Recognised Spectrum Access ("RSA") for Receive Only Earth Stations in the Bands 1690 – 1710 MHz, 3600 – 4200 MHz and 7750 – 7850 MHz

Consultation

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Contents

Section 1

Summary

Purpose of this consultation

1.1 This consultation sets out proposals to introduce recognised spectrum access (RSA) for receive-only earth stations[1] in the bands 3600 - 4200 MHz for the Fixed Satellite Service ("FSS") and the bands 1690 – 1710 MHz and 7750 – 7850 MHz for the Meteorological Satellite Service ("MetSat"). This is in response to representations from receive-only earth station operators in these bands and comments made in the regulatory report of the UK Space Innovation and Growth Team[2].

1.2 Our proposals are specific to these bands and limited to them. They will be of interest to all current and prospective users of the bands, both satellite and terrestrial.

The reason for our proposals

1.3 We are proposing the introduction of Recognised Spectrum Access ("RSA") in these bands because several receive-only earth station operators have requested formal recognition[3] in our spectrum management and planning process in order to limit the possibility of interference from sharing terrestrial services in the bands. The grant of RSA would have the effect of requiring Ofcom under section 20 of the Wireless Telegraphy Act 2006 ("the WT Act") to take account of specific receive-only earth stations on a comparable basis to a licensed use.

1.4 All three bands are used by the meteorological service, either to receive weather information from satellites or in order to distribute weather information to airports. In addition the band 3600 – 4200 MHz is used to monitor overseas news broadcasts and to distribute programmes to UK terrestrial facilities for onward distribution.

RSA will be voluntary

1.5 It is emphasised that application for a grant of RSA would be voluntary. Should we confirm our proposal (which is subject to consultation), receive-only earth stations operating in the bands in question will continue to operate lawfully, as they do at present, without holding a grant of RSA.

The advantages of RSA

1.6 For terrestrial services, the individual licensing of transmitters provides the means by which we obtain information about spectrum use and plan assignments to avoid harmful interference.

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[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 communication with one or more *space stations*.

[2] The Potential Impact of Regulatory, Policy Implementation and Legal Issues on the Market and Operation of Space-Enabled Services: http://www.spaceigs.co.uk/documents/index/index/cPath/22/

[3] By "formal recognition" we mean the specific statutory obligation on us under section 20(2) of the Wireless Telegraphy Act 2006 to take grants of RSA into consideration in carrying out the functions specified in section 20(1) of the same Act.

1.7 In the case of receive-only earth stations, since they are unlikely to cause harmful interference to other users of spectrum, they are exempt from licensing[4]. As such, we have no information about their geographical location or the frequencies on which they operate, which makes it difficult for us to take account of them. Grants of RSA would give us information about receive-only earth stations and their use of spectrum, putting us in a better position to plan terrestrial assignments in a way that avoids harmful interference to them.

1.8 RSA can also be subject to mechanisms, such as administered incentive pricing ("AIP") and spectrum trading, to incentivise users to make more effective choices about the way in which they use spectrum, encouraging efficient use of the spectrum and so maximising the benefits to society from the use of the bands.

1.9 The introduction of RSA in these bands will allow operators of receive-only earth stations to continue to provide valuable services with enhanced confidence about the levels of interference they can expect to receive.

Focus of the Consultation

1.10 This consultation seeks views on the principle of introducing RSA for receive-only earth stations in the bands specified, the technical parameters proposed to be used to define grants of RSA and our approach to pricing, trading and liberalisation in relation to the services in the bands.

[4] Under section 8(4) of the Wireless Telegraphy Act 2006, we are required to exempt equipment that is unlikely to cause harmful interference.

Section 2

Introduction and Background

Document Structure

2.1 The document is structured as follows:

- Section 2 sets out a general description of our approach to managing radio spectrum and of the receive-only earth stations covered by this consultation;
- Section 3 sets out a general description of RSA;
- Section 4 sets out Ofcom's consideration and proposals for the introduction of RSA in relation to receive-only earth stations in the specific bands in question;
- Section 5 sets out a provisional timetable and next steps.

2.2 This section provides background information on our approach to managing the radio spectrum and the use of radio spectrum for the receive-only earth stations in the specific frequency bands covered by this consultation. It is limited to those bands and the specific circumstances described. We would not introduce RSA for receive-only earth stations in other bands without first consulting on so doing.

Managing the radio spectrum

The legal framework

2.3 When carrying out functions under enactments relating to the management of the radio spectrum, we must act in accordance with various statutory duties including the duties set out under sections 3 and 4 of the Communications Act 2003 and section 3 of the WT Act. In particular, section 3 of the WT Act provides that Ofcom must have regard to:

- the extent to which the electromagnetic spectrum is available for use, or further use, for wireless telegraphy;
- the demand for use of that spectrum for wireless telegraphy;
- the demand that is likely to arise in future for the use of that spectrum for wireless telegraphy;

  the desirability of promoting:

  - the efficient management and use of the part of the electro-magnetic spectrum available for wireless telegraphy;
  - the economic and other benefits that may arise from the use of wireless telegraphy;
  - the development of innovative services; and
  - competition in the provision of electronic communications services.

2.4 Section 8(1) of 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.

2.5 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.

2.6 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.

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

(i) a person is proposing to use or to continue to use a station or apparatus for wireless telegraphy;

(ii) the circumstances of the use are circumstances specified for the purposes of that section in regulations made by Ofcom;

(iii) 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

(iv) 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.

2.8 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.

2.9 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.

2.10 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:

(i) time limits for dealing with applications for a grant of RSA;

(ii) requirements which must be met before a grant is made; and

(iii) the restrictions and conditions to which a grant may be made subject

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

2.12 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).

2.13 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.

The radio spectrum and its value

2.14 Radio spectrum is a valuable resource. Television and radio broadcasting, mobile telephone networks, emergency services, radar and many other services and applications all depend on access to it.

2.15 The radio spectrum is finite in that use of spectrum for one purpose or by one user will generally exclude or limit its use by others. This means that use of spectrum imposes a cost on society where there is insufficient spectrum available to meet demand for it, whether for the existing or an alternative use. That cost is referred to as the 'opportunity cost'. It represents the value to society of the most valuable alternative use of the spectrum that is forgone.

The need for spectrum management

2.16 Unless spectrum use is carefully managed and planned, it is likely that interference between different users will greatly diminish its value for communications and other purposes. This is the reason why the use of spectrum is co-ordinated between different services and different users nationally and internationally. Earth station receivers can be particularly vulnerable to interference from terrestrial transmissions because of the low received powers involved.

Our approach to managing the radio spectrum

2.17 Faced with evidence of actual and potential spectrum shortfalls in many frequency bands[5] , we consider that the mechanism by which frequencies are allocated and assigned plays a key role in securing optimal use of spectrum. Changes in technology and also in consumer preferences either leading or responding to technological advances have become more frequent in recent years. As a result, it has become increasingly unlikely that any regulator can have sufficient information or foresight to predict which technology or service will generate greatest benefits for society. Moreover, regulation often takes a long time to change, and as a result cannot keep up with the pace of change.

[5] See Spectrum Demand for Non-Government Services 2005-2025, 1 September 2005 by Analysys and Mason, http://www.spectrumaudit.org.uk/pdf/spectrum_demand.pdf and Predicting Areas of Spectrum Shortage by PA Consulting, 7 April 2009 at http://www.ofcom.org.uk/research/technology/research/spec_future/predicting/shortage.pdf

2.18 Accordingly, as explained in our Spectrum Framework Review,[6] and more recently the Strategic Review of Spectrum Pricing ("SRSP"),[7] we have progressively moved from 'command and control', in which the regulator specifies, often in considerable detail, which technologies and services will access the spectrum, towards a more market-led approach, in which spectrum users are given greater flexibility to decide how best to use spectrum. We believe that allowing users to take decisions within an overall framework of appropriately liberalised regulation is more likely to secure optimal use of the radio spectrum over time. This is because users have better knowledge than the regulator of their own costs and consumer preferences and a strong incentive to respond to market signals, such as prices, to put resources to the best possible use. However, we recognise that regulation will inevitably continue to be necessary in certain circumstances.

2.19 We use a range of complementary spectrum management tools.

- *AIP* enables us to set fees for WT licences and grants of RSA at a level that will incentivise users to make better choices over the way in which they use spectrum. AIP is applied for spectrum management purposes and not to raise revenue as explained in our consultation on a revised framework for spectrum pricing[7].

