW/MHz)**
		From	**To**	

Annex 7

Glossary

AIP	Administered incentive pricing. A fee charged to users of the spectrum to encourage them to make economically efficient use of their spectrum.
dB	Decibel. A notation for dealing with ratios that vary over several orders of magnitude by using logarithms.
dBi	Decibel isotropic
dBW	Decibel watt. The power ratio in decibels (dB) of the measured power referenced to one watt (W).
dBW/MHz	Decibel watt per megahertz. The amount of power in a bandwidth of 1 megahertz.
EESS	Earth exploration-satellite service. A satellite radiocommunication service which obtains information relating to the characteristics of the Earth and its natural phenomena from active or passive sensors on the satellite, and distributes this information to earth stations.
EIA	Equality impact assessment
GHz	Gigahertz. A unit of frequency of one billion oscillations per second.
GSO	Geostationary satellite orbit. The orbit of a satellite whose circular and direct orbit lies in the plane of the Earth's equator and which remains fixed relative to the Earth's surface.
ITU	International Telecommunication Union – part of the United Nations with a membership of 193 countries and over 700 private-sector entities and academic institutions. ITU is headquartered in Geneva, Switzerland.
ITU-R	International Telecommunication Union radiocommunication sector
MetSat service	Meteorological-satellite service. A type of earth exploration-satellite service for meteorological purposes.
MHz	Megahertz. A unit of frequency of one million oscillations per second.
NGSO	Non-geostationary satellite orbit
RAS	Radio astronomy. Astronomy based on the reception of radio waves of cosmic origin.
ROES	Receive-only earth station. A satellite earth station which receives radio signals but does not transmit.

RSA	Recognised spectrum access. A method of recognising the use of radio spectrum by an operator which is not covered by a Wireless Telegraphy Act licence or licence exemption.
SRS	Space research service. A radiocommunication service in which spacecraft or other objects in space are used for scientific or technological research purposes.
STFC	Science and Technology Facilities Council
TNR	Transfer notification register. Ofcom's online register which provides information on licences which have been traded or are in the process of being traded.
WRC-12	World Radiocommunication Conference 2012. The WRC reviews and revises the Radio Regulations. They are held every three to four years.
WT Act	Wireless Telegraphy Act 2006
WTR	Wireless telegraphy register. Ofcom's online register which provides information about individual licences.