- *Spectrum auctions* are a tool for awarding spectrum to those that can make the best possible use of it.

- *Spectrum trading* allows users and prospective users to trade access to spectrum and transfer it to the user that can use it most productively to yield the largest possible benefit to society.[8] RSA may be tradable and we may also provide for trading to involve conversion between WT licences and grants of RSA.

- *Liberalisation*: the specification of licence conditions that provide for as much flexibility as is possible, subject to the requirements of managing interference with other users, enables spectrum to be employed for the services that are most productive and yields the largest possible benefit to society. [9]

- *Regulation* may be necessary to prevent or deal with market competition, to secure compliance with international obligations or to comply with directions from the Secretary of State. Where regulation is necessary, we intervene in a way that is proportionate and consistent with our duty to avoid imposing or maintaining unnecessary burden.[10]

Satellite Services

2.20 Satellite services consist of various types of satellite radio communication services. Those that use the frequency bands that are the subject of this consultation are:

- the Fixed Satellite Service ("FSS"); and

[6] http://www.ofcom.org.uk/consult/condocs/sfr /
[7] http://www.ofcom.org.uk/consult/condocs/srsp/
[8] See our consultation and interim statement on simplifying spectrum trading http://www.ofcom.org.uk/consult/condocs/simplify/
[9] See our consultation and statement on spectrum liberalisation http://www.ofcom.org.uk/consult/condocs/liberalisation2/
[10] Section 6 of the Communications Act 2003

- the Meteorological Satellite Service ("MetSat"

The Fixed Satellite Service (FSS)

2.21 FSS is a radio communication service between fixed earth stations at given positions with one or more satellites. There are currently three main types of licence product for FSS. These are Earth Station Network ("VSAT"), Permanent Earth Stations ("PES") and Transportable Earth Stations ("TES").

2.22 Typical uses for FSS services are:

- international telephony;
- international data communications;
- feeder Links to other satellite services ("BSS" and "MSS");
- direct- to-home television and radio;
- point-of-sale communications;
- data feeds from National Lottery terminals;
- live outside broadcasting communications/satellite news gathering;
- corporate networks; and
- broadband access and data connectivity in remote locations.

The Meteorological Satellite Service (MetSat)

2.23 Although MetSat covers both earth stations and the satellites themselves, the proposals in this consultation relate only to MetSat receive-only earth stations that receive information, relating to the characteristics of the Earth and its natural phenomena, transmitted by meteorological satellite systems.

2.24 This service is predominantly used in the UK for reception of information regarding global and regional weather patterns and measurements and is used by the Meteorological Office and others in order to provide both weather forecasts and early warnings of adverse conditions, such as storms and floods.

Sharing Services

2.25 The three receive-only earth station bands being considered in this consultation are all shared with terrestrial point-to-point microwave radio links. In addition, in the band 3600 – 4200 MHz Broadband Wireless Access ("BWA") services, including mobile applications, operate in the bands 3605 – 3689 MHz and 3925 - 4009 MHz. In all three of the bands concerned, the sharing services and applications have co-primary status and operate on a first come first served basis within our assignment processes.

2.26 As a matter of practicality, we cannot plan terrestrial assignments to take account of reception of FSS unless we know where the receive-only earth stations are and the frequencies on which they operate. We are required to exempt receive-only earth

stations from individual licensing and so have no information about their geographical location or the frequencies on which they operate. This makes it difficult for us to take account of them. Grants of RSA would give us information about receive-only earth stations and their use of spectrum, putting us in a better position to plan terrestrial assignments in a way that avoids harmful interference to them.

Impact Assessment

2.27 Impact Assessments (IAs) provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice in policy-making. This is reflected in Section 7 of the Communications Act 2003, which states that we generally have to carry out IAs where our proposals would be likely to have a significant effect on businesses or the general public or when there is a major change in Ofcom's activities. As a matter of policy, Ofcom is committed to carrying out and publishing impact assessments in relation to the great majority of our policy decisions. For further information about our approach to IAs, see the guidelines Better Policy-Making: Ofcom's Approach to Impact Assessment at http://www.ofcom.org.uk/consult/policy_making/guidelines.pdf .

2.28 The analysis presented in this document, constitutes an IA for our proposals to introduce the grant of RSA to receive-only earth stations in the bands specified. Where possible, we have given quantitative estimates as well as qualitative assessments of the effects of our proposals, although the former are subject to a margin of uncertainty as we cannot be certain how many operators will apply for RSA. Annex 7 contains a summary table of our impact assessment

2.29 You should send us any comments on this IA, along with answers to questions asked, by the closing date for this consultation. We will consider all comments before deciding whether to implement our proposals.

2.30 As part of our IA, we have considered whether we are required to undertake a full Equality Impact Assessment (EIA) for our proposals in order to identify whether they would have particular effects on specific groups within society. On the basis of our initial EIA screening we have determined that this is not necessary because our proposed grant of RSA and the fees involved do not raise specific equality issues; they will affect spectrum users, consumers and citizens equally, regardless of race, gender or disability.

Section 3

Recognised Spectrum Access – General Description

Introduction

3.1 This section provides a more detailed description of the main features of RSA.

3.2 If a service is unlikely to involve any undue interference with wireless telegraphy, then we are required by section 8 of the WT Act to exempt it from licensing[11] .

3.3 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 be made tradable. The relevant provisions have since been consolidated in sections 18 to 26 of the WT Act.

3.4 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.

3.5 Currently, in planning the use of the radio spectrum, we aim to provide a certain level of freedom from unwanted emissions for licensed services. In order to avoid undue interference to these services, we need to know where they are and their operating frequencies. For terrestrial services, the individual licensing of transmitters provides the means by which we obtain information about spectrum use and plan assignments to avoid harmful interference to receivers.

3.6 However, the users of receive-only earth stations are not required to hold a WT Act licence. We cannot license either the transmitters, which are on satellites outside UK jurisdiction, or the earth station receivers which, since they are unlikely to cause interference to other services, are exempt from licensing. RSA provides a mechanism for us to obtain information on where receive-only earth stations are and to give them formal recognition, thus allowing us to take account of them in our spectrum planning and management.

3.7 The introduction of RSA in these bands will help us ensure that the operators of receive-only earth stations can continue to provide valuable services with enhanced confidence about the levels of interference they can expect to receive.

3.8 In each of the bands that are covered by this consultation, receive-only earth station operators have asked us to introduce RSA. This consultation responds to their requests.

3.9 RSA also enables the application of incentives to maximise the benefits to society from the use of the frequency bands in question.

[11] 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.

3.10 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.

3.11 RSA may also be made tradable. Through the introduction of spectrum trading a holder of RSA may decide to:

- move to another band or to a non-radio platform if the cost is less than the AIP; or
- continue to operate in the same band with RSA if the benefits of a trade are insufficient; or
- trade the grant of RSA for conversion to a WT Act licence or vice versa if the new user is willing to offer an amount that exceeds the value of holding the grant of RSA. The conversion of a grant of RSA to a WT Act licence is necessary in these circumstances as RSA does not authorise the use of spectrum for transmission; or
- continue to operate in the same band without RSA if the benefits of formal recognition are less than the cost of the AIP charge.

3.12 In the first three cases, society would benefit as the spectrum will become available for a higher value use, and in the last case the spectrum is already held by the highest value user.

3.13 These issues are explored further in paragraphs 4.40 et seq. below.

Experience of RSA to date

3.14 The first grant of RSA for receive-only applications was made for radio astronomy in 2008[12] and has resulted in significant improvement in spectrum sharing by that service while providing greater security that observations will not be subject to interference from terrestrial services.

3.15 In addition to RSA for receive-only applications such as radio astronomy, we have also introduced the concept of Crown RSA to release spectrum to the market for commercial use in bands that are predominantly used or managed by Crown bodies and are thus not subject to WT Act licensing.

3.16 Under Crown RSA, we have made regulations to allow RSA to be granted in the 406.1 - 430 MHz band[13]. Two grants have so far been made in that band. One, localised to the Channel Tunnel, has been traded and negotiations are progressing for the trade and conversion to a WT licence of the other. We have also consulted on introducing RSA for Crown bodies in the 3.4 - 3.6 GHz band[14].

Issues to be considered before introducing RSA in a specific band

3.17 A number of issues need to be considered before RSA can be introduced for particular applications. These may be summarised as follows:

[12] http://www.ofcom.org.uk/consult/condocs/rsa/rsa_radio_astronomy/
[13] http://www.ofcom.org.uk/consult/condocs/sfrps/ and http://www.ofcom.org.uk/consult/condocs/sfrps08/
[14] http://www.ofcom.org.uk/consult/condocs/3_4ghz/

- whether the introduction of RSA would help secure optimal use of the radio spectrum in the particular circumstances of the band in question;
- process for initial grant of RSA;
- setting technical and/or geographical parameters for recognition that provide sufficient quality of spectrum without imposing excessive constraints on the use that may be made of the band by receive-only earth stations or terrestrial services;
- the term of the RSA in case of revocation or variation;
- the basis for setting fees and the level of fees for RSA that provide sufficient incentives for spectrum efficiency;
- the conditions under which, and the process by which, RSA should be tradable and convertible into licences;
- publication of information about individual grants of RSA.

3.18 We set out our proposals for grant of RSA to receive-only earth stations in section 4 below.

Section 4

RSA for Receive-Only Earth Stations

4.1 This section sets out our proposals for the grant RSA for receive-only earth stations in response to the request from stakeholders to do so in the bands 3600 – 4200 MHz (FSS) and 1690 – 1710 MHz and 7750 – 7850 MHz (MetSat). This section is set out as follows:

- overview of RSA for receive-only earth stations:
- proposed technical and geographical parameters;
- approach to the fees for RSA;
- term of RSA
- tradability and conversion;
- publication of information;
- process for granting RSA;
- the case for introducing RSA, together with a consideration of possible alternative approaches.

Overview of RSA for receive-only earth stations

4.2 The structure of the proposed grants of RSA for receive-only earth stations would be similar to that previously used for Radio Astronomy whereby there would be a coordination zone around the receive-only earth and an agreed maximum interference level (spectrum quality benchmark, “SQB”). When an application for a new transmitter in a sharing service falls within the coordination zone of an existing RSA, then a detailed examination will be made of predicted interference levels into the receive-only earth station and the approval of the new application will be dependent on the SQB not being exceeded. Similarly, the decision on whether to grant a new RSA to a receive-only earth station would be dependent on its SQB not already being exceeded on account of transmitters that are already licensed at the time of application. These features are discussed further in the paragraphs on Technical and geographical parameters.

4.3 The main features of RSA for receive-only earth stations 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 will plan to limit the levels of licensed emissions that might interfere with a receiver and / or geographical area 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;

- legislation enables us to charge fees for RSA that reflect the economic value of the spectrum to which it relates and the factors that we propose to take into account in setting the fees are similar to those for equipment in active licensed services in the same bands. As for licences, RSA may also be made tradable and convertible into licences.

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

4.5 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 services in the bands (fixed links and BWA) etc;

Technical and geographical parameters

4.6 Given the sensitivity of receiving earth stations, it is necessary to ensure sufficient geographical and technical separation between receive-only users and transmitting equipment operating within the same frequency bands.

4.7 Currently, assignments to services sharing with licensed FSS earth stations in the 3600 – 4200 MHz band are assessed against the required Interference-to-Noise (I/N) long and short term criteria set by the registered parameters of the earth station, effectively setting a maximum acceptable interference level at the earth station. It is proposed that where a grant of RSA is made, then similar long term criteria will be used.

4.8 Within the 1690 - 1710 and 7750 - 7850 MHz bands, because the receivers are operating to non-geostationary satellites and there are no pre-existing co-ordination procedures, it is proposed that the grant of RSA be in the form of a geographic zone, within which new FS links will only be licensed after the possibility of interference to the MetSat receiver has been assessed.

4.9 The geographic area proposed in a grant of RSA to a MetSat receiver is derived from published parameters[15]. In setting the criteria for both FSS and MetSat RSA, it is necessary to balance the interests of receive-only earth stations in not suffering levels of unacceptable interference and of users in the same frequency bands, in not being subject to excessive constraints.

4.10 Listed below are the proposed parameters for use in the development of RSA for receive-only earth stations:

- frequency band;
- bandwidth;
- acceptable interference level criteria set by a typical Interference/Noise (I/N) performance; and
- degree of local mitigation accepted/provided by the applicant.

[15] ITU-R SA1027-4

4.11 The acceptable interference signal level is set as 10dB lower than the "typical" receiver noise[16] for the long term propagation conditions (prevailing for more than 20% of the time). For the baseline C Band receive-only earth station, used to derive the fees in Annex 6, the proposed noise temperature is 93 Kelvin, giving an acceptable interference level of -159dBW/MHz. This is discussed further in A6.9.

4.12 For the baseline L Band Metsat receive-only earth station, the derived proposed acceptable interference level is -156dBW/MHz for a receiver noise temperature of 186K, an assumed antenna gain towards the horizon of 10dBi and a co-ordination zone of 60km radius.

4.13 Similarly for the 7 GHz MetSat receive-only earth station the derived proposed acceptable interference level is -156dBW/MHz for a receiver noise temperature of 186K, an assumed antenna gain towards the horizon of 10dBi and a co-ordination zone of 60km radius.

Question 1: Do you agree with the list of proposed RSA parameters for assessing interference and for setting fees for receive-only earth stations? Are sufficient parameters defined for a grant of RSA? If you disagree, please give your reasons and suggest alternatives.

Fees for RSA for receive-only earth station users.

Proposed Approach

4.14 Since the proposed grant of RSA to receive-only earth stations 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. To do otherwise would risk distortions to the relative incentives and would also raise issues of equity of treatment between different groups of spectrum users.

4.15 There are two ways in which we could do this:

- set RSA fees using the same algorithms and parameters as were used to establish fee levels for current services;
- initiate a fee review for all services in this band, with the results applying both to existing services and the new RSA.

4.16 We think the former approach is more appropriate as:

- pragmatically, we're not ready to initiate and complete a comprehensive fees review. Accordingly, there would be a significant risk of delaying the introduction of RSAs and therefore postponing the benefits. Indeed, in a first come first served environment, the probability that receive-only earth station sites could have their interference environment compromised will increase with the time taken to introduce the grant of RSA. This approach would require significantly more resources to undertake than relying on existing fixed link fee benchmarks;

[16] All parameters were derived from the "average" currently licensed equipments in each relevant service held on the Ofcom data base, or in the case of MetSat receivers, published data.

- in light of the small number of expected applications for grant of RSA and the large number of fixed links in the 4 and 7.5 GHz bands, we consider that a comprehensive review of the opportunity costs would be disproportionate and impracticable for the purpose of setting AIP fees for grants of RSA in these bands;

- we do not consider that a comprehensive review of the opportunity costs would necessarily provide an appreciably better basis for fee setting, because the current FSS PES fee algorithm is related to the opportunity cost in alternative fixed link use. The issue of if and when to review existing fixed links AIP, and therefore also the RSA grants in question, will be addressed after the outcome of the SRSP.

How AIP currently applies in the bands

4.17 Since 2000, AIP has been applied to FS point-to-point links in all three bands.

4.18 Since 2001, AIP has been applied to licensed FSS earth stations, with a direct correlation between the fees charged for earth stations, with the fees charged for FS links.

4.19 AIP acts as a proxy for market prices for scarce spectrum that has been assigned administratively rather than auctioned. It promotes optimal use by ensuring that users face a signal of opportunity cost imposed on society by their use and therefore, take it into account in their business and investment decisions, just as they do for other resources that they employ, and so have incentives to use it efficiently in the provision of downstream services.

4.20 Consequently we propose that the fee structure for grant of RSA to receive-only earth stations be introduced on the basis of parity with existing PES fees.

Derivation of Proposed Fees

4.21 In considering our proposals for development of a fee structure for RSA in these bands based on parity with the existing PES fees, the starting point has been the technical parameters of existing FSS C Band (3600 - 4200 MHz paired with 5925 - 6700 MHz) licensed PESs, along with the technical parameters of the sharing FS point to point links (see Annex 6).

4.22 In order to assess the possible effect of receive-only earth stations on additional fixed services in the specified bands, a worst case long term impact area (that area where it would be difficult to assign a co-frequency fixed link) around a “typical” earth station[16] was derived by using a smooth earth model and a “typical” 4 GHz FS transmitter[16] pointing directly at the earth station receiver and an interference level of -159dBW/MHz[17].

4.23 Similar impact areas were also derived for the 1690 – 1710 MHz and the 7750 – 7850 MHz MetSat[17] receive-only earth stations.

[17] For derivation of the interference level see A6.8.

4.24 Also, in order to establish a relationship with current earth station fees (see below), the impact area of a "typical" PES at 6 GHz with respect to a typical 6 GHz FS point to point link receiver was derived.

4.25 The registered emissions in the 3600 – 4200 MHz band of existing licensed FSS earth stations are currently taken into consideration in our assignment processes by virtue of the transmit signals in the bands 5925 - 6700 MHz and the FSS earth station licence fee is directly related to the fees payable by FS point-to-point links in that band.

4.26 We have taken these existing FSS earth station fees as the basis for establishing suitable fees for FSS RSA in the bands concerned (see Annex 6 and below).

4.27 When considering the long term impact areas, the impact area on 6 GHz fixed links derived for an equivalent 6 GHz Earth station was approx 9,150km^2. The impact area on 4 GHz fixed links derived for a typical 4 GHz receive earth station was 2,320km^2. Under our current fee algorithm for FSS earth stations, the total fee for a PES is derived from an algorithm that includes a constant, a band factor, the power at the antenna flange and the bandwidth.

4.28 In order to minimise constraints on other services in the same bands, operators are encouraged to co-locate earth stations at a single site by application of a square root factor to the power and bandwidth and charging for all PESs at a site within a single algorithm[18].

4.29 Hence, in developing the appropriate fees for grant of RSA, we considered the aggregate bandwidth occupied at the six main PES sites in the UK. This varied from 478 MHz to 720 MHz and it was considered that since the maximum receive bandwidth likely to be applied for is 600 MHz (3600 – 4200 MHz), then this figure should be used in developing proposed fees.

4.30 Applying the algorithm to the typical PES and this bandwidth, taking into account the ratios of the impact areas and band factors, an algorithm for application to RSA for receive-only earth stations can be derived which consists of a constant and bandwidth (see Annex 6 for details).

4.31 This results in a proposed fee for RSA in the 3600 – 4200 MHz band of £17 per MHz and the interference level set at -159 dBW/MHz.[18]

4.32 Similarly, considering the impact areas on 1700 MHz Fixed Links of the L Band MetSat Receivers (8,559km^2) and on the 7 GHz Fixed Links of the X Band MetSat Receivers (8,592km^2) and the relative band factors in the FSS PES fees algorithm, the equivalent proposed fees for the L Band receivers would be £63/MHz for an L Band receiver with an interference level of -156dBW/MHz[18] and a co-ordination zone of 60km radius and £46/MHz for an X Band receiver with an interference level of -156dBW/MHz[18] and a co-ordination zone of radius 60km.

4.33 It is recognised that the constraint on deployment of other services imposed by a receive-only earth station can be greatly influenced by the local terrain and shielding. We propose that this should be recognised within the fee structure by taking into account the degree of local mitigation that an applicant may wish to consider in two increments of 10dB. The influence of this on the relative impact areas on other services in the specified bands can then be used to provide a reduction in the

[18] See SI 2008 No 0139 and Annex 6.

constant used in the fee algorithm. The impact of this on proposed fees for grants of RSA for typical expected bandwidths in each of the three bands is illustrated below.

4.34 Examples of the proposed fees:

BW (MHz):	2	10
No mitigation:	£500*	£626
10dB mitigation:	£500*	£500*
20dB mitigation:	£500*	£500*

1.7 GHz Fees

BW (MHz):	36	600
No mitigation:	£611	£10,178
10dB mitigation:	£500*	£5,458
20dB mitigation:	£500*	£2,645

4 GHz Fees

BW (MHz):	30	45	100
No mitigation:	£1,391	£2,087	£4,638
10dB mitigation:	£980	£1,471	£3,268
20dB mitigation:	£686	£1,028	£2,285

7 GHz Fees

*The minimum fee payable is proposed as £500

4.35 The mitigation factor can also be used to reduce licence fees where the existence of existing licensed services means that we cannot provide an acceptable performance level in part, or all, of the band applied for.

4.36 We have compared these fees with our estimates of the expected capital expenditure and operating expenditure for receive-only earth stations in order to assess the relative impact these fees are likely to have on stakeholders. We consider that the relative size of the fees is modest compared to the estimated capital and operating costs of the receive-only earth stations, so we propose to apply the full fees from the date the RSA is granted as opposed to phasing them in.

4.37 In order to encourage spectrum efficiency and to minimise impact on other spectrum users, we propose a fee structure that encourages the geographic co-location of receive-only earth stations. As the interference is the same for any number of receive-only earth stations co-located operating within the same frequency band, the fee for a grant of RSA at a given site is to be derived from the total bandwidth applied for under RSA, irrespective of the number of receive only terminals being used at the location in question. A site is to be defined as within 500m from the nominated site centre as defined by the applicant.

4.38 As with licensed earth stations, we propose that the minimum fee for RSA should be £500.

Question 2: Do you agree with the proposals for introducing fees for RSA for receive-only earth stations in the bands concerned on the basis of parity with existing PES fees (with a minimum fee of £500) and that the full fees be implemented from

the date of grant of RSA? If you disagree, please give your reasons and suggest alternatives.

Term of grant

4.39 As for the generality of licences, including those for the licensed services in the bands under consideration, we propose that RSA should be granted for a rolling term with no fixed end date but subject to a 5-year period of notice of revocation (except where necessary 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. We would welcome views from stakeholders.

Question 3: Do you agree that grants of RSA in the bands should normally be on a rolling annual basis, with a 5-year revocation period?

Tradability and conversion

4.40 As mentioned in paragraph 2.9, the WT Act empowers us to make regulations to make RSA tradable and for grants to be converted into WT licences and vice versa. We propose that, as under the current trading regulations, the parties should have a high level of flexibility to undertake transactions of various types and that it should 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;
- trade the grant of RSA for a specified period, for example if the holder did not wish to use the facility for several months a year. In this event, the spectrum could be made available to other services for the duration of the downtime.

4.41 We consider that the facility to trade grants of RSA and convert between WT licence and grants of RSA will help promote optimal use of the spectrum by enabling spectrum to be used for whichever terrestrial or satellite service is most beneficial for society. This will enable holders to trade their grant of RSA for an alternative use or existing or future earth station operators to acquire WT licences through the market if they wish to acquire a new grant or extend an existing one.

4.42 Thus we propose to allow trading and conversion of grants of RSA for receive-only earth stations under the procedure for trading as set out in the Wireless Telegraphy (Recognised Spectrum Access and Licence) (Spectrum Trading) Regulations 2009[19]. This will require the parties to notify us and to apply for our consent to the transfer.

[19] http://www.opsi.gov.uk/si/si2009/pdf/uksi_20090017_en.pdf

The Spectrum Trading and Wireless Telegraphy Register, Trading Guidance Notes[20] and statements on Simplifying Spectrum Trading[21] provide further details.

4.43 It would be for the RSA-holder in the first instance to decide whether to trade, the amount of the frequency band to offer and which alternative uses to accommodate. Once agreement is reached, current trading regulations require the parties to notify us and to apply for our consent to the transfer or conversion. We consulted last year on removing the requirement to obtain our consent and also on proposals to introduce spectrum leasing[22]. We published an interim statement on 15 April 2010 announcing our conclusion that we should proceed with our proposals[23]. We will consult further on the details of the trading regime to apply in the bands but are minded to model this on the current trading process for radio astronomy RSA as described in Annex 5.

4.44 As far as we are aware, there are no sites where multiple receive-only earth station operators have stations co-located and co-frequency on the same site. In the unlikely event that there are multiple receive-only earth station operators on a site, a free riding problem may arise, whereby each operator has an incentive to wait for another operator to pay for RSA protection and benefit from the protection for free (as RSA is a voluntary instrument). The consequence of the free-riding problem is that take up of RSA protection and trading of RSA could be substantially reduced. However, this may be deterred by the fact that any 'free-rider' would not benefit directly from the formal recognition accorded to the RSA holder, facing the prospect that if the RSA is traded or relinquished, then interference may be received in the future. Neither would a 'free-rider' benefit from the proceeds of trading.

Question 4: Do you agree that grants of RSA in the bands should be tradable and that grants of RSA and WT licences should be inter-convertible? If so, do you agree with our proposal to model the process for trading and conversion on that for RSA for radio astronomy?

Publication of information

4.45 The availability of information about spectrum holdings that are potentially 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. Publication of information about spectrum trades is required by the EU Framework Directive 2002/21/EC[24].

4.46 We publish information about assignments in the WT Register (the WTR) and information about trades in the Transfer Notification Register (the TNR)[25], including in respect of existing licences in the bands.

[20] http://www.ofcom.org.uk/radiocomms/ifi/trading/tradingguide/
[21] http://www.ofcom.org.uk/consult/condocs/simplify/
[22] http://www.ofcom.org.uk/consult/condocs/simplify/simplify.pdf
[23] http://www.ofcom.org.uk/consult/condocs/simplify/statement/

[24] See Article 9(b) of Directive 2002/21/EC, as amended by Directive 2009/140/EC.
[25] The WTR and TNR are both accessible at http://spectruminfo.ofcom.org.uk/spectrumInfo/.

4.47 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[26]. This is currently limited to information on the parties and the assignment.

4.48 Our policy is that since a grant of RSA is tradable, then information regarding the grant should be made public in line with information on tradable licences. We are currently considering the responses to a consultation on proposals to disclose information on spectrum use.[27.] As such, future disclosure of information will follow the decision resulting from that consultation.

The process for granting RSA

4.49 In considering applications for a grant of RSA to a receive-only earth station in the specified bands, we will examine the application against the existing Ofcom database of point-to-point fixed links and known BWA base stations sharing the bands, in order to assess the predicted interference to the receive-only earth station.

4.50 This assessment will be made using the criteria of geographic zones and interference levels suggested in paragraphs 4.30 - 4.32 above.

4.51 Where the predicted interference level is below the acceptable criteria, then a grant of RSA will be made and the receive-only earth station will be entered into our database and taken into account in our assignment process.

4.52 Where the predicted interference level is above the acceptable criteria, then either:

(i) a grant of RSA limited by the existing predicted interference will be made, if acceptable to the applicant, so that the receive-only earth station will be taken into account in our assignment process in the future; or

(ii) no grant will be made.

4.53 Exceptionally, where an opportunity for commercial agreement may exist, then the operator(s) of existing services will be asked if they are willing for us to give their details to the applicant for RSA.

Question 5: Do you agree with our proposed procedure for considering applications for the grant of RSA to receive-only earth stations. If you disagree, please give your reasons and suggest alternatives?

[26] See, for example, our consultation on providing spectrum information at http://www.ofcom.org.uk/consult/condocs/providing_spectrum_information/
[27] http://www.ofcom.org.uk/consult/condocs/providing_spectrum_information/

The Case for Introducing RSA

4.54 The three bands in which we are proposing to make RSAs available are ones which are also used by terrestrial services: by fixed point-to point links in all three bands and, in the case of the 3600 - 4200 MHz band, by BWA applications as well. Without a means of recognising the existence and protection requirements of the receive-only earth stations there is a risk that new assignments made to fixed links and to BWA in these bands might cause interference to the receive-only earth stations. This could seriously undermine the utility of the earth stations. Not only could this represent a serious 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 fixed link and BWA transmitters.

4.55 In general, creating the circumstances in which more services can secure their spectrum access will increase the flexibility with which spectrum can be used – and 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 the sites of which we are aware reflect high value receive-only earth station sites (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.

The implications for other spectrum users of granting RSA to receive-only earth stations

4.56 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 RSAs has the potential to reduce the remaining pool of spectrum / locations available for new fixed link licenses and, in the 3600 – 4200 MHZ band, for new BWA deployments. As a consequence of opening up access of a band to new services, it is likely that the existing services will see an increase in competition for the same spectrum resource; but this is efficient, provided there are appropriate incentives in place for all users to promote efficient use of spectrum (as is the case with AIP based fees). In practice, we expect that the impact on fixed links and BWA will be low, as the number of receive-only earth station sites is expected to be low. (see 4.64, 4.67 and 4.69).

4.57 The specific ways in which bands covered by this consultation are shared by other services is explored further below.

3600 - 4200 MHz

4.58 In this band, satellite services have historically shared with terrestrial point-to-point links in the fixed service. Latterly, Broadband Wireless Access (BWA) has also been introduced with a BWA operator holding a national licence for 2x84 MHz of the band and the BWA base stations required to co-ordinate with existing licensed FSS and FS receivers in the band.

4.59 With the increasing demand for spectrum, as new applications come to market in the bands under consideration, it is likely that receive-only earth stations, about which we

lack information, will be subject to a higher risk of interference. In particular, the opening up of the 3600 - 3800 MHz band by the European Commission for terrestrial systems capable of providing electronic communications services from [January 2012], without prejudice to existing services in the bands, makes it likely that the band will be used more intensively by terrestrial services such as BWA applications. This, along with the introduction of mobility to the existing BWA licence in the band has led some FSS stakeholders to express concern that their services may be impacted. RSA offers a way to ensure that in future, before they are licensed / deployed, terrestrial services will be co-ordinated with those receive-only earth stations subject to a grant of RSA.

4.60 There are currently some 100 licensed Permanent Earth Stations at some 28 sites in the UK. As far as we are aware, it is unlikely that there will be more than 20 requests for grants of RSA receive-only earth stations in the band 3600 – 4200 MHz, mainly located in rural areas. The operators managing the majority of these sites are expected to request grants of RSA for less than 10 MHz, though we are aware of two sites that may request a grant for the full 600MHz.

4.61 This should not impact on current deployments of fixed links in the band, as the majority of deployments are in the Highlands and Islands. Future assignments will still be on a 'first come first served' basis, and as such, grants of RSA in the band will be treated in the same manner as existing PESs.

4.62 The BWA operator in this band is already aware of the two sites whose operator may apply for a grant across the whole band. Grants of RSA will have no impact on existing deployment of BWA. The impact on future deployments will be equivalent to that which would be imposed by the licensing of new earth stations on a first come first served basis. In light of the locations of those receive-earth stations, of which we have been made aware, we believe that impact on deployment of BWA will be minimal.

4.63 The expected low take up of RSA in the band and the limited bandwidth of the majority of the expected users leads us to believe that, in practice, there will be little additional constraint on the existing or potential users.

1690 - 1710 and 7750 - 7850 MHz

4.64 As well as MetSat, these bands are also used by the FS for point-to-point links. FS links in the 1690 – 1710 MHz band are restricted to a specific operator in a closed band, are few in number and are used mainly in rural areas away from the known locations of possible grants of RSA to receive-only earth station sites. The 7.5 GHz fixed link band has a large well established nation-wide community of terrestrial point-to-point users and is currently the most popular band below 10 GHz for higher capacity fixed links.

4.65 We are only aware of three sites in the specified bands that are likely to request protection, located in Devon, Dumfries and Galloway, and Angus. The main site is currently in Devon and there is expected to be a requirement for some 100 MHz of bandwidth at that site.

4.66 The introduction of RSA for receive-only earth stations in the specified bands could impose constraints on the deployment of other services in those areas neighbouring receive-only earth stations. For example, the potential impact extends to a 60km radius per RSA site for the 7.5 GHz band.

4.67 In structuring our proposals for technical and geographical parameters, we have carefully considered the other services that are provided in the same bands. Provided that we set the fee payable by the holders of a grant of RSA at the appropriate level to reflect the opportunity cost associated with receive-only earth stations and provide for trading, the mix of FSS and other services in the band at a particular time 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.

Alternatives to granting RSA

4.68 We have considered whether the introduction of RSA would be the most proportionate approach for allowing us to take into account receive-only earth stations in our assignment process. The alternative to granting RSA would be to create a registration scheme. However, we consider that this is less desirable than RSA for the following reasons:

- a registration scheme would not provide stakeholders with the level of comfort that would come with the statutory obligation on us under the WT Act to take account of the use of radio frequencies by the holders of grants of RSA on a comparable basis to a licensed use [28];
- RSA, unlike a registration scheme, would enable the possibility of trading, as well as the conversion of grants of RSA into licences and vice versa. As explained above,(paragraph 4.41) we consider that the facility to trade grants of RSA and convert between licences and grants of RSA will help promote optimal use of the spectrum ;
- RSA, unlike a registration scheme, would enable us to signal the opportunity cost of spectrum by charging fees based on AIP (paragraphs 4.14– 4.20). Not only is this conducive to promotion of efficient spectrum use, but the absence of AIP based fees on receive-only earth stations using a registration scheme would create an imbalance, which we think would be undesirable, between the position of terrestrial microwave services or BWA and the registered receive-only earth stations, in that the former would pay AIP based fees and the latter wouldn't.
- if we were to create a registration scheme, we would still have to do the same work to implement a registration scheme, as the work required to introduce RSA, in order to create the technical conditions and modify our systems to take account of registered receive-only earth stations. All that a registration scheme would save in terms of Ofcom's resources is the work of creating and issuing the documents relating to the grants of RSA, which we estimate will be relatively low. Therefore, in terms of Ofcom's resources, a registration scheme would not be much more cost effective than RSA.

[28] Section 20 of the WT Act.

4.69 We also believe that the formal recognition of receive-only earth stations through the introduction grants of RSA with fees based on parity with PES fees is a proportionate measure (and is our preferred option) as:

- we are responding to requests from operators for the introduction of a mechanism to take into account receive-only earth stations in our assignment process;
- we estimate that the administrative cost of introduction RSAs will be low (no more than £10K) relative to the value which receive only earth station operators are likely to place on holding a grant of RSA, which we assume must be more than the AIP based fees that they would pay for holding a grant of RSA[29]; and
- application of AIP and allowing trading of RSAs will incentivise efficient use of the spectrum.

4.70 Therefore, subject to consultation, we consider that it would be appropriate for us to introduce of grants of RSA for the use of receive-only earth stations in these bands as this is likely to promote optimal use of spectrum by facilitating the co-ordination of different uses of spectrum in the same frequency bands.

Question 6: Do you agree that RSA for receive-only earth stations could provide greater security against interference and help promote optimal use of the 1690 - 1710, 3600 - 4200 and 7750 - 7850 MHz bands? If not, please explain why and describe any alternative mechanism that you consider to be necessary.

[29] Which, by definition, must be more than the fees that they would pay for holding RSAs.

Section 5

Provisional Timetable and Next Steps

Next steps

5.1 The indicative timetable of next steps is as follows:

Activity	Period
Deadline for receipt of responses	16 September 2010
Publication of statement	Q4: 2010
Consultation on draft regulations	Q4: 2010 / Q1: 2011
RSA regulations enter into force Introduction of RSA for receive-only earth station RSA	Q1: 2011 / Q2: 2011

5.2 We will consider the responses to this document and aim to publish a statement with our conclusions by November 2010.

5.3 If, subject to this consultation, we decide to proceed with the introduction of RSA for receive only earth stations in these bands, we will then hold a statutory consultation on proposed regulations necessary to give effect to the policy proposals set out in this document or as amended by the consultation.

5.4 At present, we expect that the necessary regulations in respect of RSA for receive-only earth stations would be made and come into force within 6 months of the publication of the final statement.

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 16th September 2010**.

A1.2 Ofcom strongly prefers to receive responses using the online web form at http://stakeholders.ofcom.org.uk/consultations/rsa-roes/, 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 RSAconsult@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.

SPG Space Services
Floor 03, PP 3.D
Authorisation, Products and Governance
Riverside House
2A Southwark Bridge Road
London SE1 9HA

Fax: 02079 813208

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 at Annex 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 John Rogers on 02079 813078.

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 in November 2010

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 Vicki Nash, Director Scotland, who is Ofcom's consultation champion:

Vicki Nash
Ofcom
Sutherland House
149 St. Vincent Street
Glasgow G2 5NW

Tel: 0141 229 7401
Fax: 0141 229 7433

Email vicki.nash@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

Consultation questions

Technical and geographical parameters

Question 1: Do you agree with the list of proposed RSA parameters for assessing interference and for setting fees for receive-only earth stations? Are sufficient parameters defined for a grant of RSA? If you disagree, please give your reasons and suggest alternatives.

Fees for RSA

Question 2: Do you agree with the proposals for introducing fees for RSA for receive-only earth stations in the bands concerned on the basis of parity with existing PES fees (with a minimum fee of £500) and that the full fees be implemented from the date of grant of RSA? If you disagree, please give your reasons and suggest alternatives.

Term of grant

Question 3: Do you agree that grants of RSA in the bands should normally be on a rolling annual basis, with a 5-year revocation period?

Tradability and conversion

Question 4: Do you agree that grants of RSA in the bands should be tradable and that grants of RSA and WT licences should be inter-convertible? If so, do you agree with our proposal to model the process for trading and conversion on that for RSA for radio astronomy?

The process for granting RSA

Question 5: Do you agree with our proposed procedure for considering applications for the grant of RSA to receive-only earth stations. If you disagree, please give your reasons and suggest alternatives?

The Case for Introducing RSA

Question 6: Do you agree that RSA for receive-only earth stations could provide greater security against interference and help promote optimal use of the 1690 - 1710, 3600 - 4200 and 7750 - 7850 MHz bands? If not, please explain why and describe any alternative mechanism that you consider to be necessary.

Annex 5

Trading and Conversion

A5.1 Trading of grants of RSA for Radio Astronomy and their conversion into licences (and vice versa) are subject to the Wireless Telegraphy (Recognised Spectrum Access and Licence) (Spectrum Trading) Regulations 2009[30]. Subject to consultation, we propose that similar rules may be applied to trading and conversion of grants of RSA for receive-only earth stations.

A5.2 Our proposed regulations would provide for rights and obligations under a WT licence to have effect as if they were rights and obligations under a grant of RSA and rights and obligations under a grant of RSA as if they were rights and obligations under a licence if the original holder so notifies Ofcom. This would provide the mechanism for RSA to be transferred into a WT licence and vice versa. In the course of this process, certain terms and conditions might need to be amended, removed or added to take account of differences between grants of RSA and licences. For example, in the case of transfer from a grant of RSA for a passive service such as receive-only earth stations to a licence for an active service, it will be necessary to adapt the technical terms and conditions. This will be done in accordance with our usual planning criteria so as to avoid unacceptable interference. We would propose to create a new licence product for licences formed by conversion of RSA.

Enacting the transfer

A5.3 Regulations would require us to decide whether to consent to the transfer and whether to issue directions under regulation and then to notify the parties.

Time taken for decisions

A5.4 The regulations would probably not include deadlines requiring us to decide whether or not to consent to a transfer. We consider that a rigid deadline would be inappropriate as we consider it is important to provide flexibility for us to satisfy ourselves that our decisions are well-considered and justified.

A5.5 Nonetheless, we recognise that it is important that our decisions are timely. Consequently, we have published guidelines on the trading process that include targets for the time taken to consent (or not) to a trade and these will apply in respect of trades under the trading regulations that we would propose (and consult upon), should we introduce tradable grants of RSA for receive-only earth stations. We currently aim to complete trades within 42 calendar days.

The transfer process

A5.6 In order to effect a transfer, the RSA or licence will need to be surrendered. In the case of an outright transfer, we will then grant a new RSA or licence on the same terms and conditions to the transferee. In the case of a partial transfer Ofcom will make new grants of RSA or licences to the transferee and the transferor that contain the appropriate terms and conditions to effect the partial transfer. In the

[30] See http://www.opsi.gov.uk/si/si2009/uksi_20090017_en_1.

case of a concurrent transfer, we will also issue replacement RSA or licence to both the transferor and the transferee.

Proposed extension of the Transfer Notification Register

A5.7 In line with Regulation 6(2) of the Wireless Telegraphy (Recognised Spectrum Access and Licence) (Spectrum Trading) Regulations 2009, we would be required to publish details of trades of RSA or WT licences.

A5.8 As for trades under the current regulations on trading WT licences, we will do this in the Transfer Notification Register (TNR), which is published on our website. Once the transfer has been effected, we will update the TNR to indicate that the transfer is completed.

Annex 6

Derivation of Fees

A6.1 Currently, licensed permanent earth stations (PES) in the FSS are charged a fee based on Administrative Incentive Pricing and related to the fees charged for fixed service point-to-point links in the same bands. This fee algorithm is designed for use across all of the FSS licensed bands in the UK, namely:

- 5725 – 7075 MHz Earth to space paired with the 3600 – 4200 MHz space to Earth bands;
- 12.75 – 13.25 GHz and 13.75 – 14.5 GHz Earth to space bands paired with the 10.7 – 12.75 GHz space to Earth bands;
- Parts of the 27.5 – 30 GHz Earth to space bands paired with the 17.7 - 20.2 GHz space to Earth bands.

A6.2 The algorithm used and other factors are published in UK Statutory Instruments 2008 No. 139 and 2009 No. 66.

A6.3 The fee is calculated taking into account the input power, accessible bandwidth, frequency band and a constant value. The minimum fee payable for a licence is £500.

$$AS = \sum_{bands} \left[28 \times BF_{band} \times \sqrt{\sum_{paths_{band}} \left(P_{path} \times BW_{path} \right)} \right]$$

Where:

- *AS = appropriate sum;*
- *P= power at the antenna flange in watts*
- *BW = bandwidth in MHz;*
- *BF = band factor, according to the table below*

A6.4 The square root is to encourage multiple use of single sites thereby reducing the impact on shared services e.g. for 2 antennas at a single site, the fee is approximately 1.4 x the single antenna fee.

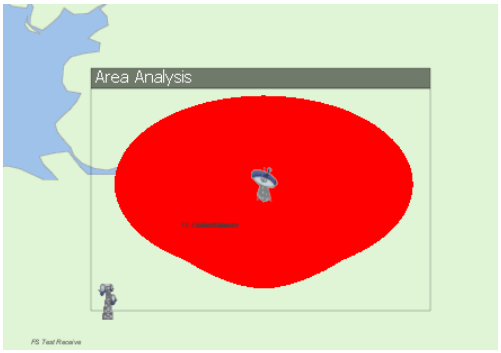
BAND FACTOR

Band	***Range of Frequency band (fb) (in GHz)***	***Band Factor***
1	fb<5	2.33
2	5 ≤ fb < 10	1.72
3	10 ≤ fb < 16	1
4	16 ≤ fb< 24	0.7
5	fb ≥ 24	0.6

A6.5 In section 4, we consider the various relationships between the maximum impact areas for typical transmit and receive earths stations and the sharing fixed links in the 4 and 6 GHz bands. These impact areas are estimated by deriving the area where a fixed link operating co-channel, and pointing directly at the earth station, would be unable to successfully co-ordinate with the earth station in a smooth earth environment.

A6.6 Examples of the derived areas for the 4 GHz (receive) and 6 GHz (transmit) earth stations are shown below:

Impact of 4 GHz Earth station on FS Links



Impact of 6 GHz Earth station on FS Links

A6.7 The impact area on a typical fixed link in the 6 GHz band, of a typical 6 GHz transmit earth station, with a 9m dish and an uplink E.I.R.P. of 81dBW in 36 MHz, is some 9150km^2.

A6.8 Similarly the impact area on a typical fixed link in the 4 GHz band, of a typical 4 GHz receive earth station, again with a 9m dish and a receive temperature of 93Kelvins, is some 2320km^2.

A6.9 The receive temperature of 93K equates to a receive noise level of -148.9dBW/MHz and this leads to an interference level of -159dBW/MHz being suggested for the benchmark RSA.

A6.10 The "typical" parameters used were the mean parameters for the equipment concerned registered in the Ofcom licence database. It is recognised that some receive-only earth stations may have a lower noise temperature than that used in our initial analysis. A sensitivity analysis shows that the impact area for a receiver noise temperature of 60K is 2577km^2. Since this is a 10% variation in the impacted area, it raises the question of whether the fees should be set by a more sensitive receive-only earth station than the average.

A6.11 The fee for the typical" earth station concerned can be derived from the fee algorithm "in section A6.3. The gain of the 9m dish is 53 dBi, which gives an antenna flange power of 28dBW (631 watts).

A6.12 As discussed in 4.46, analysis of currently licensed earth stations in the 6 GHz band reveals that a reasonable approximation of the total transmit bandwidth at large sites (i.e. multiple stations transmitting to different satellites) is 600 MHz. Hence we use this figure as the baseline figure for bandwidth in the RSA fee algorithm. Other bandwidths are derived by linear interpolation from this baseline figure.

A6.13 Thus the fee at 6 GHz for a typical earth station with 600 MHz of spectrum is:

$$AS = 28 \times 1.72 \times \sqrt{631 \times 600} = £29{,}633$$

A6.14 This fee of £29,633 (or £49/MHz) allows the operator to transmit at the power and in the bandwidth notified and also provides that the commensurate receive bandwidth be taken into account in our assignment procedures.

A6.15 In considering what should be the equivalent charge for a grant of RSA to a receive-only earth station, it is possible to relate the respective impact areas for the transmit and receive earth stations and also to take into account the different band factors according to the following formula:

$$AS_4 = AS_6 \times \frac{a_4}{a_6} \times \frac{fb_4}{fb_6}$$

Where

AS_4, AS_6 = *appropriate sum for the 4 GHz and 6 GHz bands*

a_4, a_6 = *impact areas of the 4 GHz and 6 GHz bands*

fb_4, fb_6 = *band factors of the 4 GHz and 6 GHz bands*

A6.16 The impact area at 6 GHz is found to be 9,150km^2, and the impact area at 4 GHz is found to be 2,320km^2. Using these values and the appropriate band factors from the above table, we have:

$$AS_4 = £49 \times \frac{2320}{9150} \times \frac{2.33}{1.72} = £17/MHz$$

A6.17 Hence the proposed fee for RSA for a receive-only earth station in the band 3600 MHz – 4200 MHz is £17/MHz.

A6.18 For the MetSat receive-only terminals in the 1.7 GHz band a similar assessment was made of the impact area on 1.7 GHz fixed links and the area was found to be 8,559km2. It is proposed that the fee for this band be similarly derived from the 6 GHz fee by adjusting it according to the ratio of areas and band factors:

$$AS_{1.7} = £49 \times \frac{8559}{9150} \times \frac{2.33}{1.72} \times = £63/MHz$$

A6.19 Similarly for the MetSat receive-only terminals in the 7 GHz band, the impact area is 8,592km^2 and the fee is derived as:

$$AS = £49 \times \frac{8592}{9150} \times \frac{1.72}{1.72} = £46/\mathrm{MHz}$$

A6.20 A summary of the fee calculations for all bands is given below:

Band	Area (km^2)	Ratio of areas	Band factor	Ratio of band factors	RSA Fee/MHz
6 GHz (baseline)	9,150	1.00	1.72	1.00	£49
1.7 GHz	8,559	0.94	2.33	1.35	£63
4 GHz	2,320	0.25	2.33	1.35	£17
7 GHz	8,592	0.94	1.72	1.00	£46

A6.21 In order to allow a degree of flexibility to receive-only operators, and to encourage greater spectral efficiency, assessments were also made of the effect of 10dB and 20dB shielding on the reduction in impact areas in all three bands. The following results were obtained:

	Impact area (km^2)		
Mitigation:	None	10dB	20dB
1.7 GHz:	8,559	5,036	2,615
4 GHz:	2,320	1,244	603
7 GHz:	8,592	6,055	4,234

A6.22 The corresponding fees with mitigation applied are as follows:

	Fee/MHz		
Mitigation:	**None**	**10dB**	**20dB**
1.7 GHz:	£63	£37	£19
4 GHz:	£17	£9	£4
7 GHz:	£46	£33	£23

A6.23 The benefit of this can clearly be seen in the case of a receive-only terminal applying for RSA across the entire 3600 – 4200 MHz band. If no mitigation (shielding) exists, then the fee would be £10,200. With 10 dB of shielding, this would reduce to £5,400 and with 20dB, £2,400.

A6.24 A summary of calculated fees for typical channel bandwidths in each of the three bands are given below:

BW (MHz):	2	10
No mitigation:	£500*	£626
10dB mitigation:	£500*	£500*
20dB mitigation:	£500*	£500*

1.7 GHz fees

BW (MHz):	36	600
No mitigation:	£612	£10,200
10dB mitigation:	£500*	£5,400
20dB mitigation:	£500*	£2,400

4GHz fees

BW (MHz):	30	45	100
No mitigation:	£1,391	£2,087	£4,638
10dB mitigation:	£980	£1,471	£3,268
20dB mitigation:	£686	£1,028	£2,285

7GHz fees

* The minimum fee payable for a licence is £500.

Annex 7

Cost Benefit Analysis

A7.1 This Annex summarises the costs and benefits arising under each option we have considered on whether or not to introduce RSA, the appropriate level of fees, and whether or not to make grants of RSA tradable and convertible.

Option	Benefits	Costs/risks
Status quo	No costs to Ofcom	It would prove more difficult for us to consider receive-only earth station users in our assignment process as we would lack information about the location and operation of these stations.
Introduce voluntary registration scheme	Receive-only earth station users would benefit from greater recognition of their spectrum usage.	Receive-only earth station users would not have an incentive to use spectrum efficiently and consequently the value to society from spectrum usage would not be maximised. Receive-only earth station users would not benefit from a formal recognition of their spectrum use under section 20 of the WT Act.
Introduce RSA	Receive-only earth station users would benefit from more formal recognition of their spectrum usage under s. 20 of the WT Act and would therefore be subject to a reduced risk of interference. We could apply AIP and facilitate trading to incentivise RSA holders to use spectrum more efficiently so that the value generated by spectrum usage can be maximised.	The administrative costs of introducing RSA are likely to be small as we already have RSA in place for radio astronomy. The additional co-ordination work created by the introduction of RSA should cost no more than £10k to implement.

Appropriate level of AIP-based fees for grants of RSA

Option	Benefits	Costs/risks
Charge fees based on parity with current PES fees	RSA holders would have an incentive to use spectrum efficiently and release spectrum to alternative users who place a higher value on access to the spectrum which would lead to higher value being created for society.	There is some risk of misalignment with actual underlying costs, to the same extant as any existing misalignment of PES fees.
Charge fees based on full AIP review	Fees may better reflect the underlying opportunity cost if these have changed substantially since our last review in 2007.	A full review of opportunity cost would cause the grant of RSA to be delayed so the receive-only earth station users would not be able to benefit from the introduction of RSA until the AIP review is complete. A full review of AIP would also involve significant administrative costs to Ofcom.

Trading and convertibility of grants of RSA

Option	Benefits	Costs/risks
Do not make grants of RSA tradable and convertible	There will be some administrative costs associated with trade, but we believe these to be negligible.	If RSA is not tradable then mutually beneficial trades which benefit society will not be possible and the benefits to society from usage of the spectrum will not be maximised.
Make grants of RSA tradable and convertible	Where trades occur they will transfer the spectrum from to a user who places a higher value on the spectrum so that the benefits to society from spectrum usage will be increased.	Administrative costs are likely to be negligible as the WNR and TNR are already in place for RSA for radio astronomy.

Annex 8

Sample RSA Grant and Schedule

Wireless Telegraphy Act 2006

Notification of RECOGNISED SPEC
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	
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

XX

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

RSA Term

2. This grant of RSA shall commence on X, XX, 20XX 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

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;

a. on or before the date of this RSA; and
b. 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 level of interference, arising from other authorised users who operate within the recognised frequencies and in geographical areas identified in Schedule 1, is set out in column 5 of Schedule 1 (the “Spectrum Quality Benchmark 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. which operate using a frequency band and transmit from within a Co-ordination zone described in Schedule 1,
    b. 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 benchmark level set out in 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 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

Site Name	Recognised location of wireless telegraphy use (NGR)	Co-ordination zone		Spectrum quality benchmark level (SQB) (I/N)	Recognised frequencies		
			Radius (km)		From	To	GHz/MHz

Annex 9

Glossary

AIP	Administered incentive pricing. A fee charged to users of the spectrum to encourage them to make economically efficient use of their spectrum
Allocation	The process of identifying specific frequency ranges for specific applications; or a frequency band entered in a table of frequency allocations, for use by a particular category of service
Assignment	Authorisation given by a licensing authority for a radio station to use a specific radio frequency or channel under specified conditions
BSS	Broadcasting Satellite Service: A radiocommunication service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public
BWA	Broadband Wireless Access
Band	A defined range of frequencies that may be allocated for a particular radio service, or shared between radio services
C Band	The approximate portion of the electromagnetic spectrum in the frequency range from 3 GHz to 7 GHz
Cave Review	Review of Radio Spectrum Management, by Professor Martin Cave, published March 2002
Co-ordination	This term refers to the process under which a new user seeks the agreement of existing users to share access to a particular range of frequencies while avoiding harmful interference
dB	Decibel
dBW	Decibels relative to 1 watt
EU	European Union: Collective of European Member States
Earth Exploration Satellite Service	A satellite 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
Earth Station	A station located either on the earths surface or within the major portion of the earths atmosphere and intended for communication with one or more space stations

Formal Recognition	By "formal recognition" we mean the specific statutory obligation on us under section 20(2) of the Wireless Telegraphy Act 2006 to take grants of RSA into consideration in carrying out the functions specified in section 20(1) of the same Act
FS	Fixed Service: point-to-point radio links used for telecommunications. Typically the FS shares bands with the FSS
FSS	Fixed Satellite Services: A satellite system, where the ground or earth station is fixed during transmission and/or reception
GHz	Gigahertz: a unit of frequency equal to 1,000 million (1×10^9) Hz or cycles per second
Geostationary Satellite	A satellite whose circular and direct orbit lies in the plane of the Earth's equator and which thus remains fixed relative to the Earth's surface
I/N	Interference to noise ratio, usually expressed in decibels
Impact Factor	A measure of the constraints on deployment on transmitting or receiving equipment as a result of avoiding interference from or to other equipment
Interference	The effect of unwanted signals upon the reception of a wanted signal in a radio system, resulting in degradation of performance, misinterpretation or loss of information compared with that which would have been received in the absence of the unwanted signal
kHz	Kilohertz: a unit of frequency, equal to 1000 (1×10^3) Hz or cycles per second
L Band	The approximate portion of the electromagnetic spectrum in the frequency range from 1 GHz to 2 GHz
Liberalisation	Allowing licence holders to change the use to which they put their spectrum, within constraints to prevent interference
MHz	Megahertz: a unit of frequency equal to 1,000,000 (1×10^6) Hz or cycles per second
MSS	Mobile Satellite Service: a radiocommunication service between mobile earth stations and satellites
MetSat	Meteorological Satellite Service: A use of the Earth Observation satellite service for meteorological purposes
NGR	National Grid Reference
Ofcom	Office of Communications. Ofcom took over the RA's responsibility for spectrum management in the UK in December 2003

Permanent Earth Station	A fixed station on the Earth for transmission to or reception from a satellite (space station). E.g. FSS links
Primary	This is a term used to indicate that a frequency allocation for a particular service has priority over other services in the same band. It is quite frequent to have several services that are 'co-primary' (e.g. fixed and mobile) where both services have equal priority. See paragraphs 5.23 to 5.33 of the ITU Radio Regulations
RA	The Radiocommunications Agency: a former executive agency of the Department of Trade and Industry (now Department for Business Innovation & Skills), which was responsible for the management of most non-military spectrum in the UK and for representing the UK in relevant international bodies. The RA's functions transferred to Ofcom in December 2003
RIA	Regulatory Impact Assessment: A process undertaken by policy makers to show why a particular decision was made
RNSS	Radio Navigation Satellite Service
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 a Licence Exemption
Radio Spectrum	A section of frequencies of electromagnetic radiation in the range of approximately 10 kHz to 3000 GHz
Radiocommunication service	A service involving the transmission, emission, and/or reception of radio waves for specific telecommunication purposes
Receive-only Services	This refers to satellite earth stations which receive a signal but do not transmit. This includes earth observation services/MetSat and broadcast TV services
SRSP	Ofcom's Strategic Review of Spectrum Pricing
Safety of Life Services	A Radiocommunications service primarily intended for emergency, distress, urgency and safety communication reasons
Secondary	This term is defined in paragraphs 5.28 to 5.31 of the ITU Radio Regulations. Stations of a secondary service shall not cause harmful interference to primary services or claim protection from harmful interference from primary services. See 'Primary'
Space Station	A station that is located on an object which is beyond the major portion of the earth's atmosphere
Spectrum trading	Process through which spectrum licence holders are able to transfer some or all of their rights to a third party

Station	One or more transmitters or receivers or a combinations of transmitters and receivers, necessary at one location for carrying on a radiocommunication service
Transportable Earth Station	A transportable station on the Earth for transmission to or reception from a satellite (space station). E.g. satellite links for news gathering
Terrestrial	Terrestrial radio service: any radio service other than a space service or radio astronomy
Undue Interference	Interference with any wireless telegraphy that is harmful, as provided by section 115(4) of the WT Act. This includes interference that creates dangers or risks of dangers to the functioning of any radiocommunications service designed for the purposes of navigation or safety services, or if the interference degrades, obstructs or repeatedly interrupts authorised broadcasting or other wireless telegraphy
VSAT	Very Small Aperture Terminal: A network of small earth stations typically used by businesses for transaction data or for rural internet access
Wi-MAX	Worldwide Interoperability for Microwave Access – a technology standard used for broadband wireless access
WT Act licences	Licences issued under the Wireless Telegraphy Act 1949 (as amended) or under the Wireless Telegraphy Act 2006 (which has repealed the WT Act 1949)
Wireless Telegraphy	The means of sending information without the use of a wired system
X Band	The approximate portion of the electromagnetic spectrum in the frequency range from 7 GHz to 12 GHz